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**Economic Research Report 3**

# **Measurement of Business Inventories**

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## FOREWORD

Measurement of inventories and their changes has always been one of the most troublesome problems in economic statistics, partly because of difficulties in valuing any stock accumulated in different periods at different prices. Some business firms take stock at the end of the year but do not maintain perpetual or periodic inventory records during the year. Very small firms may not take a physical count even at yearend.

The measurement problem is even more difficult when the inflation component of changes in book values of inventories is large. Problems of inventory measurement have been compounded by the inflation of recent years, as a growing proportion of firms has shifted methods of inventory valuation (notably to LIFO) in order to reduce taxes and to report profits that more accurately reflect replacement costs.

Errors in measurement of inventories and inventory changes for the economy as a whole have important consequences for measurement of economic activity for the nation. To that extent, such errors increase the possibility that business and government may not assess correctly the state of the economy, and that policymakers may pursue inappropriate cyclical policies.

Needs for improving inventory and related data are great. Making these improvements would better serve statistical requirements in estimation of the national income and product accounts by the Bureau of Economic Analysis, for market analyses by business firms, and for analyses and forecasts of economic behavior and performance by Government and private economists.

In recognition of these needs, the Bureau of the Census in April, 1975 began sponsorship of a study by the National Bureau of Economic Research to assist in providing a basis for more useful and accurate inventory measurement. This study was conducted initially under a joint statistical agreement between the Bureau of the Census and the National Bureau of Economic Research and completed under contract between the two organizations. The manuscript has been reviewed and approved under standard NBER procedures (see appendix M). The objectives of the study were to review concepts and procedures of collecting and compiling inventory statistics, to identify critical measurement problems, and to make recommendations for revised and new procedures that reasonably could be implemented.<sup>1</sup> Since raw inventory data should not be examined in isolation, measurement of inventory changes in the national accounts and measurement of prices used to deflate inventories, as well as techniques used by business firms to calculate inventory values at the plant or company level also were studied.

A large number of recommendations are made in this report for improvement of inventory statistics. Some have been made before, while others are new. There is no doubt that the emphasis given to certain issues, such as proper methods for inventory valuation, has been influenced by the high rates of inflation of recent years.

The research conducted during the study is described in this volume. Because inventory statistics are collected monthly and annually and, like other statistics, are revised on the basis of more complete information, it was necessary to set cutoff points in preparing this report. For the most part, data analyzed and discussed in the study are those available in the summer of 1977. Although preparation, review and final editing of the manuscript continued until mid-1980, it was not practical to continue updating tables or to establish a uniform cutoff date for all statistical series cited.

**Shirley Kallek**

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<sup>1</sup> Readers may also wish to refer to two studies: Council on Wage and Price Stability, *The Wholesale Price Index: Review and Evaluation* (June 1977), and Office of Federal Statistical Policy and Standards, U.S. Department of Commerce, *Report of the Advisory Committee on Gross National Product Data Improvement* (October 1977).



## PREFACE

Of the many organizations and individuals who made significant contributions of this work, special recognition goes to **Shirley Kallek**, Associate Director for Economic Fields, who was largely responsible for launching the study and offered extensive encouragement and much useful advice.

Significant contributions were made by **Milton Eisen**, **Tyler Sturdevant**, and **John Wikoff** of the Census Bureau and **Gerald Donahoe** and **John Hinrichs** of the Bureau of Economic Analysis. Others who contributed to this project are listed by agency. Bureau of the Census: **Chester Bowie**, **Dale Gordon**, **Arthur Horowitz**, **Paul Lewis**, **William Menth**, **Ronald Pienzykoski**, **Harriet Pitts**, **Edward Robinson**, **Bruce Schock**, **Kathleen Swindell**, **Faran Stoetzel**, and **Irving True**. Bureau of Economic Analysis: **Anthony Eckman**, **John Gorman**, **Martin Marimont**, and **Allan Young**. Department of Agriculture: **Steven Guebert**, **Mardy Myers**, and **Gaylord Worden**. Bureau of Labor Statistics: **John Layng**. Department of Interior: **J.D. Morgan, Jr.** Cost Accounting Standards Board: **James DiGuiseppe**. Securities and Exchange Commission: **Clarence Sampson**, and **Edward Sheramy**. Also, Financial Accounting Standards Board: **J.T. Ball**. American Institute of Certified Public Accountants: **Richard Rickert**.

National Association of Accountants: **Louis Bisgay** and **A. Kenneth Benson**. Arthur Andersen and Company: **Nicholas Deleoleos**. National Association of Purchasing Management: **E.F. Andrews**. The views expressed by these individuals are nonofficial and do not necessarily reflect the views of their organization.

Substantial field work and interviews with business firms were performed by Census staff and one or more authors of this study in the fall of 1975, December 1975, March and April 1976, and March 1977. The project benefited greatly from the many insights and useful information provided by the various companies, officials, and accountants involved.

Earlier versions of the manuscript were reviewed by staff members of the Bureau of Economic Analysis, and, on an informal basis, selected chapters were reviewed by members of the Cost Accounting Standards Board, Financial Accounting Standards Board, and Securities and Exchange Commission. Their comments provided valuable guidance for revisions.

Of the National Bureau of Economic Research, Inc., **Shelly Gordon** provided valuable research assistance during the study, and **Sarah J. Gaston** edited the manuscript.

M.F.  
G.F.  
I.R.



# CONTENTS

	Page
<b>FOREWORD</b> .....	iii
<b>PREFACE</b> .....	v
<b>HOW THIS STUDY IS ORGANIZED</b> .....	xiii
 <b>1. INTRODUCTION, MAJOR FINDINGS AND RECOMMENDATIONS</b> .....	 1
Importance of Inventory Data .....	1
Difficulties of Measurement .....	2
The National Bureau of Economic Research Study .....	3
Major Findings and Recommendations .....	3
Concluding Remarks .....	8
 <b>2. THE ACCOUNTING BASES FOR VALUING INVENTORIES</b> .....	 9
Inventory Valuation and Profit .....	9
Inventory Valuation Methods .....	10
Inventory Valuation Patterns .....	15
 <b>3. BUREAU OF CENSUS ESTIMATES OF BOOK VALUES OF INVENTORIES</b> .....	 16
Manufacturing Industries .....	17
Wholesale Trade .....	22
Retail Trade .....	32
 <b>4. MEASURING INVENTORY CHANGE IN THE NATIONAL ACCOUNTS</b> .....	 39
Some Accounting Concepts .....	39
Calculating Inventory Change in the GNP .....	42
Processing LIFO Stocks .....	43
Processing NonLIFO Stocks .....	44
Quarterly Calculations .....	50
Concluding Remarks and Recommendations .....	50
 <b>5. PRICES USED IN ESTIMATING INVENTORIES AND INVENTORY CHANGE</b> .....	 53
Shortcomings of the WPI .....	53
A Simulation Exercise .....	58
A Further Note on Deflation .....	59
Recommendations .....	60
 <b>6. LIFO</b> .....	 66
Features of LIFO .....	66
Problems in Constructing Appropriate Index Numbers .....	69
Significance for Inventory Statistics .....	70
Economic Effects of LIFO .....	71
Limitations on Use of LIFO .....	72
Some Information Issues .....	73
 <b>7. CHANGING METHODS OF INVENTORY VALUATION: THE IMPACT OF LIFO ON INVENTORY AND PROFITS STATISTICS</b> .....	 75
Inventory Valuation Surveys of Manufacturing .....	75
Inventory Valuation Surveys in Wholesale and Retail Trade .....	86
Detailed Tables by Method of Inventory Valuation .....	87
	vii



# CONTENTS—Continued

	Page
<b>8. INTERIM REPORTING</b> .....	97
Accounting Principles Board Opinion No. 28 .....	97
SEC on Interim Reporting .....	98
Interim LIFO .....	99
Standard Cost .....	106
Recommendations .....	107
<b>9. THE REPORTING UNIT IN THE COLLECTION OF INVENTORY STATISTICS</b> .....	109
Objectives in the Collection of Inventory Statistics .....	109
Problems With Reporting Units Now Used in Manufacturing .....	109
New Accounting Standards for Disaggregation .....	111
The New Benchmarking System .....	112
LIFO Versus PreLIFO Reporting .....	113
Inventory Data Breakdown by Stage of Fabrication .....	114
Potential Criticisms of Divisional Reporting and the Proposed New Benchmark .....	114
Integrating Manufacturing With Other Reports .....	115
<b>10. INDIRECT AND OVERHEAD PRODUCTION COSTS AND THE PROBLEM OF FULL COST ABSORPTION</b> .....	116
Alternative Methods of Treating Overhead .....	116
The Prevalence of Absorption and Direct Costing—Some Aspects .....	118
IRS and Full Cost Absorption .....	119
Recommendations .....	122
<b>11. ACCOUNTING FOR LONG-TERM PRODUCTION CONTRACTS</b> .....	124
Two Types of Long-term Production Contracts .....	124
The Timing of Revenue Recognition Under Fixed-Price Contracts .....	125
Cost Accounting Standards Board .....	127
Price Waterhouse Study .....	128
Treatment of Long-term Contract Production in the National Accounts .....	129
Reporting of Long-term Production Contracts in Census Bureau Surveys .....	130
Recommendations .....	131
<b>12. INVENTORIES IN AGRICULTURE, PUBLIC UTILITIES AND CONSTRUCTION</b> .....	132
Farm Inventories .....	132
Public Utilities .....	136
Construction Industry .....	138
<b>13. STOCK-SALES RATIOS; PHYSICAL STOCKS; MARKET CATEGORIES</b> .....	142
Stock-sales Ratios .....	142
Physical Stocks .....	146
Market Categories .....	150
<b>14. STATISTICS ON UNFILLED ORDERS</b> .....	151
Significance and Concepts of Unfilled Orders .....	151
Measuring Unfilled Orders .....	152
Form M3 Instructions for New and Unfilled Orders .....	157
Coverage of Industries .....	158
New Benchmark for Unfilled Orders .....	158
Choice of the Reporting Unit .....	160
Summary and Recommendations .....	161

## CONTENTS—Continued

### APPENDIXES

	Page
A LIFO Questionnaire . . . . .	163
B Monthly Wholesale Trade . . . . .	164
C Monthly Inventory Report . . . . .	166
D Turnover Period Price Weights . . . . .	168
E Application to Use LIFO Inventory Method . . . . .	171
F Revenue Procedure 76-36 . . . . .	173
G Survey of Inventory Valuation Methods and Related Information, 1973 . . . . .	175
H Survey of Firms Changing Methods of Inventory Valuation . . . . .	178
I Form M-3, Instruction Manual . . . . .	179
J Application for Change in Accounting Method . . . . .	199
K Proposed Survey, Treatment of Overhead, Indirect Costs, and Cost Absorption by Manufacturing Companies. . . .	203
L Form MA-300, Annual Survey of Manufactures. . . . .	204
M Officers and Directors, National Bureau of Economic Research (NBER) and Relation of the Directors to Work and Publications of the NBER. . . . .	206
INDEX . . . . .	209

# CONTENTS—Continued

## LIST OF FIGURES AND TABLES

	Page
<b>CHAPTER 1.</b>	
Table 1.1. GNP and Change in Business Inventories (CBI) at Business Cycle Peaks and Troughs and Early Expansion Stages . . . . .	2
<b>CHAPTER 2.</b>	
Table 2.1. Example 1: Inventories and Sales. . . . .	10
Table 2.2. Example 1: Inventory Valuation With FIFO . . . . .	10
Table 2.3. Example 1: Inventory Valuation With LIFO . . . . .	11
Table 2.4. Example 2: Inventory Additions and LIFO Valuations . . . . .	11
Table 2.5. Example 1: Comparison of FIFO, Average Cost and LIFO Cost of Goods Sold, Profits and Inventory Valuation. . . . .	11
Table 2.6. Example 3: Inventory Valuations With Cost, Market, or Lower of Cost or Market Options. . . . .	13
Table 2.7. Retail Method of Inventory Valuation: Basic Data. . . . .	14
Table 2.8. Retail Method of Inventory Valuation: Calculations for Two Variants. . . . .	14
Table 2.9. Example 1: Comparison of Inventory Valuations With FIFO, Average Cost, Retail Cost and Retail Lower of Cost or Market. . . . .	15
Table 2.10. Percentage Distribution of Census Inventories by Valuation Method, End of 1975. . . . .	15
<b>CHAPTER 3.</b>	
Table 3.1. Annual Changes in Book Values of Manufacturing Inventories Compiled in Monthly and Annual Surveys. . .	18
Table 3.2. Estimated Percentage of Universe Totals Accounted for by Respondents in M3 Survey Reporting Shipments, Inventories, and Inventories by Stage of Fabrication, December 1976 . . . . .	20
Table 3.3. Sales and Inventories of Merchant Wholesalers as Compiled in the Census and Current Survey . . . . .	25
Table 3.4. Illustrations of Panel Bias in Estimates of Inventories, Grocery Wholesalers, 1973 . . . . .	26
Table 3.5. Illustration of Adjustments for Panel Bias in Estimates of Inventories, Grocery Wholesalers, 1975 . . . . .	26
Table 3.6. Merchant Wholesale Inventory, Unbiased Estimates, 1974-1976 . . . . .	27
Table 3.7. Monthly Composite Estimates of Merchant Wholesale Inventories and Their Change, 1976 . . . . .	28
Table 3.8. Comparison of Final Composite Estimates of Wholesale Inventories with CM and PM, 1976 . . . . .	28
Table 3.9. Effect of Treating "Identicals" as Nonrespondents in Wholesale Inventory Survey, March 1976-May 1977. . . . .	29
Table 3.10. Percentage of Sales and Inventories Imputed in Wholesale Trade. . . . .	30
Table 3.11. Imputations by Inventory Size of Wholesale Trade Reporting Unit, Selected Months, 1976 . . . . .	30
Table 3.12. Followup Survey of Wholesale Trade Firms Not Supplying Inventory Data for February 1976. . . . .	31
Table 3.13. Survey Characteristics in Retail Trade as of 1976. . . . .	32
Table 3.14. Annual Change in Book Value of Inventory Compiled in Monthly and Annual Retail Inventory Surveys . . .	35
Table 3.15. Source of Inventory Data Reported by Retailers to the Census Bureau in Retail Inventory Survey, Group II and Group I Retailers. . . . .	36
Table 3.16. Gross Margins of Department Stores . . . . .	37
<b>CHAPTER 4.</b>	
Table 4.1. Change in Business Inventories in Retail Nondurables Under Two Bases for Aggregation . . . . .	43
Table 4.2. Commodity Composition of Inventories, Weight and WPI Code, Electrical Machinery. . . . .	45
Table 4.3. Number of Stock Turns and Percent Distribution of Sales and Stocks, by Department, 1974. . . . .	45
Table 4.4. Percent Changes in WPI Total and Finished Goods Over 3-Month Spans, Seasonally Adjusted . . . . .	47
Table 4.5. Components of Change in Business Inventories (CBI) in the Electrical Machinery Industry, 1974 and 1975 . . . . .	50

# CONTENTS—Continued

	Page
<b>CHAPTER 5.</b>	
Table 5.1. Relation of Shipment and Order Prices to Time Lag Between Order and Shipment. . . . .	55
Table 5.2. Percentage Change in Prices of Selected Steel Products . . . . .	56
Table 5.3. Percentage Changes in WPI, Railroad Freight Index and Weighted Average (January 1969-December 1976) . . . . .	57
Table 5.4. Ratio of Imports to Imports Plus Domestic Production, Selected Metals . . . . .	57
Table 5.5. Time Lags in Delivery of New Orders, Hypothetical Example. . . . .	59
Table 5.6. Comparison of WPI Indexes of Intermediate Materials With Alternative Measures, Quarterly Rate of Change . . . . .	59
Figure 1. Wholesale Price Index 1968-1977 All Commodities Index and its Rate of Change . . . . .	62
Figure 2. Proportion of Total Quantity of Coal at Steam Electric Plants Purchased at Spot Prices (FPC). . . . .	63
Figure 3. Spot Prices, Contract Prices, and Weighted Average Prices of Coal Delivered to Steam Electrical Plants . . . . .	63
Figure 4. WPI and FPC Weighted Average Prices of Coal at Steam Electric Utilities . . . . .	64
Figure 5. Comparison of WPI and BLS Railroad Freight Index by Months, 1969-1976. . . . .	64
Figure 6. Steel Price Comparison: BLS (WPI) Versus Prices of Foreign Steel . . . . .	65
<b>CHAPTER 6.</b>	
Table 6.1. LIFO Pools Used by Department Stores. . . . .	67
Table 6.2. Estimates of the Effects of Use of LIFO on Earnings and Tax Liabilities . . . . .	71
<b>CHAPTER 7.</b>	
Table 7.1. Methods of Determining Inventory Cost, 600 Large Corporations. . . . .	76
Table 7.2. Estimates of LIFO Inventories in Manufacturing Industries, 1947 and 1951 . . . . .	77
Table 7.3. Estimated LIFO Inventories as Percentage of Total Book Value of Inventories, by Manufacturing Industry, 1951 and 1969. . . . .	78
Table 7.4. All Corporate Inventories, Inventories of Corporations Showing Valuation Method, Inventories of Corporations Using LIFO, Selected Industries: End of 1963 . . . . .	79
Table 7.5. Book Value Change, Change in Business Inventories, IVA and Change in IVA: 1972-1974. . . . .	82
Table 7.6. Estimated Proportions of End-of-1973 Manufacturing and Trade Inventories Valued by LIFO: Comparison of Proportions in Use by BEA With BEA Survey Results . . . . .	82
Table 7.7. Estimated Negative Impact on 1974 Before Tax Corporate Profits in Manufacturing Due to Firms' Switching to LIFO in 1974 . . . . .	84
Table 7.8. Preliminary Estimates of Methods Used to Value Inventories Reported in Census ASM and M3 Surveys, End of 1973 and 1974 . . . . .	85
Table 7.9. LIFO Proportions Used in BEA Estimates of Change in Business Inventories and Profits . . . . .	85
Table 7.10. LIFO Proportions Used in BEA Estimates of Change in Business Inventories and Profits for 1974. . . . .	85
Table 7.11. IVA Applicable to Inventories Before and After 1976 Benchmark Revision . . . . .	86
Table 7.12. Percentage Distribution of Retail Inventories by Valuation Method, Three Surveys . . . . .	86
Table 7.13. Percentage of Retail Inventories Valued by LIFO by Inventory Size Class, End of 1975 . . . . .	87
Table 7.14. Percentage Distribution of Merchant Wholesaler Inventories by Valuation Methods: 1974-1975 . . . . .	87
Table 7.15. Percentage of Merchant Wholesale Inventories Valued by LIFO by Inventory Size Class, End of 1975 . . . . .	88
Table 7.16. Proportion of Manufacturing Inventories Valued by LIFO in BEA and Census Bureau Surveys, by Industry, Selected Years. . . . .	88
Table 7.17. Methods of Valuing Inventories of Manufacturers in Census Bureau Monthly M3 Survey, by Industry, 1973, 1974 and 1975 . . . . .	89
Table 7.18. Methods of Valuing Inventories of Manufacturers Reporting to Census Bureau, by Survey and Industry, End of 1975 . . . . .	91
Table 7.19. Methods of Valuing Inventories of Retailers Reporting to Census Bureau, by Kind of Business, Specified Surveys, and Selected Periods. . . . .	93
Table 7.20. Methods of Valuing Inventories of Merchant Wholesalers Reporting to Census Bureau, by Kind of Business, End of 1975 and 1976 . . . . .	95

# CONTENTS—Continued

	Page
<b>CHAPTER 8.</b>	
Table 8.1. Example: Inventory Calculated Quarterly on a FIFO Basis . . . . .	100
Table 8.2. Illustration of End-of-Year Steps Required Before Inventories Can be Calculated Quarterly on a LIFO Basis. . . . .	100
Table 8.3. Example: Inventories Calculated Quarterly on Pro-Rata and Sales Bases. . . . .	100
Table 8.4. Illustration of Annual Inventory Calculations Using the LIFO Method; Actual Prices Higher than Projected . . . . .	101
Table 8.5. Example: Effects of Price Projections on Quarterly Inventory Projections Using a Pro-Rata Basis . . . . .	102
Table 8.6. Interim Reporting by 39 Large LIFO Firms to the Census Bureau. . . . .	103
Worksheet 1. Dollar Value LIFO Reserve, With True Quarterly Calculation. . . . .	105
Worksheet 2. Dollar Value LIFO Reserve, Short Method . . . . .	105
Table 8.7. Example: Various Estimates of Interim LIFO Reserves. . . . .	106
<b>CHAPTER 10.</b>	
Table 10.1. Example: Comparison of Full Cost Absorption and Direct Cost Methods for Treating Overhead Costs. . . . .	117
Table 10.2. Summary of Inventory Change and Gross Profits From Table 10.1 . . . . .	118
Table 10.3. Percentage of Firms Who do not Allocate Indirect Manufacturing Costs to Inventories: 1971. . . . .	119
Table 10.4. Categories of Indirect Costs Under IRS Full Cost Absorption Regulations . . . . .	120
<b>CHAPTER 11.</b>	
Table 11.1. Department of Defense Contract Awards by Type of Contract, FY 1975 and 1976 . . . . .	125
Table 11.2. Cost Accounting Depreciation Practices Compared With Financial Accounting and Income Tax Practices. . . . .	127
Table 11.3. Timing of Revenue Recognition by Contractors in Price Waterhouse Study . . . . .	128
Table 11.4. Timing Differences Relating to Revenue Recognition: Book V. Tax Methods . . . . .	128
Table 11.5. General and Administrative (G&A) Expenses Included in Yearend Inventory . . . . .	129
<b>CHAPTER 12.</b>	
Table 12.1. Business Inventories, End of 1974 . . . . .	132
Table 12.2. Successive Estimates of Change in Farm Inventories: 1967-1976 . . . . .	133
Table 12.3. Successive Estimates of Quarterly Change in Farm Inventories: 1971-1976. . . . .	134
Table 12.4. Grain Stocks on and off Farms: 1976-1977 . . . . .	135
Table 12.5. Inventories of Public Utility Corporations: 1965-1975 . . . . .	136
Figure 7. Excerpt From Petition Filed by Madison Gas and Electric Company to U.S. Tax Court . . . . .	138
Table 12.6. Inventory and Inventory Change in the Construction Industry: 1965-1974. . . . .	139
<b>CHAPTER 13.</b>	
Table 13.1. Stock-Sales Ratios Published by Bureau of Economic Analysis and Census . . . . .	142
Figure 8. Manufacturing Stock-Sales Ratios: Comparison of Ratios Based on Book Values With Ratios Based on Constant Dollars . . . . .	144
Table 13.2. Comparison of Stock-Sales Ratios Based on Constant Dollars and Based on Inventory Book Values and Current Dollar Sales . . . . .	145
Table 13.3. Comparison of Quarterly Peak and Troughs: Inventory Diffusion Index and Business Cycle. . . . .	146
Figure 9. Stocks of 41 Industrial Materials, January 1967-June 1975 . . . . .	148
Table 13.4. Industrial Materials Series With Physical Stocks and Related Data. . . . .	149
Table 13.5. Changes in Ratios of Stocks to Consumption or Sales. . . . .	149
<b>CHAPTER 14.</b>	
Figure 10. New Orders, Durable Goods Industries . . . . .	153
Figure 11. Unfilled Orders to Shipments Ratio, Durable Manufacturing . . . . .	154
Table 14.1. Ratio of Unfilled Orders to Monthly Shipments, by Market Category: 1976. . . . .	156
Table 14.2. Selected Purchasing Data for a Durable Goods Manufacturer . . . . .	156
Figure 12. Manufacturers' Unfilled Orders to Shipments Ratio, Nondurable Manufacturing . . . . .	159
Table 14.3. Purchasing for the Sportswear Department of a Department Store . . . . .	160
Table 14.4. Pattern of Orders Placement for Full Fall Season, Sportswear Department of a Department Store. . . . .	160

## HOW THIS STUDY IS ORGANIZED

We believe that accounting problems have not received sufficient attention from producers and users of economic statistics. Unless one understands how accountants treat problems such as inventory valuation—to cite the most important problem discussed in this report—it is difficult to understand statistics rooted in accounting magnitudes. We were forced to delve into these matters because of major shifts in inventory valuation methods that occurred in 1973-74. Thus, substantial attention in this report is given to practical accounting issues that have significance for economic statistics. Chapter 2 is an introduction to major methods of inventory valuation—FIFO, LIFO, etc.—directed to the non-accountant. In chapter 6 we treat LIFO in greater detail and discuss some issues concerning use of LIFO. In chapter 7 we discuss how BEA has used LIFO statistics developed in its own and Census surveys, focussing especially on the 1973-76 period.

In chapter 8 we consider interim reporting—quarterly reporting in practice—and the problems for such reporting that arise from use of LIFO. It contains suggestions to the accounting profession for dealing with some of these issues. In chapter 10 we discuss “full cost absorption” or more generally the treatment of overhead and what kinds of costs should be included in inventories. Chapter 11 concerns treatment of inventories in long-term contracts, which are important in durable goods manufacturing and the construction industry.

The main conclusions and recommendations are summarized in chapter 1. But this is only a highlighting of the major recommendations; the study contains many others. Chapter 3 shows how the Census Bureau prepares its estimates of inventories in manufacturing and trade; the section on wholesale trade has a detailed discussion of Census estimating procedures common to several different sample surveys. In chapter 4 we describe how BEA transforms Census inventory data measured in book values into estimates of the change in business inventories for the GNP. An example from recent experience provides the basis for an evaluation of the procedure. Because of the importance of wholesale price indexes in estimation of inventory change we have devoted a chapter (5) to some of the issues affecting price indexes. In chapter 9 we describe the choice of the reporting unit—companies, divisions and plants.

In chapter 12 we discuss some special inventory problems outside of manufacturing and trade; time limitations caused us to focus on industry issues we consider important for inventory measurement problems generally. Chapter 13 contains an assortment of topics that could not be fitted easily into the other chapters—stock-sales ratios, inventories measured in physical terms and market categories. In our final chapter (14) we recommend a new benchmark for unfilled orders held by manufacturers. This additional task was undertaken during the course of the study at the request of the Census Bureau.

