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1. INTRODUCTION, MAJOR FINDINGS AND RECOMMENDATIONS

In July of each year, the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce usually publishes estimates of the national income and product accounts revised on the basis of more complete and up-to-date statistics than are available earlier. However, the revisions of July 1974 were different in that revisions of certain components of the GNP were unusually large. Of these, perhaps the most important were modified estimates of inventory investment during 1973 and early 1974. According to the revisions it appeared that business had accumulated substantially more inventory than had been apparent from preliminary figures. In 1973, for example, the estimated rise in inventories held by nonfarm businesses was \$11.4 billion rather than the \$7.3 billion published previously, and in the first quarter of 1974 the increase in stocks was estimated at an annual rate of \$13.1 billion rather than the \$5 billion published just a few months earlier.

The Commerce Department is the primary compiler of inventory statistics. The Bureau of the Census has responsibility for gathering monthly and annual data from businesses on book values of inventories in manufacturing, merchant wholesaling and retail trade. End-of-year or benchmark-type statistics are collected through special annual surveys and quinquennial censuses. The Census Bureau figures are adjusted by BEA, through an elaborate set of calculations, in order to measure changes in business inventories for the national income and product accounts. A large portion of BEA's extensive July 1974 inventory revision reflected modifications made by the Census Bureau of their original inventory data estimates for manufacturing and retail trade. But the changes also reflected other considerations and the extent of the revisions caused considerable concern among economists. Double-digit inflation led BEA to make adjustments of unprecedented size in the Census book value figures in order to estimate inventory change in accordance with concepts used in the GNP.

A common way of judging whether stocks are too high or too low is to compare them with sales in the light of past performance. When the level of nonfarm stocks at the end of March 1974 was compared to final sales in the first quarter of 1974, before the July 1974 revision, the ratio appeared about average gauged by post-World War II experience. However, by this standard, the same ratio appeared to be distinctly high after the revision. Whether the large difference contributed in any way to the severe liquidation of inventories that occurred in the winter of 1974-75 is unknown. But the new evaluation of inventories was disconcerting coming shortly after a majority

of economists, both private and Government, had predicted that the economy would recover from the downturn of late-1973, early-1974 caused by the Arab oil embargo and the quadrupling of imported crude oil prices. The need for the revision raised serious questions about the reliability of Federal Government statistics used to gauge developments in the domestic economy.

IMPORTANCE OF INVENTORY DATA

Inventory data collected by the Federal Government are important in compilation of broader statistics on performance of the economy and in formulation of business and public policies. The Bureau of Economic Analysis uses them for estimating the GNP; businesses have a special interest in the level and change in inventories within their own industries and in the behavior of inventories in relation to sales. Economists have a special interest in the quality of inventory statistics. Besides being indicators of fluctuations in the economy and in individual industries, good quality statistics are needed for testing hypotheses that attempt to explain inventory behavior. Obviously statistics of acceptable quality are insufficient alone for this purpose; good theories also are needed. At the level of the individual firm, regulatory agencies such as the Securities and Exchange Commission require each registered corporation filing annual and quarterly reports with the Commission to report inventories as an aid to financial analysts and to individual investors attempting to evaluate the financial condition of corporations.

Among all these uses of inventory data it is inventory in the aggregate that is most important. Government policymakers, business executives and private forecasters all look at aggregate inventory statistics as an aid in evaluating the current state of the economy and in making judgments about and forecasts of the future course of economic activity.

The importance of inventory change in overall fluctuations of the economy can be observed in table 1.1. First, the table shows the change in real GNP (GNP in constant 1972 prices) from each business cycle peak to its following business cycle trough. This change is then compared with the change in inventory investment over the same period. It is quite clear from the table that declines in inventory investment account for either all or very large fractions of declines in GNP. Declines in excess of the decline in GNP are found in 1948-49 and in 1960; for the other four recessions, declines in inventory in-

Table 1.1. GNP AND CHANGE IN BUSINESS INVENTORIES (CBI) AT BUSINESS CYCLE PEAKS AND TROUGHS AND EARLY EXPANSION STAGES

(Billions of 1972 dollars, seasonally adjusted at annual rates)

Item	Peak		Trough		4 quarters after trough (t + 4)		Change	
	Date of peak	Value	Date of trough	Value	Date	Value	Peak to trough	Trough to t + 4
GNP.....	4th quarter 1948	495.9	2nd quarter 1949	488.9	2nd quarter 1950	525.1	-7.0	36.2
CBI.....	4th quarter 1948	5.3	2nd quarter 1949	-7.1	2nd quarter 1950	7.7	-12.4	14.8
GNP.....	2nd quarter 1953	626.2	2nd quarter 1954	605.6	2nd quarter 1955	650.8	-20.6	45.2
CBI.....	2nd quarter 1953	5.1	2nd quarter 1954	-4.1	2nd quarter 1955	8.0	-9.2	12.1
GNP.....	3rd quarter 1957	685.6	1st quarter 1958	663.4	1st quarter 1959	710.7	-22.2	47.3
CBI.....	3rd quarter 1957	3.7	1st quarter 1958	-6.8	1st quarter 1959	5.0	-10.5	11.8
GNP.....	1st quarter 1960	740.7	4th quarter 1960	731.9	4th quarter 1961	776.9	8.8	45.0
CBI.....	1st quarter 1960	13.5	4th quarter 1960	-3.9	4th quarter 1961	6.7	-17.4	10.6
GNP.....	3rd quarter 1969	1,083.4	4th quarter 1970	1,071.4	4th quarter 1971	1,120.5	-12.0	49.1
CBI.....	3rd quarter 1969	13.4	4th quarter 1970	3.3	4th quarter 1971	3.7	-10.1	0.4
GNP.....	4th quarter 1973	1,242.6	1st quarter 1975	1,169.8	1st quarter 1976	1,256.0	-72.8	86.2
CBI.....	4th quarter 1973	25.4	1st quarter 1975	-20.0	1st quarter 1976	9.7	-45.4	29.7

Source: Peaks and troughs derived by the National Bureau of Economic Research; Bureau of Economic Analysis, the National Income and Product Accounts of the United States 1929-74, and July issues of the Survey of Current Business.

vestment ranged from 45 percent of the 1953-54 GNP decline to 84 percent of the 1969-70 GNP decline.

Changes in inventory investment also account for large fractions of the rise in total output in the early phases of expansions. Measuring the early expansion phase by the first four quarters of rising GNP, shows that increases in inventory investment accounted for 23 to 46 percent of rises in GNP in five of the six postwar expansions. The exception was the expansion following the recession that ended in the fourth quarter of 1970, when inventory investment increased very little during the first year of the overall rise.

To say that changes in inventory investment "accounted for" a large part of changes in total output does not mean that changes in inventory investment were the cause of changes in GNP. Although economists still do not agree on the causes of recessions, the prevalent view for much of the post-World War II period has been that fluctuations in inventory investment are a principal endogenous force in American business cycles. The authors of this report are not directly concerned with testing hypotheses regarding business cycles and the role of inventory investment in them. It is sufficient to note the magnitude of changes in inventory investment during contractions and expansions.

DIFFICULTIES OF MEASUREMENT

Just as there is no doubt about the importance of inventory statistics, there also is little doubt that of all economic statistics measured in dollar terms, inventories are among the most trouble-

some. This is true of any stock figure expressed in prices of different time periods. It is especially true of inventories because businesses may use different methods to value their inventories under what accountants call "generally accepted accounting principles." Use of different cost valuations, like FIFO, average cost or LIFO, is one aspect of this problem; the various ways overhead costs can be treated are another. Within a firm, valuation methods used at the plant level are often different from those used at the overall company level, and methods used at the overall company level for reporting to stockholders may not be the same in all respects as those used for Federal income tax purposes. Or, the methods used for valuations during the year are not necessarily the same as those used at yearend.

Measurement problems are exacerbated by inflation because ascertaining true rates of real growth is more difficult when rates of inflation are high than when they are low. Furthermore, measuring constant dollar or physical components of stocks and their changes becomes all the more difficult when inflation rates are highly variable. Looking at wholesale price changes over three-month or six-month time spans in 1973, 1974 and 1975, one can see that variability in these years is far in excess of anything experienced in the post-World War II period. Inflation has had a profound effect on which methods businesses choose to use in valuing their inventories. A large number of firms shifted to LIFO accounting because of the double-digit inflation of 1974, and the shift has continued, although at a considerably diminished pace, since that time. The ranks of LIFO firms were augmented in 1976 by giants like General Motors, Ford, and Sears Roebuck. These changes in accounting methods create many problems in interpreting inventory statis-

tics not only because of transitional considerations, but also because LIFO is a complex system.

It was against this backdrop that the National Bureau of Economic Research entered into a joint statistical agreement with the Bureau of the Census to make a critical study of Government inventory statistics and to make recommendations for their improvement.

THE NATIONAL BUREAU OF ECONOMIC RESEARCH STUDY

In 1975 NBER entered into an agreement with the Bureau of the Census to make a study of business inventory statistics, as measured by the Government, for the purpose of improving estimation procedures. The agreement involved more than a report. It was understood that NBER would work closely with Census Bureau personnel and make suggestions for dealing with ongoing problems. As a result, the Census Bureau has conducted new surveys and has added new questions to some of its older surveys that reflect these recommendations. It was also understood that the study would be broad-ranging. There is little point in viewing Census data in isolation. They must be considered in relation to complementary price indexes, which are needed to deflate book value data, and in relation to estimates of inventory change and profits in the national accounts. During the course of the research, NBER also agreed to investigate and make recommendations for a new benchmark for manufacturers' unfilled orders.

The Government should provide timely estimates of monthly and quarterly levels and of changes in inventories in current and constant dollars, in aggregate and in considerable industry detail. The precision required is that needed by policymakers and those in business and Government who observe and analyze inventories and their behavior in the national accounts. This means that reported inventory levels and their changes should need only minor revisions, substantially less than has occurred in recent years. The importance of improving the quality of the current monthly and quarterly figures cannot be overemphasized: These are statistics that receive wide attention in the media and that businesses and Government policymakers use in evaluating the economy on an ongoing basis.

We believe that major improvements in estimations of inventories and their change are possible within the broad framework of data collection that now exists and with methods now in use. We are convinced that to accomplish this will require a considerable increase in resources, and there is no simple answer to the problem of obtaining more accurate inventory statistics. Much will have to be done by the Census Bureau. Improvements must be made along a broad spectrum from collection of basic data to BEA's extensive calculations of inventory change in the GNP. The Commerce Department is not the only Government agency involved; these calculations entail extensive use of wholesale prices, published by the Bureau of Labor Statistics in the Department of Labor. In our judgment, improvements in the quality and types of price data would be almost as useful as would improvements in estimates of inventory book values themselves.

The study is not limited to Government, since basic statistics are reported by companies and are a reflection of ways they keep their books. Interim reports by corporations—reports for periods of less than a year—receive special attention in this study because these are most relevant to measurements of business cycles. We believe the accounting profession should adopt more rigorous standards for interim reporting, especially for LIFO firms, so that published figures are more accurate reflections of actual developments within firms. In this respect the Securities and Exchange Commission can play an important role by insisting on more meaningful and accurate interim reporting. This could help lower uncertainties about economic conditions in the short run.

The past few years have seen a number of improvements in data needed to measure inventory change by the Census Bureau, BEA and BLS. Further improvements are being planned, some requiring financing. There has also been ferment in the accounting profession because of new standards being formulated by the Financial Accounting Standards Board. These, together with new regulations by the Securities and Exchange Commission, are leading to collection of higher quality inventory statistics. But much remains to be done to improve the accuracy of these statistics.

MAJOR FINDINGS AND RECOMMENDATIONS

The following are the major conclusions and recommendations made in this study. These are summaries of what we thought most important. The report contains further detail and many more recommendations than appear here.

Improving Estimates of the Book Value of Inventories

These estimates are based on raw data from manufacturers, wholesalers and retailers whose collection is the responsibility of the Census Bureau. Problems concerning reporting units, samples and estimating procedures in each of the three major industry divisions are discussed in turn.

Manufacturing—In manufacturing, information is obtained from two Census Bureau surveys: a monthly survey (M3) of inventories, sales and orders in which the reporting unit is the company and in which certain large companies report by divisions, and the annual survey of manufactures (ASM) in which the reporting unit is the establishment (the plant in manufacturing). The more extensive quinquennial census replaces the ASM in census years.

Present procedures are not satisfactory for a number of reasons. Data from parts of large companies often are omitted from the monthly survey because of incomplete divisional reporting. Furthermore, within large companies methods used to value inventories at company or division levels may be quite different from those used to value inventories at plant levels. We therefore recommend that a mandatory survey be conducted as part of the annual survey of manufactures in which large, complex companies report their total domestic sales and inventories. Further, these totals should be disaggregated by the firm's own operating divisions. The Census Bureau would de-

fine "large, complex company." This annual reporting would allow Census staff to isolate activities not normally reported in the ASM, such as wholesale, retail, construction and mining. Both sales and inventories for manufacturing and non-manufacturing divisions should be reconciled with firms' annual reports to stockholders.

These divisional reports for large firms, when added to establishment reports for small firms, would constitute a new annual benchmark. This would replace the present benchmark for the monthly inventory survey; the benchmark is now based upon reports exclusively from establishments.

In recommending this approach, we take account and advantage of the common practice in American industry to make divisional reports to stockholders. Divisions from which reports would be obtained by the Census Bureau are those for which companies maintain their own records. There may be a small number of firms whose divisions are so broad that they embrace more than one sector (manufacturing and retail trade) or two or more 2-digit manufacturing industries. In these cases the Census Bureau would have to obtain finer breakdowns in order to meet publication objectives. Negotiations between the Census Bureau and certain large firms and field interviews may be required before the needed reporting detail can be arranged.

Monthly reporting units for large firms should be the same as those used for the proposed annual survey insofar as possible. Since monthly reporting is voluntary, the Census Bureau will have to accommodate on occasion to monthly reporting units for large firms that differ somewhat from annual divisional reporting units. Reporting units for small companies pose no particular problems.

Retail Trade—The main problems in retail trade concern the kind and quality of records that retailers keep and the size of survey samples.

The Census Bureau collects monthly data on retail inventories but it does not publish them. The figures are published by BEA. The Census Bureau should assume responsibility for publishing retail inventory statistics. We have no illusions about the difficulty of improving these data. A substantial part of such inventories are held by small firms, whose monthly inventory records are not good. But this should be recognized as something that requires increased attention and resources, not something to be avoided.

The present survey of retail inventories, although a probability survey, should be greatly expanded. Procedures for divisional reporting by very large companies described earlier for manufacturing should also apply to retail trade. There should be no serious obstacles to obtaining monthly reports from all large retailers on a timely basis. The survey should be conducted, as it is in manufacturing, so that respondents have an opportunity to revise preliminary estimates. The canvass of very large retailers by division should be conducted from Washington since it requires coordinating the manufacturing, wholesale and retail reports of these large firms.

Wholesale Trade—We recommend introduction of a mandatory annual survey that could serve as a benchmark for the present monthly survey. Such a survey should have a large sample frame

and should give firms enough time to report final annual figures. (The Census Bureau began such a survey in 1978 starting with end-of-1977 inventories.)

The scope of wholesale trade data collection should be extended both annually and monthly to cover all of wholesale trade, not only the industries Census has defined as merchant wholesale.

The recommendations made earlier regarding divisional reporting for large manufacturing firms apply as well to large wholesalers.

Significant estimation difficulties occur with wholesale trade data and arise from a sampling rotation process; Selected firms enter the panel for one month, drop out for three months, re-enter for one month, and keep repeating this pattern. When a firm enters the panel it reports inventories for the current month and for the preceding month. While such a sampling design has theoretical technical efficiencies in the sense of low variance per unit canvassed or per dollar of cost, it generates biases in estimated values of inventories. For each month the value of inventories is estimated twice. The second estimate almost invariably is higher than the first. The final composite estimates generated from these data are slightly lower in level and have month-to-month changes that are suspect. Unless improved estimation procedures can be introduced that properly rectify for the observed bias, we recommend that the type of rotation now in use be dropped in favor of some other process.

Improving Estimates of the Change in Business Inventories in the GNP

For the GNP, BEA transforms Census estimates of book values of inventories into measures of inventory change through an elaborate set of calculations for which BEA has depended on Census, BLS, and other agencies for additional data. The most important set of problems in this regard concerns valuation methods. Valuation methods also affect BEA's estimates of profits because profits (in most industries) are governed by valuations of opening and closing inventories.

Valuation Methods Underlying Book Value Data—By themselves, figures on the book value of inventories are of limited usefulness when firms are free to apply differing dollar values to the same physical stocks in accordance with generally accepted accounting principles and IRS regulations. A knowledge of which valuation methods are used is essential for the proper interpretation of book value data, particularly when LIFO is involved. In the absence of such knowledge many problems may arise. Among large firms particularly, inventory valuation methods used by units reporting monthly to the Census Bureau are often different from methods used by units reporting annually to Census for benchmarking purposes. When reporting units are not the same, a difference in inventory book values at one point—like yearend—may reflect different valuation methods, while an identity may mask different physical stocks. There is also a significant difference in the annual benchmarks for Census inventories and for IRS annual profits in the important manufacturing sector caused by differences in methods of

inventory valuation applied by firms reporting to the two agencies. Many of these problems, however, would be solved by adopting the divisional reporting structure as the benchmarking base for annual inventory book values.

There has been definite progress in collection and use of such information, even though much remains to be done. Following BEA's 1973 lead, annual surveys of end-of-year valuation methods have since been conducted by the Census Bureau. BEA utilizes such data in its calculations of inventory change in the national income and product accounts as the data become available.

Valuation methods employed by firms for monthly or quarterly inventories pose a special set of problems, particularly when firms use the LIFO method. LIFO is primarily an annual method of valuation that firms use to calculate taxable profits. Studies of firms reporting to the Census Bureau revealed that methods used within a firm to value stocks during the year were not necessarily the same as those used at the end of the year. Some firms reporting LIFO inventories at yearend reported FIFO during the year. Moreover, some firms did not make bona fide LIFO calculations during the year even though they designated their inventories as LIFO.

Compared to FIFO, use of the LIFO method entails additional accounting costs for firms; this offsets some of LIFO's tax advantages. Consequently, during a year most LIFO firms do not use the same elaborate accounting techniques employed at the end of the year. But, some techniques sanctioned by accounting authorities for use during the year are vulnerable to forecasting errors. These interim reporting problems may distort the reported inventory changes during the year. At the end of an accounting year most companies using the LIFO method calculate yearend inventories on the basis of refined LIFO methods, which particularly may distort changes from the third to the final quarter of the year.

During the course of our study, and at the suggestion of NBER, the Census Bureau added new questions to the M3 monthly survey. Since the start of 1977, LIFO firms in the Census monthly survey of manufacturers have been separating their inventories into a LIFO and nonLIFO portion. For the LIFO portion they also are reporting their LIFO reserve, which will permit Census to identify firms that do not make a genuine LIFO calculation each month. It will therefore be possible to make a monthly breakdown of stocks into LIFO and nonLIFO components. We recommend that Census adopt a similar approach for monthly data submitted by trade firms using LIFO, which now report valuation methods only at yearend.

Although these surveys are very important, simply adding new questions to them will not solve all the problems. Firms electing to use LIFO, for example, have a wide choice of how they measure inventories within the LIFO method. We recommend that Census conduct a one-time survey of LIFO reporters in both manufacturing and trade to determine the specific options firms have chosen regarding factors such as commodity coverage and timing of prices. This knowledge will increase understanding of LIFO data reported.

These recommendations for improving LIFO data reported to the Census Bureau are being made after careful evaluation of an alternative approach that would involve asking all respondents

to report FIFO or FIFO-type inventories. When firms report on a LIFO basis, they are supplying figures that can be used almost directly in calculations of inventory changes in the GNP. Furthermore, such LIFO inventory values usually are more consistent with their calculated business profits than would be changes in their inventories valued under FIFO. In our view these advantages of LIFO reporting outweigh disadvantages arising from the fact that for a great many firms LIFO is still a comparatively new accounting method.

NBER also made recommendations affecting firms using standard costs for valuing inventories. Such manufacturing firms now are being asked to state when they revise their standard unit costs so shifts in standards will not be interpreted erroneously as changes in physical inventories. A respondent indicating a modified standard is asked to restate the current month's figures using the old standard. This permits the Census Bureau to differentiate between changes in physical volume and changes in book value due to revisions in standard unit costs.

Commodity Composition of Inventories and Their Turnover—To deflate inventories expressed in book values it is necessary to know the commodity composition of stocks so that appropriate deflators can be used. Lacking direct information on this subject, BEA assumes that inventories of purchased materials are proportional to the consumption of materials. The pattern of materials consumed in an industry is based on material inputs derived from input-output studies; the most recent covered 1967. (Input-output data for 1972 are to be published in 1979.) Also, the commodity mix of finished goods in inventory is assumed by BEA to be proportional to sales in manufacturing and trade. We recommend that the Census Bureau, in connection with the quinquennial census of manufactures and the annual survey of manufactures, measure commodity composition directly.

BEA's Cost Accounting—BEA's treatment of manufacturing inventories needs to be improved. For manufacturing, BEA makes limited use of Census data on inventories by stage of fabrication. The agency's general approach is to match as closely as possible price indexes for specific purchased materials with specific purchased materials inventories and price indexes for specific finished goods with specific finished goods inventories. For estimating work-in-process inventories, BEA divides this total equally between purchased materials and finished goods.

There are three major difficulties with this procedure. First, it underweights purchased materials in manufacturers' inventories. On average, prices of purchased materials have been more volatile than prices of finished goods; underweighting materials could have a perceptible effect on calculations of real inventory changes in manufacturing. Second, appropriate deflators for finished goods inventories are cost indexes and not sales price indexes, as BEA has been aware for many years. What significance this has for BEA's calculations is unclear because it is not known how these cost indexes—had they been calculated—would have behaved relative to sales price indexes of finished goods. Third, BEA has assumed that when LIFO is used, materials, work-in-process and finished goods inventories are affected in equal proportions. In fact, among LIFO firms, materials are

valued by LIFO in greater proportion than are other types of inventories.

We understand that BEA is now developing cost indexes using procedures that parallel those employed by firms in their own cost accounting. When implemented the new approach should represent a substantial improvement over present procedures.

Prices Used for Deflating Inventories

Precise measurements of levels and changes in book values of inventories and knowledge of valuation methods and turn-overs are necessary but are not sufficient by themselves for careful measurements of inventory change in the GNP. Price and cost indexes of high quality are almost as important as figures on book values of inventory.

From the beginning of this project we have been concerned about the nature of the price quotations collected by BLS that is, whether they are indexes that reflect shipments prices or new orders prices. Richard Ruggles, in a recent report, for the Council on Wage and Price Stability, has demonstrated that BLS collects both types of quotations. Although orders prices predominate in durable goods industries like machinery, they are also found in other industries.

BLS is now undertaking a comprehensive revision of the WPI scheduled to be completed in 1983. As an interim measure we recommend that BLS conduct an immediate survey to determine the nature of all the quotations now being obtained for all individual indexes in the WPI.

Government price indexes are used for two main purposes: deflation and monitoring. Deflation of inventories requires shipments prices. Because shipments often lag considerably behind orders for a considerable time, movements in shipments prices and orders prices are not necessarily identical. Each of these functions—deflation and monitoring—is so important in its own right that neither should be compromised to satisfy the other function. Both types of price indexes are needed. An index based exclusively on orders prices should not be used to deflate shipments on the basis of normal order-shipment lags because such lags vary over the business cycle. Deflation work is too important to rest on lag distribution assumptions that are valid only on average.

Appropriate prices to be used for deflating materials purchased by manufacturers and goods purchased by wholesalers and retailers are prices paid by purchasers. However, the BLS WPI (now the Producer Price Index) is an index of prices charged by primary producers. Exclusive reliance by BEA on the WPI means the Bureau implicitly ignores purchases from wholesalers, transportation companies and foreign suppliers, whose price quotations often differ from those contained in the WPI.

We have several recommendations relative to price indexes. Prices of the wholesale sector should be measured separately by BLS because they often reflect conditions in spot markets, where transactions involve immediate delivery, compared to markets where contracts are for future delivery. Development of comprehensive index of prices charged by wholesalers would be an important contribution to monitoring of prices.

BLS has begun to develop export price indexes; it should accelerate this effort and broaden development of import

price indexes, which often fluctuate quite differently from domestic prices. Expanded coverage should result in BEA's using such prices in deflation of inventories.

BLS should broaden the scope of its new railroad freight rate indexes and move more quickly toward collecting statistics on trucking freight rates. BEA should utilize results published to date on railroad freight rates in deflation of inventories since these rates show cyclical movement different from that of wholesale prices.

Internal Revenue Service Statistics

Statistics of Income, published by IRS, is a basic source of information for benchmarking of profits. In publishing its statistics, IRS tends to operate as a service agency in response to requests from other agencies. The statistics IRS has published on methods used by firms to value their inventories have not been sufficiently detailed. We recommend that IRS collect inventory data by method of inventory valuation as reported in the cost of goods sold schedule, using the same type of question successfully employed in recent Census Bureau surveys.

We also propose that IRS tabulate and publish data on inventories as reported in cost of goods sold schedules and as carried on balance sheets. This information currently is being reported to IRS but has not been tabulated since 1963.

Accounting Standards

The definition of income, for purposes of Federal income taxes, is governed by regulations of the Internal Revenue Service. For financial reporting to stockholders of publicly held corporations, the governing regulations are those of the Securities and Exchange Commission and the Financial Accounting Standards Board. Traditionally, SEC has relied on the accounting profession to establish its own standards. In recent years, high rates of inflation, a severe recession, public requests for greater disclosure, and SEC dissatisfaction with self-regulation has led to a more aggressive stance by the Commission and the adoption of new regulations that affect inventory accounting. Compliance with these regulations should improve reporting of inventories in Government surveys.

SEC has proposed that most registered companies separate their sales and earnings into "segments," which is an important move toward disaggregation. If earnings are reported by segments it follows that inventories are available in the same detail. In this respect SEC is adopting the standards for segment reporting issued in December 1976 by the Financial Accounting Standards Board, the professional organization of accountants whose function is to establish and improve standards of financial accounting and reporting.

In 1975, SEC instituted more stringent and detailed requirements for interim financial reporting or, in practical terms, quarterly reporting. For the first time, SEC called for balance sheet information including disaggregation of inventories by stage of fabrication. SEC's advisory committee on corporate disclosure recommended that registered companies report by segments quarterly as well as annually but so far SEC has not adopted this recommendation. The Financial Accounting

Standards Board ruled in late 1977 that public companies are not required to report their quarterly results by segments, pending completion of a new FASB study of interim reporting.

Effective with SEC's 1976 Form 10K, the 1,000 or so largest corporations are now required to restate values of their fixed assets, inventories, cost of goods sold and depreciation at current replacement costs. This has evoked considerable controversy, mostly over problems associated with fixed capital and not with inventories. The effect of the new regulation is that all large companies on an annual basis must calculate their inventories in the same way that BEA calculates estimates of inventory change. This means that companies will be using procedures at the firm level that BEA approximates through procedures applied to highly aggregated data.

This report is not limited to Government agencies; we make some proposals for the accounting profession. Many companies now on LIFO have not established good quarterly financial reporting systems. Their quarterly figures are dependent on forecasts of yearend prices made at the beginning of a year. It is possible that new standards for interim reporting currently being developed by FASB will eliminate these difficulties. In the meantime, we believe that companies would obtain more meaningful figures if they used techniques similar to those utilized by BEA for calculating the IVA on a quarterly basis. Also, we think that publicly held corporations should report some key operating results to stockholders in seasonally adjusted terms as well as in unadjusted terms. Economists have been using seasonally adjusted economic data for several decades. The technique of comparing a current quarter with the same quarter a year ago is adequate when the trend of business activity has not changed over the year, but it can be misleading around turning points. The Financial Accounting Standards Board, at a minimum, should initiate an experimental program on calculating and reporting seasonally adjusted sales.

Long-Term, Fixed-Price Production Contracts

Under present concepts used in deriving the GNP and in Census Bureau manufacturing surveys, long-term, fixed-price production contracts are measured on a delivery basis. Production underway but not yet completed is counted in inventory until delivery to purchasers.

The accounting issue revolves around the timing of revenue recognition. Private sector accounting for such contracts—which generally involve Government purchases or large private sector investment items such as turbines, civilian aircraft, or construction—permits optional ways of recording such transactions. Furthermore, methods used by companies for financial reporting may differ from those they use for reporting to IRS. Collection of statistics in this area is extremely difficult; it requires more careful attention than it has been accorded in the past. In the long run, we recommend that the value of work done concept (percentage completion method in accounting terminology) be introduced in both deriving the GNP and Census Bureau surveys for most types of long-term production contracts. This concept already is used for shipbuilding and construction activities.

An Interagency Committee on Inventory Measurement

We recommend the establishment of an interagency committee on inventory measurement which would monitor developments pertinent to inventories, coordinate research and sponsor or conduct research. Committee members would represent several Government agencies: OMB, Census Bureau, BEA, IRS, CEA and BLS.

In its monitoring activities, the committee would keep abreast of developments in the fields of taxation and accounting that might have an impact on calculations of inventories. Developments of this kind in recent years might include the full cost absorption regulations of IRS; the latest LIFO rulings of IRS; the SEC regulations concerning replacement costs; interim reporting; SEC's current proposal on segment reporting; the Conceptual Framework study of the Financial Accounting Standards Board.

The committee might also represent Government statistical agencies before groups such as the Financial Accounting Standards Board, the American Institute of Certified Public Accountants, and Government regulatory agencies like the SEC and FTC. FASB recently broadened representation on one of its outside advisory committees but included no professional economists or representatives from Government agencies like BEA and the Census Bureau. Accounting practices are not immutable; they respond to changed circumstances. By taking joint action through an interagency committee, the statistical agencies can present their views to rulemaking bodies on these changing accounting practices, thereby serving their interests in improving the availability and quality of data.

Modifying the Allocation of Duties Between the Census Bureau and BEA

Under the present division of labor, the Census Bureau functions as a collection agency while BEA performs all subsequent processing steps. These include converting inventory book values to stocks and changes in stocks in both current and constant dollars, calculating the IVA, and compiling related stock-sales ratios. The conversion of book values is intimately related to estimation of the GNP and its components. As a consequence, BEA now maintains the expertise on price indexes needed for deflation, the weighting of prices, use of new data on methods of inventory evaluation, and the like.

Transfer of such functions from BEA to Census should be undertaken if substantial gains in quality would result. Aside from extra costs incurred during any transition period, we believe there would be no cost advantages or disadvantages in having the Census Bureau carry out calculations for deflation, IVA, etc. The theory, and the computations that evolve from the theory, are only moderately complicated, but with training and further staffing this work should be readily transferable over a reasonable interval.

The decision on whether to transfer functions depends entirely on potential gains in the quality of the processing that might accrue from such transfer. In our view the potential gains are considerable.

In chapter 4 we note that to solve problems inherent in the entire process requires as much disaggregation as possible. In a

sense BEA is attempting to duplicate what firms do in their own accounting. This requires maximum disaggregation, in some cases to the level of individual firms. General Motors, for example, has over \$6 billion in worldwide inventory with perhaps over \$5 billion held in the United States. Much could be gained by treating this firm uniquely now that it has begun to use the LIFO method.

The Census Bureau's close relations with individual firms can be used in many ways to improve data on inventory change. Suppose, for example, that a large firm employing dollar value LIFO reduces its LIFO inventory. In order to substantiate the reduction to IRS, the firm must have records of the price index used in making its calculations. The Census Bureau could request the actual price index numbers utilized in the LIFO calculation and employ them for reflation of stocks to current price. This is the type of privileged data that is available more readily to Census than to BEA. BEA does not have statutory authority to compel access to or assure confidentiality of individual company figures nor does BEA have the close relations with reporting firms that would enable it readily to query them directly about price indexes. Note that the focus here is on specialized knowledge of a sort that cannot be treated routinely.

Perhaps an even more important reason for assigning additional responsibilities to the Census Bureau is to familiarize its staff with broad problems and data requirements for inventory measurement. Over the years the Census Bureau has viewed itself simply as a data collecting agency whose responsibility ends with totaling book value figures. If Census assumes the responsibility of processing book value figures to obtain stocks and their changes in current and constant prices, the horizons of its staff members would be broadened and the entire estimating process should be improved.

The major transfer of functions recommended here should not be made precipitately. An enlarged Census Bureau staff well-trained in necessary procedures is an important prerequisite. The shift should be made only after careful planning to minimize disruptions and delays. When the transfer is made, it should include responsibility for processing quarterly inventory estimates for industries outside of manufacturing and trade. The Bureau should be involved in the entire inventory measurement problem. We recommend that the Census Bureau move toward publishing monthly, as well as quarterly, deflated inventory and sales data.

Unfilled Orders

A Census Bureau survey of unfilled orders as of the end of 1976 has had a good response from industry. The particular

form of this survey, with divisional breakdowns, was recommended by NBER. This should be an annual feature of the M3 survey in order to prevent a recurrence of the events that caused the large revision of unfilled orders published in early 1977.

Census should also expand its coverage of industries supplying unfilled orders data, which requires further research to refine orders concepts. This coverage has not been changed in a generation although some industries like chemicals sell their output under very long-term contracts.

Census should also begin a research program aimed at deflating new and unfilled orders. This is an important and difficult task since it requires knowledge of the time structure of backlogs, how that structure changes over the business cycle, and of the pricing terms of contracts—whether prices are fixed, escalated or given at time of delivery.

We also recommend that the Bureau examine the feasibility of conducting an orders-placed survey, as distinct from the present M3 survey, which measures orders received by manufacturers. An orders-placed survey is easier to conduct when buyers are large and producers are small, as in the case of department stores in their purchase of clothing.

CONCLUDING REMARKS

Improving the measurement of business inventories is important at both the micro and macro levels. The apparent and true profitability of individual firms is strongly affected by costs and quantities of inventories held. Errors made in managing inventories can lead to low net returns and to difficulties in acquiring working capital to fund current operations. Inventories, of course, are not the only factors that impinge on short-run profitability, nor are they the most vital decision variable. However, the sensitivity of business returns to movements in inventories is high, and their measurement deserves careful attention.

Similarly, at the national level, perceptions of the state of the economy depend greatly on estimated swings in inventory investment. Stabilization policymakers still are forced to rely on uncertain indicators of the short-run state of the economy. A good part of this uncertainty stems from the difficult-to-measure and highly volatile inventory change component of the GNP. Therefore, improvements in measurement of business inventories could contribute significantly to formulations of better short-run economic policies and should be given high priority in Government statistical programs. The Census Bureau is to be commended for recognizing and responding to this need.