

Volume 15

Number 3

1998

Government Information Quarterly

Editor

PETER HERNON
Simmons College

Associate Editor

CHARLES R. McCLURE
Syracuse University

Symposium on the 1997 Economic Census
U.S. Bureau of the Census



JAI PRESS INC.
Stamford, Connecticut

London, England

Name of publication: **Government Information Quarterly** (ISSN: 0740-624X)

Issue: Volume 15 / Number 3 / 1998

Frequency: Quarterly (January, April, July, October)

Office of publication: 100 Prospect Street, P.O. Box 811
Stamford, Connecticut 06904-0811

Subscription rates (postage included):

Institutions: United States \$205.00
Foreign Surface Mail \$225.00
Foreign Air Mail \$245.00

Individuals: United States \$80.00
Foreign Surface Mail \$100.00
Foreign Air Mail \$120.00

Back issues available @ \$47.50 per issue from volume 1 onward.

Please contact publisher for missing issues.

All subscriptions must be prepaid and are for the 1998 volume.

POSTMASTER: Send address changes to:

Subscription Dept.: 100 Prospect Street, P.O. Box 811, Stamford, Connecticut 06904-0811
(Europe and United Kingdom): 38 Tavistock Street, Covent Garden,
London WC2E 7PB, England

Editorial Office: Simmons College, Graduate School of Library and Information Science,
300 The Fenway, Boston, Massachusetts 02115-5898

Copyright. This is a special issue of *Government Information Quarterly* published for the U.S. Bureau of the Census. No copyright is claimed for any article authorized by an employee of the United States Government. Notwithstanding the copyright notations on pages 243, 247, 263, 275, 303, 319, and 335 this material is in the public domain and no copyright is claimed. For *Government Information Quarterly* on the World Wide Web, see www.lib.auburn.edu/madd/docs/giq/conlink.html.

Government Information Quarterly is indexed in *Current Contents: Social & Behavioral Sciences*, *Current Index to Journals in Education (CIJE)*, *Information Science Abstracts*, *INSPEC*, *Library & Information Science Abstracts*, *Legal Information Management Index*, *Library Literature*, *Public Affairs Information Service (PAIS) Bulletin*, and *Social Sciences Citation Index*. It is also included in *Articles First* (OCLC Database), *CARL UnCover*, *Content First* (OCLC Database), and *Current Awareness Abstracts*. Book reviews are selectively covered in *The Journal of Academic Librarianship*.

Volume 15

Number 3

1998

Government Information Quarterly

Editor

PETER HERNON
Simmons College

Associate Editor

CHARLES R. McCLURE
Syracuse University

Symposium on the 1997 Economic Census
U.S. Bureau of the Census



JAI PRESS INC.
Stamford, Connecticut

London, England

EDITOR

Peter Heron
Graduate School of Library and Information Science
Simmons College
300 The Fenway
Boston, Massachusetts 02115-5898
<pheron@simmons.edu>

ASSOCIATE EDITOR

Charles R. McClure
School of Information Studies
Center for Science and Technology
Syracuse University
Syracuse, New York 13244-4100
<cmclure@mailbox.syr.edu>

EDITORIAL BOARD

Colin Bennett
Department of Political Science
University of Victoria
Box 1700, Victoria
British Columbia, V8W 2Y2, Canada

John Carlo Bertot
Department of Information Systems
University of Maryland
Baltimore County
1000 Hilltop Circle
Baltimore, Maryland 21250

Patrick J. Birkinshaw
Faculty of Law
The University of Hull
Hull HU6 7RX
United Kingdom

Gary Cornwell
Humanities & Social Sciences
Services Division
Library West
University of Florida
Gainesville, Florida 32611

Maggie Farrell
Montana State University Libraries
PO Box 173320
Bozeman, Montana 59717-3320

Robert Gellman
431 Fifth St., SE
Washington, D.C. 20003

Jane Bortnick Griffith
Science Policy Research Division
Congressional Research Service
Library of Congress
Washington, D.C. 20540

Jane E. Kirtley
The Reporters Committee
for Freedom of the Press
1101 Wilson Blvd., Suite 1910
Arlington, Virginia 22209

Henry H. Perritt, Jr.
IIT Chicago Kent
College of Law
565 West Adams St.
Chicago, Illinois 60661-3691

Harold C. Relyea
Government Division
Congressional Research Service
Library of Congress
Washington, D.C. 20540

Reviews Editor

John A. Shuler
Richard J. Daily Library
University of Illinois at Chicago (M/C 234)
801 S. Morgan St.
Chicago, Illinois 60607-7041
<alfred@uic.edu>

SPECIAL ISSUE

SYMPOSIUM ON THE 1997 ECONOMIC CENSUS,
U.S. BUREAU OF THE CENSUS

GUEST EDITOR

Kathy V. Friedman
Economic Planning and Coordination Division
U.S. Bureau of the Census
Washington, D.C. 20233-6100

< kfriedma@census.gov >

The Economic Census has the daunting task of describing the activities of 21 million businesses and nearly 1,100 industries. 1997 Economic Census products will tell us what those businesses produce or sell, where they are located, and the markets they serve. The result is a vital information resource for both government and business.

We hope you find this special issue of the *Government Information Quarterly* both interesting and illuminating. The Census Bureau is especially grateful to all the U.S. businesses who took the time and effort to complete and return their 1997 Economic Census report forms.

Thomas L. Mesenbourg, Jr.
Assistant Director for Economic Programs
U.S. Bureau of the Census

Government Information Quarterly

Volume 15, Number 3, 1998

CONTENTS

SPECIAL ISSUE

SYMPOSIUM ON

**The 1997 Economic Census
U.S. Bureau of the Census**

Edited by Kathy V. Friedman

Introduction Frederick T. Knickerbocker	243
---	------------

ARTICLES

Determining Economic Census Content Judy M. Dodds	247
Introducing the North American Industry Classification System Carole A. Ambler and James E. Kristoff	263
Conducting the Economic Census Shirin A. Ahmed, Lawrence A. Blum, and Mark E. Wallace	275
Disseminating Economic Census Data Paul T. Zeisset	303
Public and Private Sector Uses of Economic Census Data Mark E. Wallace	319
Evolution of the U. S. Economic Census: The Nineteenth and Twentieth Centuries William F. Micarelli	335
About the Authors	379

Introduction

Frederick T. Knickerbocker*

Federal Reserve Chairman Alan Greenspan has called the Economic Census “indispensable to understanding the American economy.” Economic censuses provide unsurpassed statistical data: Countless public and private decision-makers find Economic Census statistics more complete, more specific, more reliable, and more useful than any other single source of economic information.

The U.S. Census Bureau conducts an Economic Census every five years. Statistics from the 1997 Economic Census will feature the first-ever use of completely revised industry classifications. The release of initial census reports, early in 1999, will provide economy-wide statistics far earlier than for any previous census. Data products will be more comparable across industry sectors than ever before.

The articles in this special volume showcase the 1997 Economic Census, including its innovations, components, and history.

“Determining 1997 Economic Census Content,” by Judy M. Dodds, addresses the questions of *what* we measure and *why* we measure it. This article highlights the steps and explores complexities of deciding what information the census collects and in what formats. Considerations that the Census Bureau weighs include (but are not limited to) these: gathering data to meet the chief purposes that Economic Census data are meant to serve, such as providing benchmarks and sample frames for monthly quarterly, and annual surveys; balancing the need to capture changing economic conditions with the need for minimizing the burden on businesses of reporting census information; determining the availability of data that can be gathered from administrative records, rather than by canvassing directly every U.S. business establishment; and taking account of the additional costs associated with including additional census questions, the responses to which require

* Direct all correspondence to: Frederick T. Knickerbocker, Associate Director for Economic Programs, Office of the Director, U.S. Census Bureau, Washington, D.C. 20233-0160

Government Information Quarterly, Volume 15, Number 3, pages 243-245.

© 1998 by U.S. Department of Commerce

Economics and Statistics Administration

BUREAU OF THE CENSUS

All rights of reproduction in any form reserved. ISSN: 0740-624X

substantial processing. The article also emphasizes the lengths to which the Census Bureau goes to gather the input of federal agencies which use the data, in addition to obtaining the recommendations of trade associations, accounting organizations, and other data users and suppliers.

“Introducing the North American Industry Classification System,” by Carole A. Ambler and James E. Kristoff, describes the all-new North American Industry Classification System (NAICS). The data gathered, and the reports issued, from the 1997 Economic Census will be the first to provide official statistics on a NAICS basis. Introducing a consistent, production-based economic concept, NAICS replaces the Standard Industrial Classification (SIC)—a system used in the U.S. since the 1930s—to classify business establishments by industrial sector. This article shows how NAICS recognizes hundreds of new industries that have emerged in our highly technological, increasingly service-oriented economy, and why NAICS provides a clearer basis than the old SIC for the classification of economic activity that will continue to evolve in both the U.S. and North America in the 21st century. In cooperation with Canada and Mexico, the U.S. developed this system in the early 1990s, and officially adopted the system in 1997.

“Conducting the 1997 Economic Census,” by Shirin A. Ahmed, Lawrence A. Blum, and Mark E. Wallace, details the carefully-managed multi-year actions needed to prepare for, collect, process, and tabulate information for over 20 million business locations. This account begins with the thorough evaluation, in 1994, of previous census data processing techniques. The purpose was to seek major technological improvements for conducting the 1997 Economic Census. Described here are the substantial innovations for the multi-establishment, company mailout process. Also detailed are census subject matter analysis and quality review steps; fundamental changes in table design and layout, as well as in the product dissemination system; and the effects of those changes in supporting greatly increased data product standardization, comparability, and usefulness.

“Disseminating Economic Census Data,” by Paul T. Zeisset, describes the ways that 1997 Economic Census data will be reported—in terms of industries, scope, geographic areas, types of reports, and timing. CD-ROM and the Internet are described as comprehensive sources for published data from the census—in both database and page image formats—while less data will appear in hardcopy than for previous Economic Censuses. The article discusses the challenges of assembling time series data, particularly in view of the conversion from the SIC system to the NAICS. After reviewing other sources of information, the article closes by recommending the Economic Census web site <www.census.gov/econ97> as the most comprehensive and up-to-date source of information about census data.

“Public and Private Sector Uses of Economic Census Data,” by Mark E. Wallace, uses a construction metaphor to show how Economic Census statistics provide essential building blocks for the analysis of specific businesses, industries, and geographic areas. These building blocks also form the secure foundation for economic surveys, performance estimates, and analyses done by countless public agencies and private entities. Illustrated in this article are the variety of ways in which Economic Census statistics are applied to practical matters by federal, state, and local officials, by private business planners and managers, and by academic and professional researchers. The article is organized around five major categories of uses for Economic Census data: as a framework and benchmark for

current economic surveys; as source data for calculating composite measures of the national economy; for planning and monitoring economic policies and programs; for research, marketing, and management in the private business sector; and to measure and track changes in economic activity.

“Evolution of the U.S. Economic Census: The Nineteenth and Twentieth Centuries,” by William F. Micarelli, portrays the path of Economic Census data collection from the first instance—as part of the 1810 Decennial Census—to full electronic data availability in the 1997 Economic Census. Recounted here are the many historical events that have had an impact on the Economic Census. These include the Civil War, formation of trade societies, westward expansion of the nation, extensive use of administrative records in lieu of data collection, and the acquisition of UNIVAC I. “Over the past 187 years,” Micarelli observes, “the importance of the Economic Census has grown in direct proportion to the growing complexity of the nation’s economy.”

The 1997 Economic Census will provide uniquely relevant, timely, and useful statistics (on our nonfarm economy), including statistics that will be comparable to those of other North American countries. For the first time in the history of economic census-taking, all census results will be accessible electronically. Read this special issue to learn how and why these data can enhance our nation’s competitiveness, the public effectiveness of our policy makers, and the vitality of U.S. business activity.

Determining Economic Census Content

Judy M. Dodds*

Determining the content of the Economic Census is one of the Census Bureau's most important tasks. It involves balancing the needs of the data user with the burden imposed on the respondents; deciding which of the competing needs for data are most important and appropriate for the Economic Census; and working with groups that represent both data users and data suppliers to develop questions that will result in data that are both accurate and relevant.

For many years, the Economic Census has been the foundation of much of the nation's economic statistical system. Determining the content of the census—that is, deciding what data will be gathered by the questions that are placed on the census forms—is one of the most important jobs that the Census Bureau does. Census Bureau staff—in consultation with other federal government agencies, private industry, and academic community officials—must decide which of the various requests for data will, or will not, be included on the questionnaires. Moreover, the Census Bureau has had to decide which data, while valuable, can no longer be collected due to various constraints that will be discussed below.

The specific data to be collected are governed by the chief purposes served by the Economic Census. Economic Census data are used for:

- Benchmarks and sample frames for monthly, quarterly, and annual surveys that provide timely measures of the nation's economy between censuses;
- Data for measuring growth and changes in the nation's economy over time;
- The basic statistical framework for composite measures of the nation's economic activity;

** Direct all correspondence to: Judy M. Dodds, Assistant Division Chief for Census and Related Programs, Manufacturing and Construction Division, U.S. Census Bureau, Washington, D.C. 20233-6900
<Judy.M.Dodds@ccMail.Census.GOV>.*

Government Information Quarterly, Volume 15, Number 3, pages 247-262.

© 1998 by U.S. Department of Commerce

Economics and Statistics Administration

BUREAU OF THE CENSUS

All rights of reproduction in any form reserved. ISSN: 0740-624X

- Development and analysis of federal economic policy;
- Planning and evaluating the results of a wide variety of programs of other federal agencies;
- Geographic area statistics, which local governments use for planning and evaluation purposes and for comparing their areas of jurisdiction with other areas;
- Business planning for such purposes as:
 - Determining the best locations for manufacturing plants, warehouses, stores, and other facilities;
 - Measuring potential markets;
 - Forecasting sales and analyzing sales performance;
 - Laying out sales territories;
 - Allocating advertising budgets; and
 - Trade publications and by trade associations for programs and studies to assist their members and readers.¹

The overall responsibility for determining the questions to be asked is vested (by Title 13, Section 5, of the *U.S. Code*) in the Secretary of Commerce, who has delegated this authority to the Director of the Census Bureau. The Economic Census provides general purpose statistics. The data needs of all users are considered, but not all their requests can be granted. Fortunately, the needs of many data users are similar. However, some prefer more geographic detail; others need more industry or product information; and yet other data users would like greater detail on materials used, for example, in the manufacturing process, or some other area of interest. These differences are usually reconciled, or compromises agreed upon, during the planning process. Differences on such issues as level of geographic detail involve *only the summary level at which the data will be published*, not the actual data to be collected.

Nevertheless, various problems can arise: Many data users correctly view the Economic Census as a “golden opportunity” to obtain statistical information about their industry or field of interest. They request that questions be included to meet these needs. But, some of the resulting requests are for data that are not required by large numbers of data users. To honor such requests would greatly increase the cost of the Economic Census and the burden upon those who provide the information. Although Title 13 *requires* businesses to report in the Economic Census, the *cooperation* of the business community is essential to the success of the program. This is particularly true for questions that require companies to provide estimates or other information not available from financial, tax, or other records.

Moreover, legislation currently limits the total response time needed by businesses to complete federal agency information requests. As a result of these practical and legal restrictions—on the quantity of information that can be obtained through the Economic Census—there is an increasing competition for placement of questions on the census forms. On the one hand, information currently collected is important. On the other hand, new data may be required to answer questions about rapid changes occurring in the nation’s economy. To weigh and resolve these competing needs, the Census Bureau has established a number of criteria for determining what questions, from among the hundreds upon hundreds of questions proposed, will be included on the questionnaires.

CRITERIA FOR INFORMATION COLLECTED IN THE ECONOMIC CENSUS

General Purpose Statistics

As mentioned, the Economic Census is designed to provide general purpose statistics to all users of economic statistics. Collection requests for data that are needed by only a single data user, or a small number of data users, are generally not accepted.

Priority of User or Program

For the most part, requests for data from other federal agencies are given the highest priority. Requests from the Bureau of Economic Analysis (BEA) for data that will be used for the national accounts and for benchmarking or improving estimates of Gross Domestic Product (GDP) are considered the most important. High priorities also are given to data requests from the Federal Reserve Board and the Bureau of Labor Statistics, as well as from other federal agencies that request data for such mandates as monitoring the impact of foreign trade.

Costs

As with many other federal agencies, the Census Bureau operates within an increasingly limited budget. The cost of collecting and disseminating data has become a more and more important consideration. The Census Bureau has, at times, had to deny certain data requests, and in some cases, eliminate previous data collection efforts, simply because the funds are no longer available.

When requests are made for additional data to be collected, the assumption is that—since the Economic Census is being conducted in any case—there can be but little or no additional expense for further inquiries. This assumption is just partially true: it is predominantly true for such things as printing and mailing questionnaires. However, *each additional question can incur substantial costs* for:

- Follow-up by mail or telephone of establishments that do not respond;
- Data keying;
- Computer editing of reported data;
- Resolutions of problems discovered in the analysis of reported data, including, possibly, the need to contact respondents;
- Analysis of additional summary data at every level of publication; and
- Dissemination of the data, both electronically and on paper.²

Availability of the Same or Similar Data

Requests to collect data that are already available—or for which substantially similar data are available from another government or private source—generally are not accepted. Such data may be available, or potentially available, from statistical programs or administrative records of other federal agencies, from trade associations, or from business publications.

The availability of similar—or even apparently identical—information does not, however, mean that a request will *automatically* be denied. Frequently, it can be demonstrated that the available data are inadequate in quality or scope. For example, in some cases, statistical information that is available as a by-product of programs of other agencies may not meet the needs of economists or other data users because they are the result of tax or regulatory programs that involve fundamentally different definitions of the data items.

Availability of Company Records; Respondent Difficulty in Making Estimates

To the extent possible, census questions are designed so that the information can be provided from records that companies customarily maintain for accounting, tax, or other purposes.

The need for data occasionally involves information for which such records are not maintained. The capability of companies to make *reasonable estimates*—if such records are not available—is an important consideration in determining if a proposed question will be included in the census.

This issue arises when the need for information involves summary data that are not required for a company's own purposes. In some cases, data requests involve information that clearly is *not* available in the records of the affected companies. In such situations the company still may be the only feasible source of estimates. For example, information may be required about the uses that are made by the customer of the products sold, or whether products sold by manufacturers to other producers become part of other products that are exported. If data based on the industrial classification of the producing or selling company are required, they can only be obtained from that source. When, for any reason, book records are not available, companies are requested to provide their best estimates.

While the lack of records and the difficulty of making estimates are important factors for not including a question in the census, the need for the information may be so great that the question must, nevertheless, be included. In such situations, the Census Bureau often has found that estimates prepared by—or under the direction of—the owner or manager of a business are better than those available from any other source. (This is particularly true of information for which the business has detailed information but does not summarize the data in the manner required for census purposes. For example, expense categories or sales by type of product may be summarized by a company's operating divisions rather than by store, plant, or other location. It is less true for data for which the business does not have detailed records, such as questions about the use or disposition of products after they are sold. In that case, the owner or manager cannot provide the information.)

Burden of Reporting Imposed on Business Community

Another important consideration in determining which questions to ask in the Economic Census is the amount of burden and expense that the proposed inquiry would impose on the business community. "Response burden" is the measure of the total time required to complete a questionnaire—that is, the average time needed to complete the census form—multiplied by the number of respondents to whom the form is sent.

The Census Bureau is but one of many federal, state, and local government agencies that require reports (that is, completed census forms) from businesses for tax, regulatory, and statistical purposes. In total, these reports represent a major cost to businesses. The problem is particularly acute for small and medium-sized businesses for which the census reports may represent a much larger burden in proportion to their size and financial resources. To reduce the reporting burden of the small business community, census reports are not required from most (about 15 million) very small firms—particularly in the construction, trade, and services sectors. Limited data for these very small businesses are obtained from probability samples or from administrative records³ obtained by the Census Bureau from the Internal Revenue Service (IRS) and/or the Social Security Administration (SSA).

In response to concerns from the business community about the increasing reporting burden imposed on businesses by federal agencies, the Paperwork Reduction Act was enacted in 1980. In fact, the law required an actual reduction in the level of paperwork during the first two years, but did not specify which data efforts should be curtailed or eliminated. This was left to the discretion of the individual agency and the Office of Management and Budget (OMB) of the Executive Office of the President.

Because of the importance of the Economic Census, no major cuts were made in the content or coverage program as a direct result of the law. However, the Census Bureau did substantially increase its use of administrative records as a proxy source of information for small firms. And, it has become an important consideration in determining if an inquiry will be included in the Economic Census, since—as a consequence of the law—additional respondent burden resulting from questions *added* to the census must be *offset by reductions* in other Census Bureau data collection programs.

Comparability of Proposed Data Requests with Similar Data from Administrative Records

A further consideration in determining census content is the similarity of proposed data requests with data available from administrative records. This is an outgrowth of the Bureau's increased use of such records. Limited, but key, data from administrative sources are used:

- As proxy statistics for most very small businesses (particularly in trade, construction, and services);
- For control purposes to compare reported data with known information about that firm (to detect errors in reporting or coverage); and
- As the basis for estimating essential data for companies for which reports cannot be obtained.

Since administrative records are an integral part of the structure by which the Economic Census is conducted, census definitions may be designed to assure that reporting is based upon the same definition used in the program from which the administrative records are obtained. For example, the definition of “payroll” on the census forms is identical to that on the quarterly report (IRS Form 941) that companies file when they submit federal pay-

roll taxes withheld from employees' salaries. Furthermore, the reporting period for the census, for the number of employees, is the same as for the quarterly tax report.

For statistical purposes, some variations from the tax form definitions might be preferable. However, using the same definition on the census form as that used for administrative files facilitates combining data from these two sources. This outweighs any disadvantages of a restricted definition. Moreover, it often happens that the use of administrative source definitions on census forms actually improves the quality of data reported by larger firms.⁴

Historical Continuity of Data

Another criterion is the historical continuity of the data. However, when other needs predominate, then this criterion becomes less important. The 1997 Economic Census provides a case in point.

The North American Industry Classification System (NAICS)

The 1997 Economic Census will be the first to collect data and publish results in terms of NAICS. NAICS replaces the Standard Industrial Classification (SIC) system (used in the United States since the 1930s) as the basis for grouping all economic activities into like categories. NAICS was developed in cooperation with Canada and Mexico.⁵ The new system will meet the needs of analysts to compare the data of the three North American Free Trade Association trading partners.

During the time that SIC was in use, there were periodic updates that were intended to reflect the changes in technology—and structure of the U.S. economy—that had taken place over time. These updates, while keeping up with some types of changes reasonably well, did not effectively keep up with the more dramatic changes that occurred since SIC was originally adopted. In order to reflect adequately the new structure of the economy, a new classification system was developed.

In order to address the break that NAICS will introduce into the historical continuity of Economic Census data, the Census Bureau will publish *Bridge Tables*, to be issued early in the year 2000, covering all U.S. industries at the national level. *Bridge Tables* will present 1997 Economic Census Data cross tabulated by both the old and new classification systems. This will help alleviate problems for data users when dealing with breaks in time series data.⁶ The introduction of the new classification system also had tremendous consequences for the Economic Census' forms design process. Many of the additions and changes that the Bureau made to the 1997 census forms were made in order to classify correctly establishments under NAICS. Because the NAICS approach in many areas is quite different than the SIC, a large number of special inquiries and check box questions have been added to the forms to collect information on classification. Much of this collection is for information that will not actually be published but that will be used by the Census Bureau in editing and tabulation operations.⁷

In sum, the historical continuity of data—as a criterion for inclusion of questions in the Economic Census—is given some weight, but questions are not automatically retained because they were included in the previous census. Figure 1 summarizes the factors that have been discussed that relate to the determination of Economic Census content.

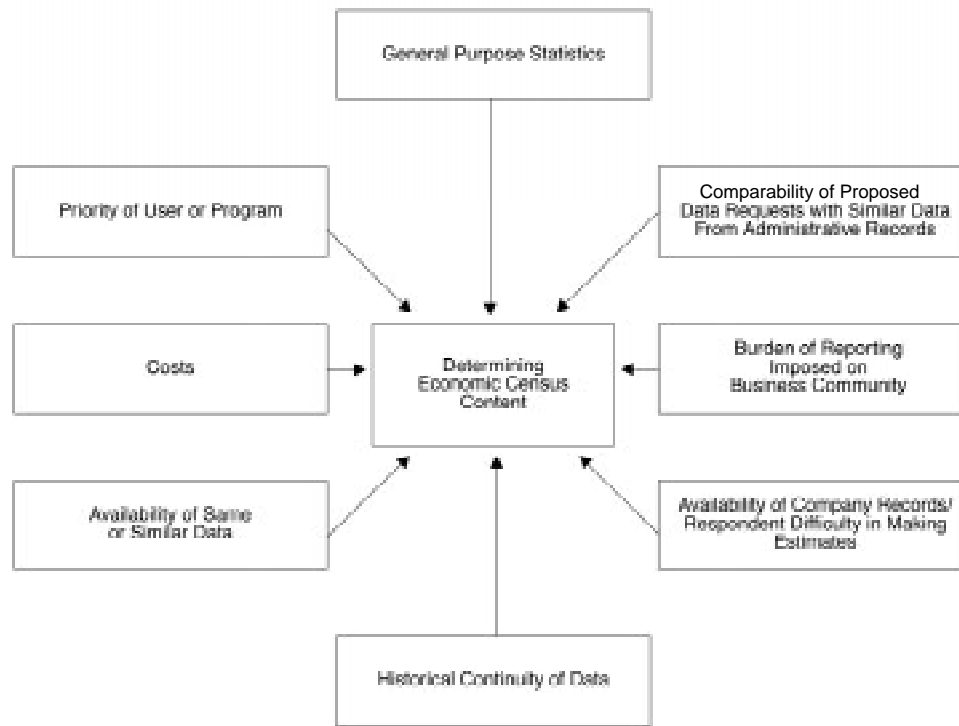


Figure 1
Criteria for Determining Economic Census Content

THE SELECTION PROCESS

Once the criteria are established—guiding the Census Bureau in determining what questions will be included—the next step is the actual selection process. When does the process begin? Who recommends questions for inclusion? And, who actually *decides* what questions will be asked?

In a broad sense, the selection process is continuous. Recommendations received too late for one Economic Census automatically are considered for inclusion in the following census. Recommendations may be made by any public or private individual or organization, but the Census Bureau makes the final determination.

As the Census Bureau has planned and conducted nine Economic Censuses since the combined census program was introduced in 1954,⁸ procedures have developed that may be considered typical. Beginning with the 1954 Economic Census, the Bureau has been consolidating the previously separate censuses of manufactures, minerals, commerce, and the like with a fully integrated census that provides comparable data across economic sectors. With each succeeding census, the Bureau has developed more consistency in time periods, concepts and definitions, classifications, and reporting units. The move toward a fully integrated Economic Census will be completed with the 1997 Census, where the

Bureau will standardize the data product line by adopting a uniform presentation of results across sectors.⁹ This move toward an integrated Economic Census has been carried through in the procedures for determining the content of the questionnaires.

Meeting with User Federal Agencies

To obtain concrete recommendations from federal agencies that are major users of census data, meetings are held early in the planning process. The meetings for the 1997 Economic Census were held in early 1995 and in 1996. Agency representatives were advised that, even though funding for the census permitted no major expansion in scope or coverage, changes to the census content for specific industries and questionnaires could be considered. For example, changes could be made to the list of products produced, materials used, and special inquiries tailored to the 450 manufacturing—and the more than 300 other—industry classifications covered by the 475 variations of the 1997 Economic Census questionnaire. Representatives were asked to review their agencies' data needs, together with the data from past censuses, and to make written recommendations for changes. Agencies that could not, or did not, attend the meeting were invited by letter to provide recommendations.

Recommendations from the Bureau of Economic Analysis

Because of the critical importance of the Economic Census to the BEA, special consideration is accorded BEA's recommendations. BEA extensively uses Economic Census data directly and indirectly in developing and benchmarking estimates of GDP and for related national accounts work.¹⁰

Studies in recent years directed at improving estimates of GDP have identified many areas in which improved or additional census data are required. The large expansion of the coverage of the 1992 Economic Census was the result of recommendations of BEA and others federal agencies. At that juncture, the Finance, Insurance and Real Estate, Communications, and Electric, Gas, and Sanitary Services sectors were added to the Economic Census. Since that time, however, budget reductions have forced the Census Bureau to limit adoption of additional recommendations from BEA. Nevertheless, BEA recommendations are carefully considered by the Census Bureau. Most of the long-range plans for enhancement of the census address BEA's data needs for improvements to the national accounts.

Recommendations from Trade Associations and Trade Publications

To obtain specific recommendations for the private sector, the Census Bureau contacts hundreds of specialized trade and professional associations and trade publications. These organizations are asked to review a copy of the most recent census questionnaire for their industry and are invited to provide recommendations for improving census data. Meetings are held with many of these organizations to update industry terminology, lists of products and materials used, and special inquiries that are tailored to the needs of each industry. These cooperative meetings with industry representatives are the most effective means of determining the data needs of individual industries.

Most of these organizations fully appreciate the value of the Economic Census to their industries, and want to work closely with Census Bureau subject analysts to reconcile differences and to resolve problems. They may want to benchmark their *own* monthly or annual surveys to the census results. The resulting continuous personal contacts with trade association representatives enable Census Bureau staff to keep abreast of the latest industry trends, terminology, technology, and data needs. The role of trade associations in determining the census content is highly important.

Meetings with Accounting Organizations

As part of the planning process for recent censuses, meetings have been held with public accounting organizations to obtain their assistance. The interest of these organizations—whose members frequently complete the census questionnaires for their clients—is somewhat different from that of other professional associations. Accounting organizations basically are concerned with keeping the reporting burden of their members to a minimum.

By bringing accounting organizations into the planning process, several objectives are achieved:

- Accountants gain a better appreciation of the importance of the census, both to the nation in general and to their members and clients;
- Their suggestions frequently result in reductions in respondent burden; and
- Valuable information is obtained about the types of records maintained by businesses and the burden imposed by certain types of data requests.

Informal Contacts with Data Users and Suppliers

Equally important as these formal meetings and solicitations of recommendations are various informal means of learning about the needs of data users and the feasibility of collecting the data. Inquiries about the availability of data, or requests that specific data be collected, are received regularly from data users in both the public and private sectors. Letters from respondents, or notes on completed questionnaires, advise the Census Bureau of problems in reporting certain information. As a result, alternative data items frequently are suggested. Recommendations or requests also are received at the various conferences, seminars, and training programs that the Census Bureau conducts for data users in the public, private, and academic areas. While, individually, such requests are not critical in the processes of determining the data to be collected, collectively they provide important information both about the needs of data users, and the problems of data suppliers. Figure 2 summarizes the sources of recommendations for the question selection process.

EVALUATION OF RECOMMENDATIONS AND DEVELOPMENT OF QUESTIONNAIRES

Data users frequently request that data be collected in the census, but sometimes this occurs with little understanding of the difficulties that may confront businesses in providing the

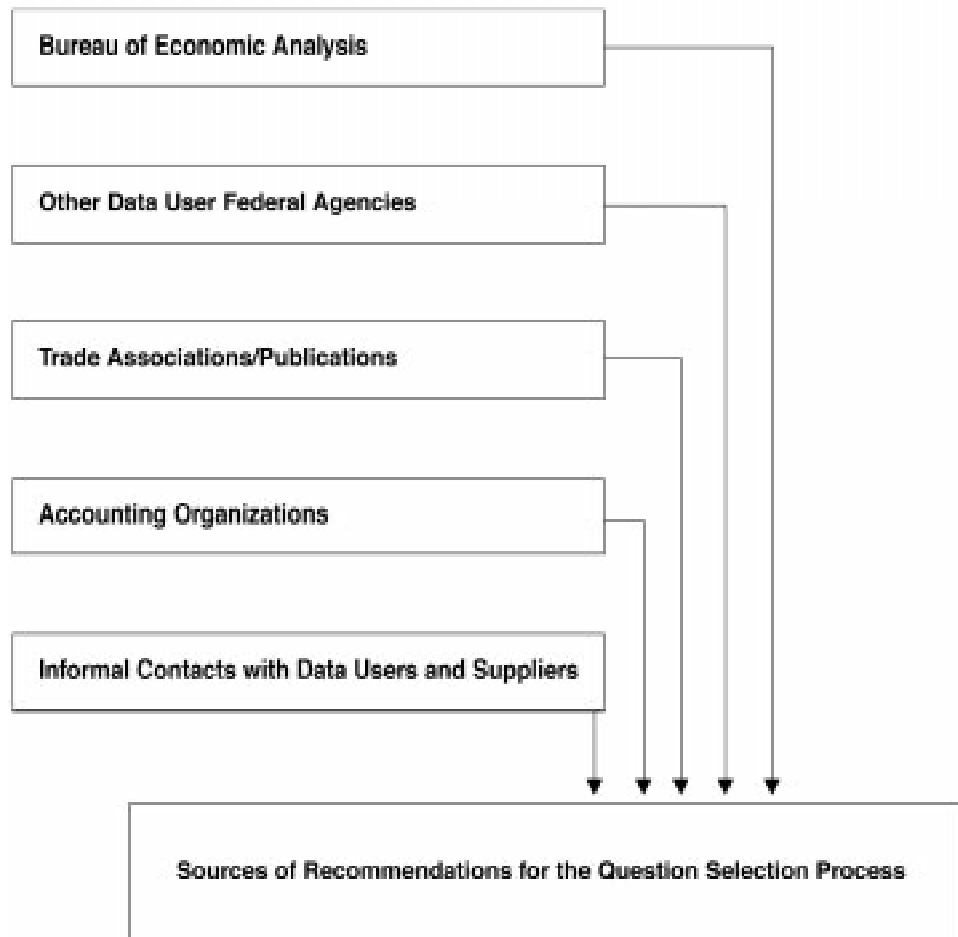


Figure 2
Sources of Recommendations for the Question Selection Process

information. The Census Bureau is sometimes viewed as the *source or producer* of data—rather than as a *collector and compiler of information* from *other* data sources. While this may appear obvious in a written account such as this, it is often overlooked in the desire to obtain information.

To determine if the sought-after information *can* be reported, one or more of several possible actions may be taken by the Census Bureau. If the information clearly may be required by businesses for financial, tax budgetary, regulatory, or other purposes, then the Census Bureau knows that the information potentially is available. In other cases, trade or professional associations, or accounting organizations familiar with the industry, may provide adequate information to the Census Bureau about the availability of information from establishment records.

Recordkeeping Practices Survey

For certain data needs, there may be no clear pattern of information available from establishment records. Because of the importance of designing questionnaires that can be completed from available records—or for which reasonable estimates can be made—the Census Bureau may conduct a survey of the recordkeeping practices of representative firms. The objective of such a survey is to determine if companies have the capability of providing data not previously requested in the Bureau's Economic Census and surveys. The survey also may obtain information for evaluating data currently being collected in the census or in current surveys. No attempt is made to collect actual data in these surveys, only to gather information on how companies and establishments maintain records.

The most recent survey of this type was the 1989 Recordkeeping Practices Survey. It was an extremely comprehensive survey conducted through both mailed questionnaires and personal visits. The questions asked on the survey covered such diverse items as:

- Preferred paper size and style of forms;
- Past experience with reporting on the census;
- What information about individual establishments is available from the company;
- The company's ability to provide demographic information about the owners or stockholders; and
- Records that were maintained regarding such items as assets and capital expenditures, purchased services, inventories, depreciation charges, and employment by function.

The above mentioned expansion of the coverage of the Economic Census in 1992, along with rapid organizational changes that were occurring at the time in the business world, led to one of the most important questions in the Recordkeeping Practices Survey, namely: What is the appropriate statistical unit to collect some of these types of data? The results of the 1989 survey revealed two important findings, namely that: For much of the data the Bureau was trying to collect, the traditional establishment¹¹ was still an appropriate unit of measure; and that much of the data the Bureau was seeking *was* available from establishment records.

There were, however, data items that the Recordkeeping Practices Survey indicated should be collected by means other than the establishment-based Economic Census. In some cases, the entire company, or major segment of a company, would be the appropriate statistical unit; in others, a sample survey would produce better data; and in yet other cases, the survey indicated that the information simply was unavailable—for example, capital expenditures for industrial machinery. In relation to this, for a number of years, there has been significant interest in the country-of-origin of certain kinds of industrial machinery purchased by manufacturers. The Recordkeeping Practices Survey indicated that 95 percent of companies kept no records for, and therefore did not know, the origin of the equipment they purchased. Consequently, questions concerning this aspect of capital expenditures have not been added to the forms for the Economic Census.

Information from the 1989 and earlier surveys have been invaluable in determining if inquiries under consideration meet the various evaluation criteria. These surveys have frequently been the most reliable guide for deciding if the data being requested are maintained

in company or establishment records, and if the definitions are consistent with those used by the companies the Census Bureau plans to canvass.

Testing Proposed Inquiries or Questionnaires

Test or "pilot" surveys of representative companies occasionally are conducted in advance of the census. The purpose is to test new survey methodologies designed to reduce costs, sampling error, or respondent burden. Since this is an extremely expensive undertaking, pilot surveys are normally done only when major methodological changes are being considered. Pilot surveys also may be used to test the wording of inquiries and instructions for a proposed survey, question, or solution to a problem.

FINAL DETERMINATION AND APPROVAL OF QUESTIONNAIRES

After all recommendations have been received, after the requirements for classification revisions have been determined, and after the results of recordkeeping or test surveys have been evaluated, it might be assumed that the items to be included on the form would be selected by a committee or through the application of a set of objective rules. In fact, no such mechanism exists. In many cases, only the Bureau's subject analysts have the necessary understanding of both the need for the data, and the problems and costs of collection to make an informed decision.¹²

While the data items selected for inclusion in the census are subject to extensive review, in general, the individuals who work most closely with the industry, group of industries, or economic sector involved play the dominant role in the final determination. For this purpose, it is appropriate to divide census inquiries into two types: (1) inquiries that are unique to a specific industry or group of related industries; and (2) general inquiries that are applicable to entire sectors, such as manufacturing or construction, or to all of the sectors covered by the census.

The first group—items that are unique to a specific industry—includes such information as the specific products produced or lines or merchandise sold; types of materials consumed in manufacturing; types of machinery or equipment owned or used; or the manufacturing process employed. These are questions for which the knowledge of the Bureau's subject analysts, as well as the aforementioned trade associations and other industry representatives, is essential in the decision-making process. Such inquiries are selected, and the wording designed, by the subject analysts after evaluating all of the available information and recommendations.

The decision process for questions common to an entire economic sector, or to all sectors covered in the Economic Census, is more complex. Such questions frequently are based on the needs of economists for additional or improved data for the national accounts. They may present serious problems of definition, respondent burden, or cost of collection. They include questions on topics such as capital expenditures, depreciation, gross and net value of assets, inventories, operating expenses, and sales by type of customer that apply to *all* industries in an economic sector. And, they include the even broader measures of total

sales or shipments, employment, and payroll that are common measures across the entire Economic Census.

Since these measures are needed for broader areas of the economy, it is important that the data be collected using the same concepts and definitions applicable to all industries and sectors. Consequently, decisions on such data items are made at a higher Census Bureau organizational level¹³ after considering all of the relevant criteria. These two basic types of data items cannot be completely separated, however. For example, after the basic decisions are made on such inquiries as shipments or materials consumed in manufacturing, the lists and definitions of specific products or materials are developed by the subject analysts.

After the general questions, related definitions, and formats are determined for each sector, they are provided to the subject analysts for completion of the 475 different industry-specific questionnaires used for the 1997 Economic Census. The format of the questionnaires and general inquiries are similar *within* each economic sector. Specifics, such as the list of products produced and materials consumed by manufacturing industries, vary.

Review and Clearance

OMB has responsibility for final approval of all census forms requesting data from individuals, businesses, and other organizations in the private sector. As part of its review, OMB is required, by law, to verify that the requested information:

- Is necessary;
- Is not already available from other government or private sector sources; and
- Can be reported from the records customarily maintained by respondents, or that reasonable estimates can be provided.

It also determines that the data collection will be conducted within the reporting burden control program, that is, will not result in an overall increase reporting burden on the business community.

Prior to submitting the draft forms to OMB for final approval, a notice is published in the *Federal Register* announcing the Census Bureau's plan to conduct the census, and informing interested parties of their opportunity to comment on the forms. At the time of this announcement, copies of the proposed forms are made available at the Bureau's Internet site—www.census.gov/econ97. Interested parties also may write to the Census Bureau for copies of the census forms. Comments concerning the forms, or the proposed data collection, can be sent either to the Census Bureau or to OMB.

Final Preparation of Forms

Once the final content of the forms is determined, the industry specialists (subject analysts) take several actions:

- They notify anyone who submitted comments or suggestions of the Bureau's decision with respect to their recommendations.
- They finalize the wording for questions, insuring that questions that are common across sectors are consistent.
- They incorporate any modifications that pertain either to instructions or to layout of the form.

Determining the content of the Economic Census and developing the questionnaires designed to collect the data are intricate and lengthy processes, as well as one of the Census Bureau's most important tasks. Figure 3 summarizes the processes that have been described in this article, and shows their important relationship to the feature attraction itself: the actual conducting of the Economic Census.¹⁴

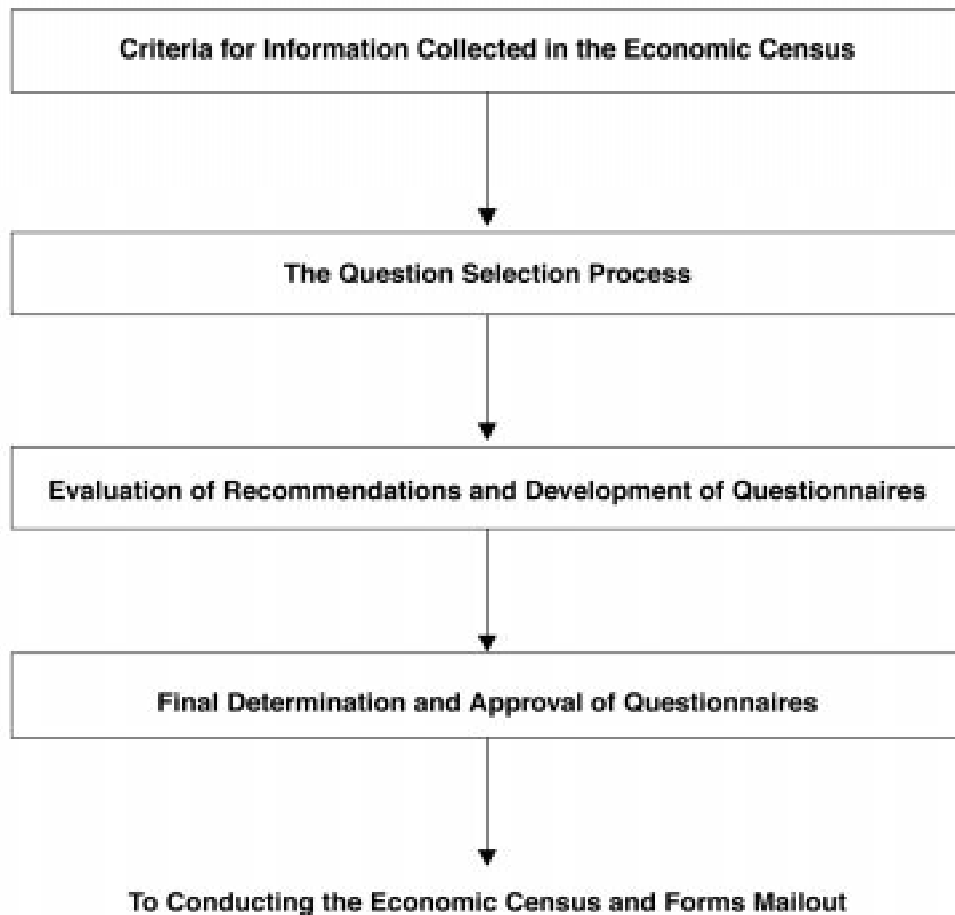


Figure 3
The Processes Underlying the Determination of Economic Census Content

NOTES AND REFERENCES

1. See Mark E. Wallace, "Public and Private Sector Uses of Economic Census Data," *Government Information Quarterly*, 15 (1998):321–336, for a discussion of the chief purposes served by Economic Census data, and for examples of data use for business planning purposes.
2. To see how the addition of questions to the questionnaire would incur such additional costs, see Shirin A. Ahmed, Lawrence A. Blum, & Mark E. Wallace, "Conducting the Economic Census," *Government Information Quarterly*, 15 (1998):275–304. This article provides a step-by-step account of how census data are collected, processed for use, and then published and distributed.
3. "Administrative records" is the term used to describe data on the business entity, its classification, payroll, employment, and receipts that the Census Bureau obtains from the records filed with the IRS or the SSA. (The relationship, however, is not two-way: the Census Bureau *does not share the data it collects on businesses with any other agency*. These data are confidential, and this confidentiality is protected by Title 13 of the *U.S. Code*.) Where possible, the Census Bureau makes use of all, or part of, administrative record information to substitute for data that would otherwise be collected in a direct canvass. This alleviates the reporting burden for small firms.
4. For example, the Bureau of Economic Analysis requires measures of retail sales that include state and local sales taxes as well as federal excise taxes. The sales figures available from administrative records generally include excise taxes, but exclude sales taxes. This matches the information available on business accounting records, since excise taxes are normally paid by the manufacturer or distributor, but sales taxes are normally paid by the customer.

Because of the importance attached to the needs of the national accounts, the Census Bureau tried, for many years, to include both categories of taxes in the sales definition, leaving it to national accounts economists to adjust the portion of census sales data based on administrative sources. However, the census definition was inconsistent with the respondents' own records. Therefore, what resulted was a very poor reporting of sales taxes as a component of sales. It was a particular problem with multi-establishment firms, whose accounting records for sales taxes are structured according to administrative reporting requirements, rather than by the store in which taxes were collected, which corresponds to the census reporting structure.

Not only was it difficult to collect sales figures including sales taxes, but also special studies were required to determine the portion of sales taxes that had been omitted from reported sales. The work of national accounts economists had been made *more* difficult rather than easier. The census definition of sales now excludes sales taxes paid directly to tax authorities. The quality of the reported data is much improved, and BEA accountants can more reliably adjust the census sales to suit national accounts purposes.

This experience underscored the importance of requesting data based on definitions consistent with business records. Good quality reported data are generally preferable to poor quality data that exactly meet user's definitions. The data user often can obtain the necessary information to adjust for any deficiencies and with a better overall result. In this example, it is possible that BEA could develop estimates of sales taxes from information directly from the authorities. This information could then be used by BEA to adjust the sales and receipts data. In this way, they would have much more confidence about what is actually included in the data.

5. See Carole A. Ambler & James E. Kristoff, "Introducing the North American Classification System," *Government Information Quarterly*, 15 (1998):263–273, for a complete account of the emergence and characteristics of the new system.
6. For more discussion on this subject, see Paul T. Zeisset & Mark E. Wallace, "How NAICS Will Affect Data Users," published on the Internet at www.census.gov/epcd/www/naicsusr.html. This brochure also is available in paper: Lanham, MD: Berman Press (1997). See also Paul T. Zeisset, "Disseminating Economic Census Data," *Government Information Quarterly*, 15 (1998):305–320.
7. Ahmed, Blum, & Wallace, in "Conducting the Economic Census," discuss editing and tabulation operations in detail.
8. For further discussion on changes (in the format of the Economic Census) that were initiated in 1954 and that are continuing through to 1997, see the U.S. Census Bureau's *The Economic Census—Two Moments of Truth: 1954 and 1997*, September 1997. The Internet address for this brochure is: www.census.gov/epcd/www/img/ec97x-tm.pdf

For a fuller account of the Economic Census of 1954—and, indeed, of the entire history of the U.S. Economic Census—see William F. Micarelli, “Evolution of the U.S. Economic Census: the Nineteenth and Twentieth Centuries,” *Government Information Quarterly*, 15 (1998):337–379.

9. Ahmed, Blum, & Wallace, in “Conducting the Economic Census,” delineate standardization of the product line.
10. Wallace, in “Public and Private Sector Uses of Economic Census Data,” provides further discussion of how BEA uses Economic Census data.
11. Distinctions among the “establishment” (the physical site of the business), the “company” or “firm” (the organizational entity that owns the establishment), and the “enterprise” (which is a combination of companies) are treated in Ahmed, Blum, & Wallace, “Conducting the Economic Census;” Wallace, “Public and Private Sector Uses of Economic Census Data;” and Zeisset, “Disseminating Economic Census Data.”
12. Ahmed, Blum, & Wallace, in “Conducting the Economic Census,” elaborate upon the substantial role of the subject analysts in preparing data for release.
13. The U.S. Census Bureau organizational structure can be found in Ahmed, Blum, & Wallace, “Public and Private Sector Uses of Economic Census Data.”
14. See Ahmed, Blum, & Wallace, “Conducting the Economic Census,” for the sets of graphics that show the next steps in the process. The graphics (and respective accompanying discussions) in both that article and the present one form a unified account of the Economic Census—from determining census content, to collection and processing of data, to publication and distribution of results.

Introducing the North American Industry Classification System

Carole A. Ambler*
James E. Kristoff

Since the 1930s, Economic Census data have been published based on the Standard Industrial Classification (SIC) system, developed and maintained by the Office of Management and Budget (OMB). The decision by OMB to replace the SIC with the new North American Industry Classification System (NAICS) has had a profound effect on planning, data collection, data processing, and publication activities of the Economic Census. It was necessary to design new and different forms, expand the kinds of questions included on the forms, canvass a larger number of companies to request classification information, and develop a process for recoding over five million business establishments to a NAICS basis.

On April 9, 1997, the Office of Management and Budget (OMB) announced its decision to adopt the North American Industry Classification System (NAICS pronounced Nākes) as the industry classification system used by the statistical agencies of the United States. NAICS replaces the 1987 Standard Industrial Classification (SIC).

NAICS is a unique, all-new system for classifying business establishments. It is the first economic classification system to be constructed based on a single economic concept. Economic units that use like processes to produce goods or services are grouped together. This "production-oriented" system means that statistical agencies in the United States will produce data that can be used for measuring productivity, unit labor costs, and the capital intensity of production; constructing input-output relationships; and estimating

** Direct all correspondence to: Carole A. Ambler, Chief, Service Sector Statistics Division, U.S. Census Bureau, Washington, D.C. 20233-6500 <cambler@cmail.census.gov>.*

Government Information Quarterly, Volume 15, Number 3, pages 263-273.
© 1998 by U.S. Department of Commerce
Economics and Statistics Administration
BUREAU OF THE CENSUS
All rights of reproduction in any form reserved. ISSN: 0740-624X

employment-output relationships and other such statistics require that inputs and outputs be used together.

NAICS is the first-ever North American industry classification system. The system was developed by the Economic Classification Policy Committee (ECPC), on behalf of the OMB, in cooperation with Statistics Canada and Mexico's Instituto Nacional de Estadística, Geografía e Informática (INEGI) to provide comparable statistics across the three countries. For the first time, government and business analysts, using the system, will be able to compare directly industrial production statistics collected and published in the three countries. In addition to providing the means to compare data across the three North American countries, NAICS also provides for increased comparability with the International Standard Industrial Classification System (ISIC, Revision 3), developed and maintained by the United Nations.¹

NAICS responds to increasing and serious criticism about the SIC. It reflects the structure of today's economy in the United States, Canada, and Mexico, including the emergence and growth of the service sector and new and advanced technologies. It is a flexible system that allows each country to recognize important industries below the level at which comparable data will be shown for all three countries.

The recognition of NAICS United States as the official classification system to be used by the U.S. statistical agencies is the culmination of a multi-year review by the ECPC of economic classifications, business data users, and future information needs. The ECPC established seven interagency subcommittees, representing nineteen federal government agencies, to create the new system in consultation with U.S. data users and in cooperation with staff from the statistical agencies of Canada and Mexico.

DEVELOPMENT OF NAICS

The SIC, used since the 1930s, was developed by an Interdepartmental Committee on Industrial Statistics, established by the Central Statistical Board of the United States. Its charge was "to develop a plan of classification of various types of statistical data by industries and to promote the general adoption of such classification as the standard classification of the Federal Government."² That List of Industries for manufacturing, published in 1938, and the 1939 List of Industries for nonmanufacturing industries, completed in 1939, became the first Standard Industrial Classification (SIC) for the United States.

The SIC was established to promote uniformity and comparability of data collected and published by agencies within the U.S. government, state agencies, trade associations, and research organizations. It was developed as an establishment based industry classification system that classified each establishment (defined as a single physical location at which economic activity occurs) according to its primary activity. The SIC covered the entire field of economic activities by defining industries in accordance with the composition and structure of the economy.

Since the 1930s, the SIC has been revised periodically to reflect changes in the economic structure of the United States. New industries were added and small, declining industries deleted or combined with other activities. However, the overall structure of the SIC remained essentially unchanged since the 1930s. The SIC was last revised in 1987, when approximately 20 new service industries were added to the SIC and a few

new industries were added to manufacturing to reflect technological changes occurring in that sector.

By the early 1990s, many data users and analysts were criticizing the SIC as outmoded and not reflective of the economy of the United States. The adoption of the North American Free Trade Agreement underscored the need not only to develop a new system, but also to develop that system in cooperation with Canada and Mexico. In early 1992, OMB established the ECPC, comprised of representatives from the Bureau of Economic Analysis that chaired the committee, the Bureau of the Census, and the Bureau of Labor Statistics, and charged it with a “fresh slate” examination of economic classifications to determine if a new system should be developed and whether or not that new system should be based on an economic concept. The ECPC developed issue papers and consulted with the statistical agencies of Canada and Mexico regarding their interest in developing a common system among the three countries. In July 1994, OMB announced its intention to develop a new system, based on a production-oriented concept and in cooperation with INEGI and Statistics Canada. The ECPC solicited proposals for new industries from data users and in consultation with INEGI and Statistics Canada developed NAICS.^{3, 4}

HOW IS NAICS DIFFERENT FROM THE SIC?

NAICS is based on a consistent, economic concept. Establishments that use the same or similar processes to produce goods or services are grouped together. The SIC, developed in the 1930s and revised periodically over the past 50 years, was not based on a consistent economic concept. Some industries are demand based while others are production based.

NAICS recognizes the changing and growing services-based economy of the United States and its North American neighbors. NAICS includes 1,169 industries of which 565 are service-based industries. The SIC had 1,004 industries, of which 416 were service-related industries. Three hundred and fifty eight new industries are recognized in NAICS, 250 of which are services producing industries. There are 20 sectors in NAICS of which 16 are services related. The SIC had 10 divisions, of which five were service-related. Table 1 shows the relationship between NAICS sectors and SIC Divisions.

NAICS provides for comparable statistics among the North American countries. In addition, it provides for more comparable information with ISIC. The SIC did not.

NAICS is a six-digit system that provides for comparability among the three countries at the five-digit level. The SIC was a four-digit system that was not linked in any way to the systems of Canada and Mexico. A six-digit system was adopted for NAICS to provide for increased flexibility in the system. NAICS allows each country to recognize activities that are important in the respective countries, but may not be large enough or important enough to recognize in all three countries. The sixth digit is reserved for this purpose.

The nomenclature of the groupings within the system is different in NAICS. NAICS calls the highest level of aggregation in the system a sector; the SIC referred to this grouping as a division. Other changes have been made to the nomenclature as shown in Table 2.

Table 1
NAICS vs. SIC Sectors

<i>NAICS SECTORS</i>	<i>SIC DIVISIONS</i>
Agriculture, Forestry, Hunting, and Fishing	Agriculture, Forestry, Hunting, and Fishing
Mining	Mining
Utilities	Transportation, Communications and Public Utilities (pt)
Construction	Construction
Manufacturing	Manufacturing
Wholesale Trade	Wholesale Trade
Retail Trade	Retail Trade
Accommodation and Food Services	
Transportation and Warehousing	Transportation, Communications, and Public Utilities (pt)
Information	Services
Professional, Scientific, and Technical Services	
Administrative Support; Waste Management and Remediation Services	
Educational Services	
Health Care and Social Assistance	
Arts, Entertainment, and Social Assistance	
Other Services (except Public Administration)	
Finance and Insurance	Finance, Insurance, and Real Estate
Real Estate and Rental and Leasing	
Public Administration	Public Administration
Management of Companies and Enterprises	

WHAT ARE SOME OF THE IMPORTANT CHANGES IN NAICS?

Manufacturing

The Manufacturing sector is reorganized and resequenced to achieve comparability with Canada and Mexico. Seventy-nine new industries are recognized and another 186 are revised. In all, there are 473 NAICS industries in manufacturing as compared with 459 in the 1987 SIC. The most significant change to manufacturing is the creation of the Computer and Electronic Product Manufacturing subsector. This new subsector brings together those establishments engaged in the production of computers, computer peripherals, communications equipment, similar electronic products, and the components for such products. The subsector was created because of the economic significance these industries have obtained, because their rapid growth suggests that the products of these industries will

Table 2
NAICS vs. SIC: Structure and Nomenclature

<i>NAICS</i>		<i>SIC</i>	
2-digit	Sector	Division	Letter
3-digit	Subsector	Major Group	2-digit
4-digit	Industry Group	Industry Group	3-digit
5-digit	NAICS Industry	Industry	4-digit
6-digit	National IndustryN/	N/A	N/A

become even more important to the economies of the North American countries, and because the production processes of the establishments in these industries are fundamentally different from the production processes for other machinery and equipment.

Information

Perhaps the most important change in NAICS is the recognition of a new Information sector. This new sector includes those establishments that create, disseminate, or provide the means to distribute information. It also includes establishments that provide data processing services. Industries included in this new sector are newspaper, book, and periodical publishers, previously included in the manufacturing sector in the SIC; software publishers, previously included in services; broadcasting and telecommunications producers and distributors, previously included with utilities and transportation; and motion picture and sound recording industries, information services, and data processing services, previously included in services.

There are 34 industries included in this new sector, 20 of which are new. Some of the new industries include paging, cellular and other wireless telecommunications, and satellite telecommunications.

Health and Social Assistance

This new sector recognizes that it is sometimes difficult to distinguish between the boundaries of health care and social assistance; therefore, NAICS groups these industries together in a new Health and Social Assistance sector. The industries are grouped in order from those providing the most intensive type of health care to those providing minimal health care with social assistance to those providing only social assistance.

There are 39 industries in this new sector, 27 of which are new. Some of the new industries include HMO Medical Centers, Family Planning Centers, Diagnostic Imaging Centers, Continuing Care Retirement Communities, and Community Food Services.

Retail and Wholesale Trade

NAICS redefines the boundaries between Retail and Wholesale Trade. The new NAICS definition emphasizes what the establishment does, rather than to whom it sells. Retailers are defined as those establishments that sell merchandise, generally without transformation, and attract customers using methods such as advertising, point-of-sale location, and display of merchandise. A store retailer has a selling place open to the public; merchandise on display or available through sales clerks; facilities for making cash or credit card transactions; and services provided to retail customers.

Wholesale establishments, on the other hand, are primarily engaged in selling or arranging the purchase or sale of: (a) goods for resale, (b) capital or durable nonconsumer goods, and (c) raw and intermediate materials and supplies used in production. Wholesalers normally operate from a warehouse or office and are characterized by having little or no display of merchandise. In addition, neither the design nor the location of the premises is intended to solicit walk-in traffic. Wholesalers also do not normally use advertising directed to the general public.

The 1987 SIC defined retailers as those establishments that sold primarily to consumers while wholesalers were those establishments that sold primarily to business customers. The distinction between the boundaries of the two SIC divisions was based on class of customer rather than the selling characteristics of the establishment.

Another major change to the retail trade sector is the removal of restaurants from retail trade. Restaurants are combined with accommodations to form a new sector in NAICS, Accommodation and Foodservices. Restaurants accounted for about 10% of retail trade as defined by the 1987 SIC.

Auxiliary Establishments

Auxiliary establishments are those establishments that primarily produce support services for other establishments of the enterprise. Generally, these support services are not intended for use outside of the enterprise. In NAICS, these establishments are classified according to the establishment's primary activity, that is if the establishment is providing data processing services for the enterprise, the establishment is classified in NAICS 51421, Data Processing Services, or if the establishment is the head office of the enterprise, it is classified in the new NAICS industry 551113, Corporate, Subsidiary, and Regional Managing Offices. In the 1987 SIC, each of these establishments was classified according to the primary activity of the establishment for which the support activity was performed. In the above example, if the support unit primarily served an automobile manufacturing establishment, then the support establishment was classified as an automobile manufacturer.

The SIC, however, treated the production of goods for other establishments of the same enterprise differently. If a manufacturing establishment produced goods for use within the enterprise, the manufacturing establishment was classified according to its primary activity, not the primary activity of the establishment it served. This different treatment of service producing versus manufacturing auxiliary establishments was inconsistent and NAICS recognized this inconsistency. NAICS classifies auxiliary establishments based on what they do, not on whom they serve. The production oriented concept of NAICS mandated this change.⁵

This change will result in significant shifts in employment data. In 1992, Census data showed over 1,000,000 auxiliary employees assigned to manufacturing and over 840,000 auxiliary employees assigned to retail trade. These employees will most likely move to either the Management of Companies and Enterprises sector; the Warehousing and Storage subsector; the Computer Systems Design and Related Services subsector; the Accounting, Tax Preparation, Bookkeeping and Payroll Services subsector; or some other services related subsector. For the 1997 Economic Census, these auxiliary establishments will be dual coded by primary activity and by whom they serve. The data will be shown separately to provide data users with the necessary links to prior information.

IMPLEMENTING NAICS IN THE 1997 ECONOMIC CENSUS

The Economic Census is the first program in the Census Bureau to implement NAICS. Staff began planning for NAICS implementation even before the final structure of NAICS was approved. It was necessary to make decisions on content of the Census, forms design, and areas of responsibility before the final structure was set. These early planning sessions

ensured that NAICS-based Economic Census data could be published in January 1999, giving data users their first glance at the economy according to NAICS.

1997 Economic Census Content

The 1992 Economic Census included activities accounting for about 98% of Gross Domestic Product. Activities excluded were agriculture (the Census of Agriculture covered agricultural related activities, except for agricultural services; forestry; and fishing, hunting and trapping); large certificated air carriers; railroad transportation; U.S. Postal Service; elementary and secondary schools; colleges and universities; political organizations; and religious organizations. Based on funding expectations, it was determined early in the census planning process that the scope of the 1997 Economic Census would remain the same as 1992. Even though NAICS moved activities from sectors that were covered by the census to sectors that were not and from sectors that were not previously covered by the census to those that were traditionally covered, funding constraints would not permit an expansion into previously uncovered areas. Therefore, activities such as veterinary services and landscape services that were moved from agricultural services to professional and support services are not included in the 1997 Economic Census. Conversely, logging, which was moved from manufacturing to agriculture, continues to be covered, at least for the 1997 Census.

Refile Survey

In January 1996, a Refile Survey was conducted to collect information necessary to ensure that establishments were mailed the correct Economic Census form. Establishments included in the refile were those: (1) for which the Bureau did not have enough information to assign a NAICS code and (2) which might be moving to a different sector in NAICS. Both conditions had to be met to be included in the refile survey. For example, NAICS includes bakeries that bake on the premise in manufacturing while those that do not bake on the premise remain in retail. In the 1987 SIC, all bakeries were included in retail trade. There was no information in the business register file to determine if bakeries would remain in retail (not baking on premises) or move to manufacturing (baking on premises). Retail bakeries met both of the conditions to be included in the refile survey. Likewise, the redefinition of wholesale and retail trade meant that establishments would be moving between the two sectors based on their method of selling. Like retail bakeries, the business register did not contain the information necessary to determine in which sector selected retail/wholesale establishments should be included.

Seventeen discrete forms tailored to different activities were designed and mailed to 215,000 single establishment companies that met the above criteria. Specific questions pinpointing new or redefined NAICS activities were asked to ensure proper NAICS coding of the establishment so that it would receive the correct census form.

Multi-establishment companies that met the criteria for inclusion in the refile survey were queried via the 1996 Report of Organization survey. Approximately 60,000 multi-establishment companies received this form. For establishments whose activities were affected by NAICS, companies were asked the same type of questions included on the

single-establishment company form. Based on the information provided in that survey, the correct NAICS code and, thus, the correct census form were determined.

Over 90% of establishments canvassed by the Refile Survey responded. As a result of that refile survey, the following changes were identified:

- Almost 16,000 merchant wholesalers were reclassified as retailers;
- Some 2,200 retailers were reclassified as wholesalers;
- Approximately 2,100 retail bakeries were moved from retail to manufacturing;
- About 315 tire rebuilding and recapping establishments were moved from wholesale to manufacturing;
- Almost 2,200 pawn shops were moved from retail to finance; and
- Over 3,500 ambulance service establishments were moved to health services from transportation.

Forms Design and Mail-Out

Over 450 separate forms, tailored to individual industries, were designed for collecting information in the census. These forms look much like the 1992 forms in that 1987-based SIC codes are used to collect the data. However, all of the forms include information needed to recode the establishment to a NAICS basis. In the manufacturing sector, additional detailed product codes were added; in the retail/wholesale sector, new merchandise and commodity lines were added, along with additional check boxes requesting kind of business and type of activity information; and, in the services sector, additional check boxes and source of receipts data were added, all to ensure that the proper NAICS code could be assigned once the data were received.

Approximately 5.2 million business establishments were mailed some type of census form. To reduce reporting burden, short, easy-to-complete forms with preprinted check box questions designed to obtain detailed classification information were mailed on November 3, 1997 to about 1.4 million small business establishments. Another 200,000 small, birth (new) establishments were mailed these short classification forms the end of November. Firms that received these forms were single-establishment companies, generally with less than 10 employees if a manufacturer and less than five employees if nonmanufacturing, for which no classification information was available. The primary goal of these classification forms was to assign a correct NAICS code. Data for these establishments are obtained from administrative records data reported to other government agencies. In 1992, only about 500,000 classification forms were sent; the adoption of NAICS and the need to assign a new classification code to each business establishment, whether large or small, almost tripled the number of these forms that were mailed.

Twenty-eight different classification forms, tailored to individual industries, were developed. There were 26 services forms used, one general form, and one manufacturing form. Even though only one manufacturing form type was used, it was a custom imprinted form with about 500 variations to the questions asked.

The remaining establishments received one of the approximately 425 longer Economic Census forms. These forms were mailed during the week of December 15 and were due back to the Bureau on February 15.

Recoding Establishments to a NAICS Basis

The Census Bureau developed a unique system for implementing NAICS into the Economic System. The “bridge code system” links the information collected in the 1992 Economic Census to the 1997 Economic Census data that will be published based on NAICS. Bridge codes facilitate the collection and publication of data on both a NAICS and SIC basis, allowing the Census Bureau to create the bridge tables in which both NAICS and SIC data are published.

An example will better explain the system. SIC industry 7299, Miscellaneous Personal Services, was split into some of the following NAICS industries as follows:

- Diet and Weight Reducing Services (NAICS 812191);
- Formal Wear and Costume Rental (NAICS 53222);
- Babysitting Services (NAICS 62441);
- Personal Care Services (NAICS 812199); and
- All Other Miscellaneous Personal Services, NEC (NAICS 81299).

Bridge codes were created within SIC 7299 to implement these NAICS changes. The first four digits of the bridge code relate to the SIC, in this case 7299. Then a unique two digit code was added to the end that relates to the NAICS industry. Bridge code 729970 was assigned to diet and weight reducing services while 729996 represents babysitting services. Any establishment assigned the bridge code 729970 belongs in SIC 7299 and NAICS 812191, while any establishment assigned bridge code 729996 belongs in SIC 7299 and NAICS 62441. These unique codes permits the Census Bureau to publish the Economic Census data on both a NAICS and SIC basis and relate individual establishments to both systems. Table 3 illustrates the bridge codes for each of these 1987 SIC 7299 activities.

Bridge codes were developed using Table 2 as published in the *Federal Register* notice announcing the adoption of NAICS. For each activity that was moved in NAICS, a bridge code was established. In all, almost 5,000 bridge codes were developed to process and publish the census.

PUBLISHING NAICS BASED DATA IN THE ECONOMIC CENSUS

The forms are designed and in the mail and processing systems are complete and waiting. The final curtain on NAICS implementation in the Economic Census will fall when the last bridge table is published in the year 2000. For the first time, data users will have a

Table 3
SIC 7299

Bridge	Description	NAICS	Description
729970	Diet and Weight Reducing Services	812191	Diet and Weight Reducing Centers
729980	Formal Wear and Costume Rental	53222	Formal Wear and Costume Rental
729996	Babysitting Services	62441	Child Day Care Services
729998	Personal Care Services	812199	Other Personal Care Services
729999	All Other Miscellaneous Personal Care Services	81299	All Other Personal Services

look at data based on a restructured industry classification system that was designed to reflect the growing and changing economy of the United States as the year 2000 approaches.

The first glimpse of NAICS based data will be published in early 1999 in a new census report, the *1997 Economic Census Advance Report*. That report will provide information on employment, payroll, receipts, and number of establishments on both a NAICS (sector, subsector, and industry group level) and SIC (division, major group, and industry group) basis.

Beginning in early 1999, geographic and industry data will be published on a NAICS basis only. These reports will provide NAICS data down to the six-digit U.S. industry detail level. A new *Comparative Statistics Report*, scheduled for release in January 2000, will show information on employment, payroll, receipts, and number of establishments on an SIC basis. The *Bridge Between NAICS and SIC Report*, to be issued in March 2000, will include data on a six-digit NAICS by four-digit SIC and four-digit SIC by six-digit NAICS. The tables in this report will provide the link needed to compare data between the two systems.

IMPLEMENTING NAICS IN THE CURRENT PROGRAMS OF THE CENSUS BUREAU

Planning is underway for implementing NAICS in the current programs of the Census Bureau. All current surveys, including the Annual Survey of Manufactures, Annual Survey of Communications Services, and Monthly Retail Sales, will be converted to NAICS beginning with data year 1998. A detailed time schedule has been developed for this implementation. It is shown below:

Manufacturing surveys:

- | | |
|---|----------------|
| • Annual Survey of Manufactures | Data year 1998 |
| • Current Industrial Reports | Data year 1998 |
| • Manufactures Shipments, Inventories,
and Unfilled Orders | Data year 2001 |

Services surveys:

- | | |
|---------------------------|---|
| • Annual Surveys | Data year 1999 (collect
both 1998 and 1999 data) |
| • Retail Trade Monthly | Data year 2001 |
| • Wholesale Trade Monthly | Data year 2001 |

Other Programs:

- | | |
|-------------------------------|---------------------|
| • County Business Patterns | Data year 1998 |
| • Quarterly Financial Report | Data year 2000/2001 |
| • Annual Capital Expenditures | Data Year 1999 |

There are a number of issues under review concerning implementation into the current programs. In the services area, these issues center around the content of the annual current services programs. With the addition of eight new service sectors and 250 new industries, the program must be completely redesigned. Plans include a new Information survey, but the structure and content of the remaining program have not been determined yet.

One of the most important issues in the monthly programs, especially the indicators program that includes retail/wholesale trade and the manufactures shipments, inventories, and unfilled orders survey is the development of a time series necessary to seasonally adjust the data. Decisions on these and other issues will be made by the fall of 1998, in consultation with both public and private data users.

CONCLUSION

The introduction of NAICS into both the Economic Census and current economic programs will have a profound effect on statistics published by the Census Bureau. For the first time, data will be available on the Information sector, service industries never before identified in the SIC will be measured, and statistics published by the Census Bureau will be on a consistent basis with industry data provided by Canada and Mexico's statistical offices. NAICS is forward looking and flexible, anticipating increasing globalization and providing enhanced industry comparability among the NAFTA trading partners while recognizing important national industries and providing for periodic updates through three country review. NAICS recognizes the structural and technological changes occurring in the economies of the three North American countries and provides the means to measure these changes. The Economic Census will provide the very first look at these changes.

NOTES AND REFERENCES

1. The *International Standard Industrial Classification of All Economic Activities, Revision 3* is available from the Statistical Office of the United Nations, New York, New York.
2. Esther Pierce, "History of the Standard Industrial Classification:" (Washington, D.C. Executive Office of the President Office of Statistical Standards, U.S. Bureau of the Budget) (mimeograph).
3. For a detailed discussion of the development of NAICS, see the *Federal Register* (April 9, 1997), pp. 17288–17478.
4. For information regarding purchase of the NAICS Canada and NAICS Mexico manual, contact Statistics Canada, Ottawa, Ontario, Canada, and INEGI, Aguascalientes, Mexico.
5. A complete explanation of the treatment of auxiliaries in all three countries is contained in the paper "The Treatment of Auxiliary Establishments in Industry Classification Systems," by Paula Young and Jack Triplett of the Bureau of Economic Analysis. This paper can be accessed via the Census Internet site <www.census.gov/naics>.

Conducting the Economic Census

Shirin A. Ahmed*
Lawrence A. Blum*
Mark E. Wallace*

“‘Conducting a census’ to most people conjures up images of questionnaires, interviewers, and respondents. So much more is involved. This article describes the organization and planning that precedes the questioning, and shows what happens after the answers come in.”

John Govoni, Chief
Economic Planning and Coordination Division
U.S. Census Bureau

This article is divided into five parts:

- The Organizational Structure Behind the Economic Census describes the organization of the U.S. Census Bureau with particular reference to the roles of divisions that impact upon the Economic Census. These divisions stipulate the policies underlying the programs that Economic Census data are to serve, prepare the questions and the questionnaires, arrange for the census to be taken, process the data after they are collected, and disseminate the results to the public. Without such an organizational apparatus, there could be no Economic Census.

** Direct all correspondence to: Shirin A. Ahmed, Assistant Division Chief for Post-collection Activities, Economic Planning and Coordination Division, U.S. Census Bureau, Washington, D.C. 20233-6100 <sahmed@census.gov>; Lawrence A. Blum, Assistant Division Chief for Collection Processes, Economic Planning and Coordination Division, U.S. Census Bureau, Washington, D.C. 20233-6100 <Lawrence.A.Blum@ccMail.Census.GOV>; Mark E. Wallace, Chief, Economic Planning Staff, Economic Planning and Coordination Division, U.S. Census Bureau, Washington, D.C. 20233-6100 <mwallace@census.gov>.*

Government Information Quarterly, Volume 15, Number 3, pages 275-302.

© 1998 by U.S. Department of Commerce

Economics and Statistics Administration

BUREAU OF THE CENSUS

All rights of reproduction in any form reserved. ISSN: 0740-624X

- Basic Concepts and Methodology elaborates the terms through which the Economic Census is conducted—the language of the census. These concepts include the (business) establishment, the company, the North American Industry Classification System (NAICS), and the Standard Statistical Establishment List (SSEL).
- Centralized Collection Processing covers the actual launching of the Economic Census. It highlights the role of the new DocuPrint technology in mail collection of data, electronic reporting, forms mailout, receipt and check-in, completeness and coverage of multi-establishment data, microfilming, data screening/keying and control file match.
- Decentralized Post-collection Processing covers the intricate processes that take place after the Economic Census data are collected. Accompanied by several graphics, this section shows the series of tasks that must be performed to make the answers to the questions usable: assigning of classification codes, determining the validity of the answers, creation of databases, tabulation of data, and the like.
- Publication of Data/Distribution of Results emphasizes one of the chief reasons for which censuses are conducted in the first place: that is, to make the results available to both public and private sector users. As such, this part of the article treats the topics of new, standardized table formats for 1997 Economic Census data, the development of a streamlined data production and dissemination system, the use of CD-ROMs and the World Wide Web (one part of the Internet) in making results available, and the advantages of access, speed, and consistency that users will enjoy as a result of these improvements.

Title 13, *U.S. Code*, mandates the taking of the Economic Census once each five years, for years ending in “2” and “7”. The law directs the taking of the census for manufactures, minerals, construction, retail trade, wholesale trade, selected service industries, plus finance, insurance, real estate, and transportation. In addition to this basic coverage of business establishments, the Economic Census includes supplemental programs providing special information about the transportation industry, women- and minority-owned businesses, and the characteristics of business owners. The geographic scope of the census also is specified in the census law. The census covers each of the 50 states, the District of Columbia, the Virgin Islands, Guam, the Commonwealth of the Northern Mariana Islands, and the Commonwealth of Puerto Rico.

Census Bureau Organization

The Economic Census can be conducted successfully only because of the breadth of specialized resources and talents throughout the Census Bureau. As can be seen in Figure 1, the Bureau is organized along generally functional lines.

The *Director*, together with the *Deputy Director* and the *Principal Associate Directors*, serve as the Bureau’s chief administrators, with the *Associate Directors* reporting to the *Principal Associate Directors* or the *Deputy Director*. The *Associate Directors* formulate the policies and provide the direction for carrying out the programs in their areas of responsibility. For the Economic Census, that person is the *Associate Director for Economic Pro-*

grams. Organized under that Directorate are the *Assistant Director for Economic Programs* and the divisions that plan and conduct the Economic Census.

The processing operations of the Economic Census are planned and coordinated by the *Economic Planning and Coordination Division (EPCD)*. EPCD also performs all maintenance activities of the Standard Statistical Establishment List (SSEL), which is the source list for mailing the Economic Census forms. This includes obtaining and processing administrative records from other federal agencies. In addition, EPCD is responsible for developing the census lists; mailing the questionnaires; planning and coordinating all centralized processing in connection with data collection operations, as well as decentralized post-collection operations; and formulating and implementing the plans for marketing and disseminating data results.

Also reporting to the *Associate and Assistant Directors for Economic Programs* are three subject divisions and the *Economic Statistical Methods and Programming Division (ESMPD)*. These subject divisions are responsible for planning the content¹ of the Economic Census and for analyzing, tabulating, and providing clearance for publication of the data. They include the *Manufacturing and Construction Division (MCD)* (with overall responsibility for census coverage of Construction, Manufacturing and Mining); *Service Sector Statistics Division (SVSD)* (with overall responsibility for census coverage of Retail Trade, Wholesale Trade, Finance, Insurance and Real Estate, Transportation and Utilities, and selected Services Industries); and *Agricultural and Financial Statistics Division (AFSD)* (with overall responsibility for census coverage of Outlying Areas, women- and minority-owned businesses, and the characteristics of business ownership). [Editor's Note: As of May 1, 1998, AFSD was renamed Company Statistics Division.] In turn, ESMPD has overall responsibility for the systems design and programming functions for the Economic Census.

Several other divisions of the Census Bureau participate in conducting the Economic Census:

- *Data Preparation Division (DPD)* is the Bureau's processing center in Jeffersonville, Indiana, and is under the *Associate Director for Field Operations*. Staff in DPD perform the large-scale clerical and related operations crucial to the census such as labeling questionnaires, assembling mailing packages, entering the reported data into the computer, and corresponding with respondents. [Editor's Note: As of May, 1998 DPD was renamed the National Processing Center.]
- *Geography Division*, under the *Associate Director for Decennial Census*, develops the geographic coding system and assigns geographic location codes to each establishment in the Economic Census.
- Awareness of the Economic Census involves the efforts of three offices under the *Associate Director for Communications*. These offices are the *Public Information Office* with responsibility for informing the general public or business sector about the Census Bureau's work; the *Congressional Affairs Office* which monitors congressional actions that may affect the Census Bureau and which provides a central point for congressional inquiries about Bureau activities; and the *Customer Liaison Office* whose mandate is to help data users learn about, acquire, understand, and use Census Bureau statistical reports. Moreover, 12 U.S. Census Bureau Regional Offices within

Note: As of May 1, 1998, the Associate Director for Administration and Comptroller was renamed the Associate Director for Finance and Administration. Also, the Data Preparation Division was renamed the National Processing Center and the Agriculture and Financial Statistics Division was renamed Company Statistics Division.

Figure 1
Organizational Structure of the U.S. Bureau of the Census

Field Division, under the *Associate Director for Field Operations*, also publicize and disseminate Economic Census data products.

- Supporting staff manage and operate the computers and peripheral equipment used to process the Economic Census, to develop and maintain operating systems and associated software, and to plan and perform various engineering services. These functions are under the responsibility of the *Associate Director for Information Technology*.
- Under the *Associate Director for Administration and Comptroller* are the divisions performing many of the other support services required to conduct the census. These include budget and finance, personnel, and the preparation of publications. [Editor's Note: As of May 1, 1998, this Associate Directorship was renamed the Associate Director for Finance and Administration.]
- The divisions and staff under the *Associate Director for Methodology and Standards* are responsible for ensuring that appropriate statistical methods and techniques are followed in taking the Economic Census.

BASIC CONCEPTS AND METHODOLOGY

Certain crucial concepts underlie the methodology of Economic Census-taking. These are basic to both the preparation and use of statistical information. First, statistics for the Economic Census are collected and summarized for publication primarily in terms of the *establishment*. Second, establishments are classified and statistics are summarized using the new *North American Industry Classification System (NAICS)*. Finally, the Census Bureau's *Standard Statistical Establishment List (SSEL)*, which is compiled by reference to administrative records of businesses, provides the frame (i.e., universe) from which the list of establishments is selected for conducting the Economic Census. To understand the census it is essential to understand these concepts.

Establishment/Company Classification

For statistical purposes, an *establishment* is defined as a business or industrial unit at a single geographic location that produces or distributes goods or services—for example, a factory, store, or hotel. An establishment generally is the smallest basic unit for which key economic data—such as employment, payroll, and the value of products or services produced or sold—are available. Thus, the “establishment” concept provides for a highly detailed and definitive level of data collection and publication. The result is great latitude in how the data can be used: for example, information can be published not only on a very detailed industrial and geographic basis, but also summarized to much broader organizational, industry, and geographic levels.²

Aggregating data to broader organizational levels requires that a firm's ownership, affiliation, or structure be known. If an *establishment* is the physical location where goods or services are produced or distributed, then the *company* is the organizational entity (i.e., headquarters) that *owns the establishment or establishment(s)*. For most businesses, the organizational structure is quite simple—one establishment constitutes the entire company. Approximately 85% of all establishments counted in the Economic Census are single-establishment companies. Other establishments, however, are operated by companies with

complex structures. Figure 2 shows the relationship between the two census concepts of *establishment* and *company*. the figure also illustrates the NAICS codes, which will be discussed in the next section.

The North American Industry Classification System (NAICS)

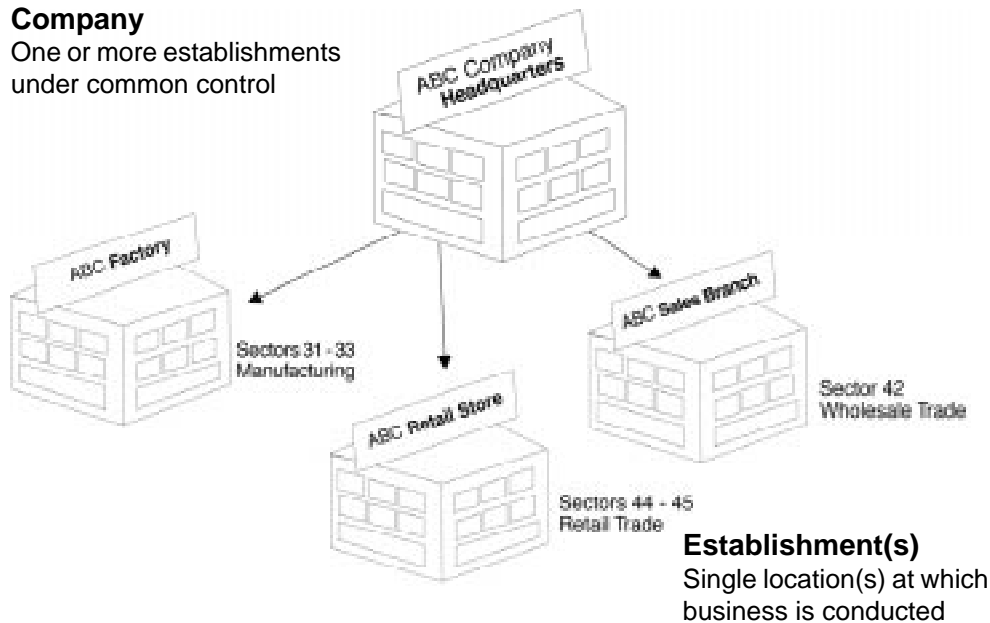
The 1997 Economic Census will be the first among the three North American nations—the U.S., Canada, and Mexico—to showcase the new classification system that was created to capture the many changes in the composition of economic activity in North America. This new system is the North American Industry Classification System (NAICS), and it replaces the Standard Industrial Classification (SIC) that was developed and used in the U.S. since the 1930s, albeit with periodic revisions.³

In vital economies, new goods and services are being offered constantly, and some of the old ones decline or disappear. The first step in measuring what goods and services are currently being offered is to classify them. The SIC classified the U.S. economy into 10 sectors: Agriculture, Forestry and Fishing; Mining; Construction; Manufacturing; Transportation, Communications, Electric, Gas, and Sanitary Services; Wholesale Trade; Retail Trade; Finance, Insurance and Real Estate; Services; and Public Administration. The subclassifications of these major groupings were modified a number of times throughout this century—the last time, in 1987—to enable the basic 10 SIC categories to accommodate new types of economic activity.

Finally, the point came at which the emergence of new industries and the decline of older ones made further adjustments to the SIC untenable. NAICS was developed over

Company

One or more establishments under common control



Establishment(s)
Single location(s) at which business is conducted

Figure 2
The Relationship of the Establishment to the Company
and the Classification of Economic Activity Using the New NAICS Codes

a five-year interval, 1992–1997, to replace the SIC and to consolidate the classification of all economic activity on the North American continent. With its 20 sectors, NAICS added a tremendous new vocabulary to “the language of the Economic Census.” The 20 sectors of NAICS and their numerical classification codes are: Agriculture, Forestry, Fishing, and Hunting (11); Mining (21); Utilities (22); Construction (23); Manufacturing (31–33); Wholesale Trade (42); Retail Trade (44–45); Transportation and Warehousing (48–49); Information (51); Finance and Insurance (52); Real Estate and Rental and Leasing (53); Professional, Scientific, and Technical Services (54); Management of Companies and Enterprises (55); Administrative and Support, Waste Management and Remediation Services (56); Educational Services (61); Health Care and Social Assistance (62); Arts, Entertainment, and Recreation (71); Accommodation and Food Services (72); Other Services [except Public Administration] (81); and Public Administration (92).

NAICS will allow for the presentation of more detail for the rapidly expanding service sector that accounts for most economic activity, but accounted for only 40% of SIC categories. However, the objectives for the 1997 revision were even broader. Not only was the system designed to identify new industries, but NAICS also reorganized industry classifications according to a more consistent economic principle. That principle was the *type of production activity performed*. By contrast, SIC classified industries according to a mixture of production-based and market-based activity. Moreover, NAICS was developed in collaboration with Canada and Mexico to produce comparable statistics for the three North American Free Trade Agreement trading partners.⁴

Figure 2 illustrates the relationship of classification systems to the measurement of business activity—both across industrial sectors and across levels of organization. Using Figure 2 as an example, a 1997 Economic Census questionnaire package—using DocuPrint technology, which will be discussed below—would be mailed to ABC Company headquarters. In the package would be three separate census forms: one questionnaire *each* for the factory, the retail store, and the sales branch—that is, the “establishments” owned by ABC “company.”⁵ The data collected on the three separate questionnaires would be classified, respectively, in NAICS sectors 31–33 (Manufacturing), 44–45 (Retail Trade), and 42 (Wholesale Trade). In this way, the Economic Census accurately measures *what type* of economic activity is taking place (industrial sector), *where* (geographically), at *what level of organization* (establishment, company, or combination of companies—which are called “enterprises”), and *what the economic activity is*: employment rolls, size of payroll, volume of sales receipts or value of shipments, types of raw material used, costs of operating expenses, costs of capital expenditures, and the like.

From this example, it is clear that accuracy of data collection relies upon accuracy of classification. We cannot measure any economic activity occurring in a context whose classification characteristics we have not clearly identified.⁶ As we will see in the following section, the next task in conducting the census is to arrive at a valid list of to whom to mail the questionnaires. Armed with the new NAICS, we can more precisely classify establishments than we ever did before—but first, we need a complete list. The SSEL points us in the right direction.

The Standard Statistical Establishment List (SSEL)

The SSEL is a database compiled and continuously updated by the U.S. Census Bureau. In it are maintained the records of about 6.5 million corporations, partnerships, sole proprietorships, and other organizations with employees. Its scope spans all economic activities (e.g., wholesale, retail, and services).⁷

The SSEL database contains basic economic data on U.S. businesses. Many of these data are obtained by the Census Bureau from administrative records filed by businesses with the Internal Revenue Service (IRS) or the Social Security Administration (SSA). These data include employment, payroll, sales and receipts, geographic location, industrial activity, and legal form of organization (e.g., corporation and partnership). It should here be mentioned that the relationship between the Census Bureau and the IRS is *not reciprocal*; that is, *the Census Bureau does not share its data with any other agency*. Census data are confidential, and are protected by Title 13 of the *U.S. Code*.

There are two chief reasons that the Census Bureau uses administrative records to obtain data on businesses:

- To ascertain the basic list of business establishments to which Economic Census forms should be sent. How would the Census Bureau know to whom to send census report forms without a means of determining the (universe of) businesses that are in existence? Administrative records provide one such means.
- To collect economic data on very small businesses—typically those “without paid employees”—without having to burden the small business owner with census forms. Stated otherwise, administrative data can often (but not always) be used in lieu of directly-collected information.

The use of administrative data makes possible a significant reduction in the size of the mail canvass that is used to conduct the Economic Census. In 1997, Economic Census questionnaires were mailed to approximately 3.7 million companies representing five million business establishments. But there were an additional 1.5 million small business establishments “with paid employees” and 14 million establishments “without paid employees” for which data were collected purely through administrative records of both (or either of) the IRS and the SSA. By using these already available tax records, the census could be conducted more efficiently, at less cost, and with a lighter burden on the small business community. Moreover, these businesses accounted for less than 10% of total economic activity measured in the 1997 Economic Census.

For various reasons, administrative record information cannot be used for larger firms: rather, Economic Census questionnaires are the only way to gather important information on products or activities, expenditures and assets, and operating characteristics that are not necessarily available from administrative sources. Moreover, the classification codes—now in terms of the new NAICS—from administrative records are less reliable than those that can be assigned based on information about the firm’s products or activities that are reported on the census questionnaire. This is particularly true of larger, more complex businesses. Therefore, for the 1997 Economic Census, questionnaires had to be sent to all multi-establishment companies. These 165,000 companies accounted for 1.5 million establishments.⁸ With this, the discussion turns to *levels of company organization* and the

importance of the SSEL in determining those levels so that the Economic Census can be conducted on the basis of accurate lists.

Conducting the Economic Census efficiently and accurately requires that all components of a company be identified and linked together. This process involves uniquely identifying three *levels of organization* for each *multi-establishment company*: (1) the enterprise or parent company; (2) each legal entity or subsidiary which, for tax reporting purposes, has been assigned an Employer Identification Number by the IRS; and (3) each establishment operated by the company. The means through which this linkage is accomplished is the SSEL.

The mailing list for the Economic Census comprises both single- and multi-establishment companies selected from the SSEL database. It is this database that provides information that administrative records alone cannot: for example, administrative records may cover entire firms, or other legal entities, in a way that provides no information about the location and kinds of businesses at the separate locations within multi-establishment companies. From the information in the SSEL, however, such crucial information about company structure can be derived.

For example, an *enterprise* is an entire economic unit consisting of one or more *companies*. Composition may vary from a *single legal entity*—including, for example, a corporation, partnership, or individual proprietorship with only one establishment—to a *complex family of legal entities* and their constituent establishments. If an enterprise is owned or controlled by another enterprise, all establishments of the subsidiary company are included as part of the “parent” enterprise.⁹

Following this line of reasoning, while it is true that the Economic Census collects data on *each establishment*, nevertheless, the questionnaires usually are mailed to the *company headquarters* (as shown in Figure 2). This is to ensure complete, unduplicated coverage of all of a company’s establishments and activities. Stated otherwise, the Census Bureau obtains individual reports for each establishment of multi-establishment companies or enterprises.

Therefore, for Economic Census purposes, there are at least three objectives in linking together all legal entities and their establishments:

- To facilitate centralized mailing, collection, and correspondence relating to questionnaires for a company or an enterprise;
- To collect and publish data for enterprises as well as establishments; and
- To ensure, by linking all related companies under a master number, that there is complete coverage of changes within companies and to ensure that there is no publication of data that might reveal information about that company.

CENTRALIZED COLLECTION PROCESSING

A Short Overview

Plans for processing the 1997 Economic Census began in 1994. A thorough analysis of the processing operations used in previous censuses was conducted to determine where delays occurred and what operations needed to be improved or re-engineered to reach the goal of more timely publication of results. Questionnaires were mailed out in November and December 1997, and as completed questionnaires were received at the Census Bureau’s processing center (DPD) in Jeffersonville, Indiana—near Louisville, Kentucky—the

reported information was keyed and transmitted electronically to headquarters in Suitland, Maryland. In turn, the information that was derived from administrative records also was processed at the Census Bureau's computer center in Suitland. After the questionnaire data were transmitted from Jeffersonville, the data were then merged with tax data from administrative records and given to the subject divisions for further processing and analysis.

Mail Collection of Data: The Role of the New DocuPrint Technology

The advanced operations of conducting a vast mail canvass require systematic planning and cooperation among a number of Census Bureau organizational units. Questionnaires must be designed, printed, and assembled into mailing packages. In 1997, the entire multi-establishment mailout system was re-engineered using DocuPrint technology. This technology made possible the simultaneous printing of all forms pertaining to a single company. This included cover letters, inserts, and the like, so that minimal clerical assembly was required. Previously, the Census Bureau relied on a commercial organization to provide preprinted forms. This required a massive clerical assembly operation to put the different forms of a company together in one package. In addition, an extensive quality control operation was needed to ensure that the company package included the proper forms.

By contrast, the DocuPrint technology stored all forms as "images," thus eliminating the dependency on the outside organization, as well as the intense manual assembly line needed in the past. Moreover, there were about 475 variations of the 1997 Economic Census questionnaires, and *only* inquiries about the operations of, or products produced by, a particular industry, or closely related industries, were included on a questionnaire for that industry. A further advantage was that, since the DocuPrint technology produced a company package at the outset, the former large quality control requirement was virtually eliminated.

The multi-establishment mailout system also was redesigned to identify easily two other contingencies: "split mail companies" and those who wished to report electronically. This was accomplished through the design of a parameter driven identification system. This system allowed an analyst to identify which parts of a company needed questionnaires to be mailed separately to *another* location within the company (i.e., "split mail") and/or allowed companies who wished to report electronically also to receive the proper electronic reporting medium within the company package.

For single-establishment companies, the Census Bureau relied on commercial organizations to provide pre-assembled mailing packages. Using specialized labeling equipment, these packages were then addressed—by the Census Bureau—through the open window envelope.

Classification Forms Mailout

As mentioned, questionnaires were mailed to approximately 3.7 million companies representing five million business establishments in November and December 1997. This included about 1.5 million classification forms generally designed only to obtain the more detailed kind-of-business classification information than was available from the administrative records. Because of the first-time use of NAICS, the 1997 mailout of classification forms was much larger than usual for a U.S. Economic Census. For these cases—and for the remaining 1.5 million nonmail businesses with paid employees, as well as for the 14

million businesses without paid employees—the basic statistics were obtained from administrative record tax sources.

Finally, it should be noted that supplemental mailings—over the several months succeeding the first mailouts—covered approximately 200,000 firms that had gone into operation *after* the basic mail list was developed.

Electronic Reporting

Electronic reporting initiatives for the 1997 Economic Census, like previous censuses, focused primarily on large retail, food service, and hotel chain enterprises. The Census Bureau contracted with a private company to develop an enhanced Windows-based Computerized Self-Administered Questionnaire (CSAQ) to facilitate electronic reporting in the 1997 Economic Census. CSAQ is a diskette-based questionnaire which runs on a personal computer.

Benefitting from prior experiences with CSAQs, the Bureau established challenging requirements. The Economic Census CSAQ had to be able to accommodate reporting for multiple establishments within an enterprise; cover reporting for 21 different report forms with content varying by form; handle a variable number of data items within a form; and perform selected interactive editing. Additional requirements included these: enterprise capability to export and manipulate information provided by the Census Bureau such as establishment identifiers, and name and address information; multiple import capabilities that provide the enterprise or an establishment within an enterprise the capability of linking to internal corporate spreadsheets and databases; and self-contained communication software that would permit modem transmission of the census data.

As in past censuses, the Census Bureau continued to offer magnetic tape reporting within the retail, services, finance and insurance, and utilities sectors, plus a CSAQ in the finance and insurance sectors.

Electronic reporting media were mailed to approximately 600 companies representing over 250,000 establishments during the original mailout process. The Census Bureau received inquiries from an additional 100 companies after mailout.

The actual mail/nonmail establishment counts for the 1997 Economic Census are shown in Table 1.

Receipt and Check-In

Completed questionnaires are returned to the Jeffersonville, Indiana processing center. Supermarket-type bar-coded labels and high-speed sorting equipment using laser

Table 1
Mail/Nonmail Establishment Counts

<i>Economic Census/SSEL</i>	<i>Mail/Nonmail Establishment Counts</i>		
	<i>Total</i>	<i>Mail</i>	<i>Nonmail</i>
Total Establishments	6,500,000	5,000,000	1,500,000
Multi-establishments	1,500,000	1,400,000	0
Electronic Reporters	250,000	250,000	0
Single-establishments	5,000,000	3,500,000	1,500,000
Classification Forms	1,500,000	1,500,000	0

technology are used to rapidly record their receipt. The high-speed equipment is augmented by hand-held wand stations linked to microprocessors to record the bar codes on the large mailing packages containing multi-establishment questionnaires (plus any single-establishment reports not neatly placed in the return window envelopes that were provided with the questionnaires). In addition to eliminating all hand-sorting and manual counting of questionnaires, the system ensures that the receipt of questionnaires and related correspondence are reflected in control records almost immediately, and that only those establishments for which reports are delinquent are included in subsequent follow-up mailings. Next, all multi-establishment report forms are transmitted for the completeness and coverage operations. Single-establishment forms are transmitted for microfilming.

Multi-establishment Data—Completeness and Coverage

The questionnaire data received from multi-establishment companies undergo extensive computer review to ensure that: (1) all establishments of the company are accounted for; (2) all essential individual establishment and company data are reported; and (3) company affiliation information—such as new adds, mergers, and sold cases—are properly handled. These operations produce a current, unduplicated list of companies and their establishments in the SSEL, and assure that total company employment and payroll are consistent with administrative record tax data.

A dedicated computer system linked to interactive terminals is used to meet the completeness and coverage processing requirements. By using a series of video display screens, each terminal operator is guided through the steps required to take the following types of actions based on returned questionnaires:

- Correcting company affiliation information such as address information; adding new or acquired establishments, moving sold establishments of a company to the acquiring company; inserting codes to indicate that establishments were closed or idle; and adding new multi-establishment companies and their establishments to the files.
- Researching “postmaster returns” for the latest addresses for remail of questionnaires.
- Correcting unusual employment and payroll data relationships as compared to administrative record tax data. Comparing reported data to administrative record tax data usually uncovers many new locations for which the company has not reported.
- Correcting establishment reports of the company where the company combined all the data on one report. This involves splitting the combined data across the establishment reports based on prior year employment and payroll relationships.

These problems are usually resolved by calling the company to correct obvious data errors when compared to IRS data, or by using the SSEL interactive routines to process the company affiliation changes or the combined reports. After the completeness and coverage operations, all multi-establishment questionnaires, along with those for single-establishment firms, are microfilmed.

Microfilming

As part of the microfilming process, a serial number, which becomes an integral part of the establishment record, is imprinted on each questionnaire. Analysts may later reference this frame number at an interactive terminal and locate any census questionnaire for review. This process avoids the costly and error-prone filing of the actual reports. Further, copies can always be printed from the microfilm when needed. After microfilming, all questionnaires are transmitted for data screening/keying.

Data Screening/Keying

Data screening/keying, or data entry, is the typing of information from the questionnaire onto video display screens. As the data are keyed, the computer performs simple range checks on entered data. The video terminal displays messages alerting the keyer to unacceptable entries along with what procedures to follow to correct records. After data screening/keying, the keyed data are transmitted electronically to the Census Bureau's computers at headquarters for the control file match operation.

Control File Match

After keying, questionnaire data are merged by computer with existing administrative records and Census Bureau historical data contained in the SSEL database. The primary functions of this operation are to: (1) update company structure and affiliation based on changes reported on the census questionnaire; (2) identify and delete duplicate establishments and add new establishments to the control file; (3) capture any address changes made to the census questionnaires so that geographic coding operations (explained below) can be performed; and (4) assemble all keyed data from both the questionnaire and the SSEL in a single file for later in-depth computer analysis.

For the geographic coding operation, the Geography Division of the Census Bureau maintains an up-to-date computer address reference file with corresponding state, county, place, and census tract numerical codes. To publish tables on economic activity by these detailed geographic areas, address information is needed on the physical location of each establishment. Prior to mailing the questionnaires, the list of establishment addresses—both those that would be sent questionnaires and those for which information would be obtained from administrative records—are coded based on the address reflected in the SSEL. Any address changes identified during the control file match are recoded based on the information reported by the respondent.

Records for which problems are identified are held until the problems are corrected. The merged file of "good" records in terms of organizational and coverage checks are released to the economic subject divisions for post-collection processing.

To summarize this section, Figure 3 depicts the main data collection operations for the 1997 Economic Census.¹⁰ It includes the following operations: forms mailout, receipt and check-in, multi-establishment completeness/coverage, microfilming, data entry, and the control file match. The next section will cover the processing of the reported data through post collection operations.

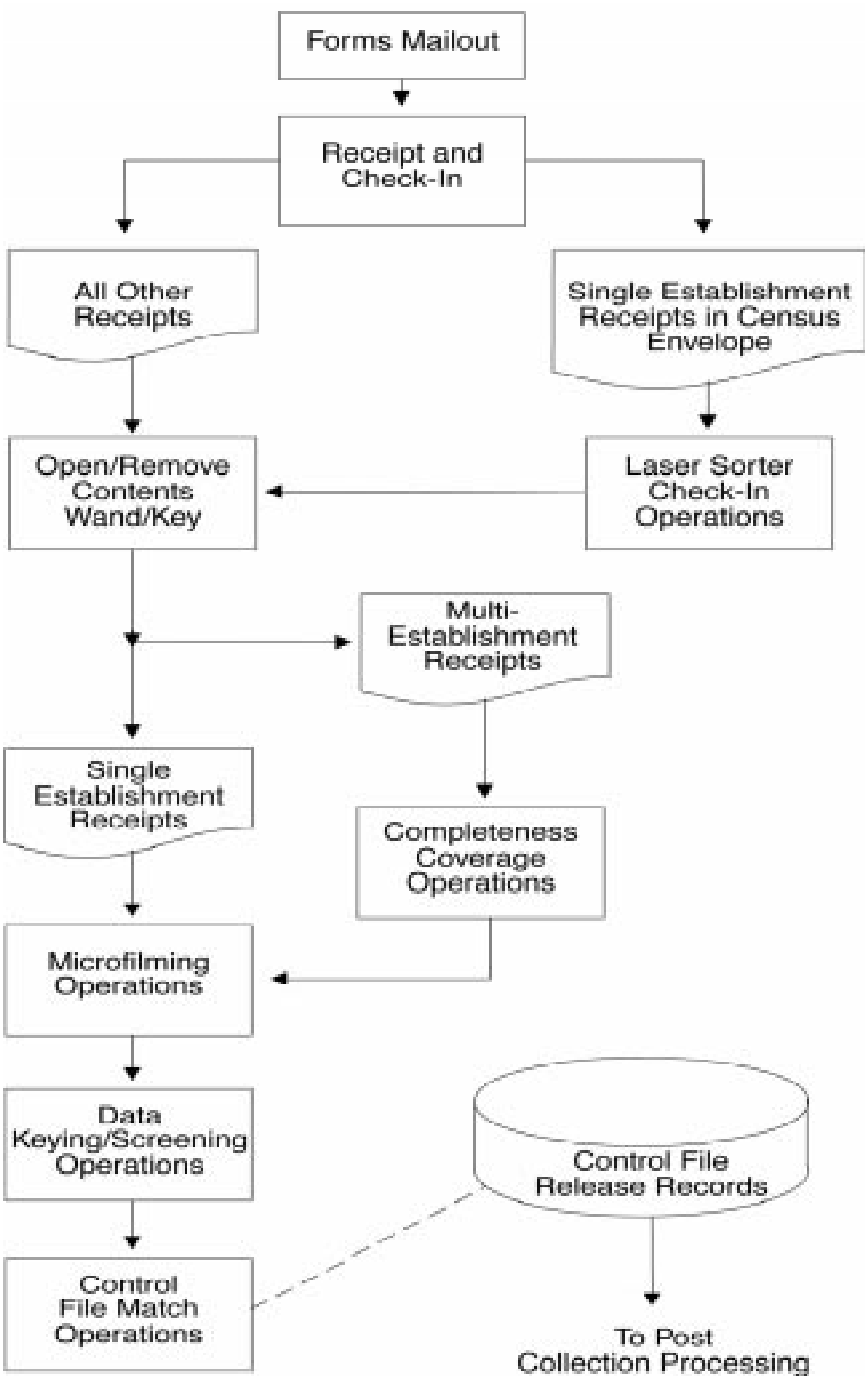


Figure 3
1997 Economic Census Data Collection Operation

DECENTRALIZED POST-COLLECTION PROCESSING

In the Economic Census the post-collection processing represents the steps conducted after the control file match, the last phase associated with the collection processing. The objective of the post-collection processing is editing, cleaning, summarizing, and analyzing the response data in preparation for dissemination to the public. The subject matter analysts in MCD, SVSD, and AFSD (now called Company Statistics Division) have the responsibility for this work, relying on additional analytical and clerical resources at the Jeffersonville, Indiana site. The two distinct phases of post-collection are the micro edit referral processing and the macro analytical processing.

Micro Edit Referral Processing

Micro edit referral processing involves further editing and cleaning of records on an establishment basis. The micro edit referral processing occurs in conjunction with the collection cycle, representing the next step in the pipeline. Figure 4 provides an overview of the micro edit referral processing.

Each subject area performs the tasks associated with the basic flow in Figure 4. Each processing block from Figure 4 is described below:

- **Get Release Records:** The first step in the micro edit referral process is to get the “good” records from the control file match. Recall that these records passed computer checks for organizational structure, coverage, and completeness as described in the

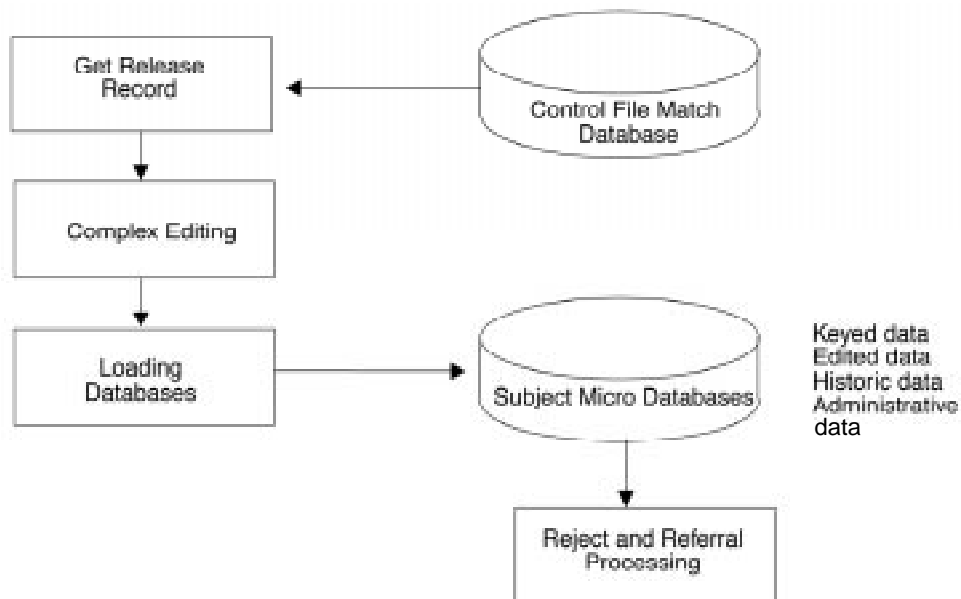


Figure 4
Basic Flow for Micro Edit Referral Processing

collection section. Once the organizational structure is reviewed and approved, the establishments are ready for post-collection processes, where review of response data becomes the focus. While the collection phase is concerned with organizational integrity, the post-collection phase is concerned with data integrity. Each subject area gets its own release records from the control file match database. Thus, post-collection becomes a decentralized process at this point in the census cycle.

- *Complex Editing*: Computer programs subject the retrieved records to a series of “complex” data edit modules. These complex edit programs have two major purposes. First, they assign a valid kind-of-business or industry code to classify the establishment. Assigning a valid classification code depends on computer evaluation of the responses to specific items on the census questionnaires. These items cover many aspects. For example, they include responses to merchandise lines sold by a retail establishment, products manufactured by a plant, entries written-in by the respondent explaining the establishment’s activities, and self-designated check-box classifications. If this critical information is missing, the record is noted (i.e., flagged) as a “reject.” It must be fixed (see discussion below) before further processing occurs.

If critical information is available, the edit assigns the correct classification code. For the 1997 Economic Census the program assigns a “bridge” code that lets the Census Bureau ultimately tabulate the record on both the old SIC basis and the new NAICS. After classification codes are assigned, a “verification” operation is performed to validate the kind of business, industry, geographic, and zip codes.

The second purpose of the complex edits is to evaluate the response data for consistency and reasonableness—for example, assuring that employment data are consistent with payroll or sales/receipts data. Evaluating the response data is done by industry. Additional checks compare data reported in previous censuses or from administrative sources. These checks are accomplished through generalized computer routines. The generalized routines are particularized by subject area to account for differences in industries and data collected on the questionnaires.

The generalized routines cover modules to balance items and to conduct ratio checks.¹¹ Imputation options are employed to estimate noncritical missing data or to replace extreme outlier data. The balancing module allows for simple tests of details to totals; for nested tests of subtotals to broader levels; and for two-dimensional tests to compare additive rows to corresponding column information. The ratio module sets up comparisons of data for the establishment to parameters, developed by industry. These industry parameters are derived based on how the data have been correlated in past censuses or through administrative sources. The ratio module uses items from the questionnaires, administrative sources, or historically reported information. While suspicious records get through the pipeline, they have certain characteristics that question how the predefined computer rules applied to them. These establishments are flagged as “referrals” for manual review.

- *Loading Databases*: After the complex edits, computer programs load data into separate subject micro databases. Each subject area database contains the keyed responses from the questionnaire, the resulting data and flags after the complex edits, administrative data from the SSEL, write-ins from questionnaires, and historic 1992 census data (if available) for each establishment.

Table 2
Estimated Rejected and Referral Counts

<i>Subject Area</i>	<i>Total Establishments</i>		<i>Number of Rejects and Referrals</i>
	<i>Mail*</i>	<i>Nonmail</i>	
Retail	1,350,000	220,000	115,000
Services Industries	1,740,000	450,000	185,000
Wholesale	455,000	0	100,000
Utilities	150,000	100,000	37,000
Finance, Insurance, Real Estate	405,000	125,000	87,000
Construction	130,000	405,000	80,000
Manufacturing	300,000	90,000	70,000
Minerals	17,000	10,000	4,000
Outlying Areas	40,000	0	20,000

Note: *Mail count includes the classification cards with the exception of the 328,000 unclassifieds.

Source: Based on 1997 mailout counts and expected referral counts.

- *Reject and Referral Processing:* The flags assigned during complex editing indicate establishments requiring further follow-up as part of the reject and referral processing. Table 2 shows estimated counts of the rejects and referrals expected throughout the processing for the 1997 Economic Census.

Establishments identified as rejects and referrals are handled through post edit correspondence and through manual problem resolution procedures. Where possible, the complex edits automatically identify establishments qualifying for post edit correspondence. These establishments receive correspondence requesting information on the missing items. In some subject areas, such as manufacturing, more manual procedures are used to mail correspondence to respondents requesting explanation to failed-edit information or to request more detailed information than what was previously reported. For example, detailed product data are needed to code manufacturing plants. Respondents reporting only broad product lines are mailed correspondence asking for the detailed product lines.

For manual problem resolution, analysts and clerks are involved in the data cleaning process, with clerks handling primarily the rejected, simpler cases. These are typically problems involving respondent write-in entries for kind of business descriptions, merchandise lines, or products. The clerks code the write-ins to the appropriate bridge code, type of operation, type of construction, or product code. The analysts and clerks use video-display terminals to review the rejects and referrals. They follow carefully prepared guidelines and procedures for evaluating and correcting problems. Update capabilities let them correct errors and reedit the data interactively. This means the analyst or clerk gets an immediate response to determine further review points. These sophisticated computer systems that operate in an interactive environment are distinguished from the batch computer process shown in Figure 4. The interactive environment is referred to as the "establishment review and correction system."

Macro Analytical Processing

The objective of macro analytical processing is review of tabulated summaries in preparation for data release. The key macro analysis begins at the end of the collection cycle—in other words, after September 1998. Meaningful tabulations are not available until the Census Bureau receives a vast majority of questionnaires and completes most of the follow-up activities for missing and failed-edit establishments. Figure 5 shows the macro analytical process.

Starting in the left corner of Figure 5, the macro analytical process is described below:

- *Subject Micro Databases:* The starting point for the macro analysis is the tabulation of the establishment records housed in the subject micro databases. For the Economic Census, the tabulation of these records occurs along two paths. First, the micro records are tabulated as part of the main publication series associated with the Economic Census. Second, the micro records are tabulated for new cross-sector publications which showcase the introduction of the new NAICS.¹²
- *Data Tabulation:* The micro establishment records defined as “tableable” are used in the tabulations. Tableable records are those establishments which get through the com-

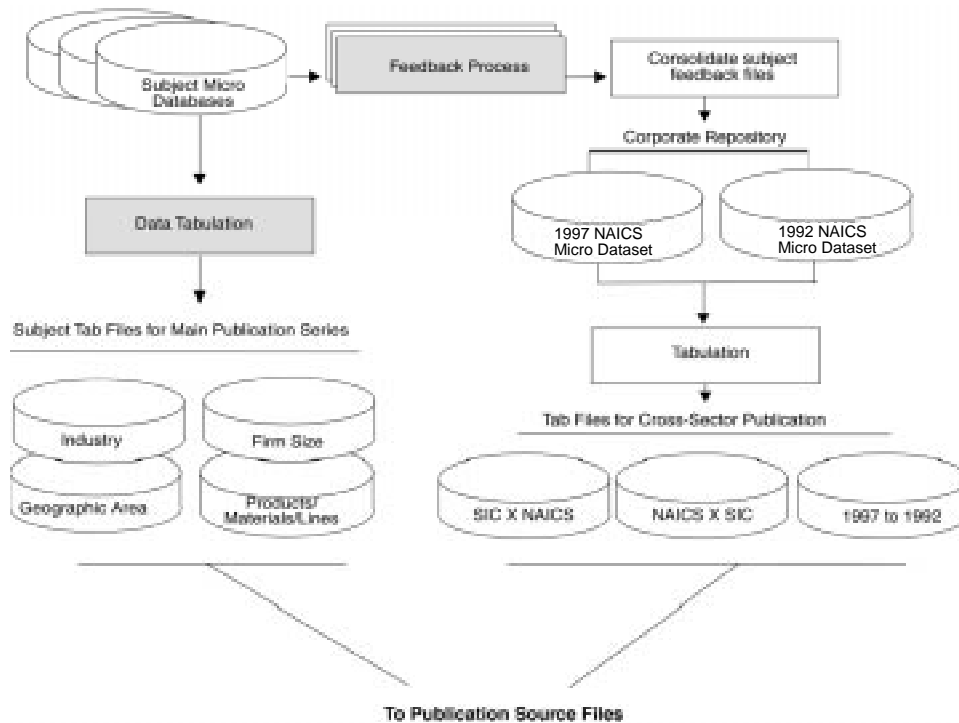


Figure 5
Macro Analytical Process

plex edits without being identified as a reject or referral. The objective of the reject and referral processing is to resolve problems such that the establishment becomes tabable. Invariably, the scope of this work leaves many problem establishments unfinished at the time of macro analysis. Once macro analysis starts, only the most significant offenders are corrected at this stage.

For the Construction sector, which is sampled and does not reflect a complete enumeration, records are weighted to equal universe totals. In general, tabulations occur frequently once the collection cycle ends. This is necessary to account for those corrections to micro records which occur at the macro review stage.

- *Subject Tab Files for Main Publication Series:* Once data are tabulated, the totals are loaded into computer files, which analysts access via macro analytical tools. The Census Bureau tabulates the micro establishment records many ways based on data product and analytical needs. For example, as shown in Figure 5, tabulated data exists by Industry, Geographic Area, Firm Size, Products Produced, Materials Used, and Merchandise Lines Sold, to name the major ones. Note, each subject area has its own set of tab files for its industries.
- *Feedback Process:* New for the 1997 Economic Census is a process to feed tabable micro records from the subject area databases to a corporate repository. Unlike the subject-specific systems, the corporate repository allows analysts to share data across the subject areas. For example, those subject analysts assigned to review Manufacturing also have access to view establishments in Retail industries.

As shown in Figure 5, the tabable establishments are pulled as feedback records and consolidated into one file, labeled the 1997 NAICS micro dataset. Only basic data items are pulled for each establishment. That is, data items reflecting Sales/Receipts/Value of Shipments, Payroll, Employment, Operating Expenses, and Wholesale Inventories. Once created, a process combines the 1997 micro dataset with the 1992 micro dataset. The latter reflects all tabable records from the 1992 Economic Census. The resulting current and historic dataset makes possible the creation of special cross-sector tabulations and reports that allow the analyst to compare data on the new NAICS basis as well as on the old SIC basis. The corporate repository is a SAS[®] dataset.

Figure 6 brings together the heart of the macro analysis. The inputs, as discussed previously, represent the subject micro databases, the subject tab files, and the corporate repository datasets.

Figure 6 shows the analytical tools available to the analysts. Detailed analytical review guidelines are prepared to instruct analysts on what to look for and on how to use the available tools. Typical review points cover analyzing large differences, assessing changes to the tab cell composition due to organizational changes (establishments bought, sold, or new); nonresponse; and errors in historic 1992 data. For tabbed cells confirmed as correct, analysts document their findings. For corrections, they modify data and review re-tabbed results. Descriptions of the tools follow:

- *Subject Table Review Systems:* As with the micro edit referral processing, the macro analysis has specially designed interactive systems that let analysts view the subject tabs in table formats. Each subject matter area has an interactive table review system

for analyzing tabulated cells on a NAICS basis. As analysts correct micro data through the establishment review and correction system, they can then use the table review systems to determine the macro effect of these corrections. The subject table review systems are instrumental in the disclosure analysis.

Disclosure analysis preserves the confidentiality of reported information such that no individual firm's operations or identity can be inferred from the published data disseminated to the public. For 1997 data, consistent rules across all the subject areas are used to identify possible disclosures. Often when tabulated cells are disclosed (and not published), it is necessary to suppress additional tabulated cells so that the primary (originally) disclosed cell cannot be obtained through subtraction. The process of suppressing these secondary tabulated cells is called complementary disclosure analysis. The analysts use the table review systems to review and interactively set the complementary suppression symbols.

- Problem Identification Tools:* To review thousands of tabulated data cells, the analysts need mechanisms to help pinpoint specific problem cells. The two main methods of identifying suspicious tabulated cells are reconciliation and outlier detection. For reconciliation, the analysts compare cell totals to sources outside the Economic Census. The outside sources cover the current programs within the Census Bureau as well as information from related government agencies.

For outlier detection, statistical techniques are used to identify the suspicious cells. New for the 1997 census is the use of automated graphical data review techniques to accomplish this. Graphical techniques provide analysts with visual displays that let

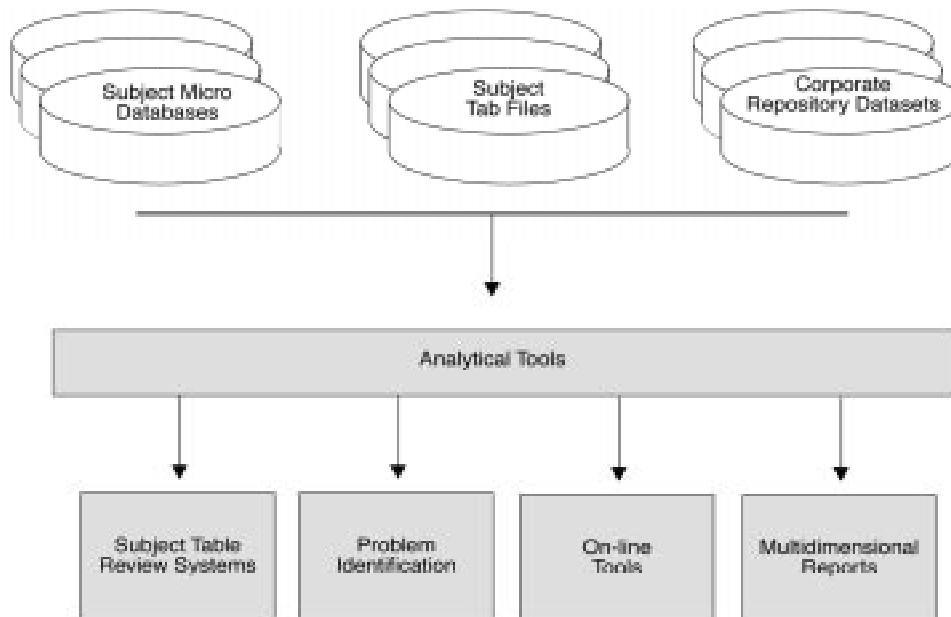


Figure 6
Analytical Tools

them see cells outside the normal distribution. The SAS ® product called “SAS Insight” makes this capability available. Of particular note, the graphical analysis is used to identify extreme cell changes for historic ratios (e.g., historic census employment compared to current census employment) as well as current ratios (e.g., current census annual payroll compared to current census employment).

In addition to graphical analysis, subject matter areas use manual techniques to identify cell outliers. Generally, analysts specify predetermined values for their historical and current ratios. For example, since the Manufacturing sector has prior year comparison points with the Annual Survey of Manufactures, analysts search “census to prior-year” totals exceeding 5% for basic statistics items and 10% for products.

- *Online Tools:* Analysts have tools that let them navigate through the tabulated cells and through the micro establishment records. The predominant tool is the capability to search computer files. Analysts develop “canned searches” which they execute interactively for typical inquiries about the data. Analysts can modify the canned searches for ad hoc, unplanned situations that surface in data review. They specify and incorporate ratios as part of their searches to select records on predetermined size.

In addition to the canned and ad hoc searches, analysts have specially designed computer interfaces that let them do special ad hoc tabulations. For example, using the corporate repository, analysts can select and tabulate the establishments associated with specific companies — even if these establishments cross subject areas. They can use their subject micro databases to select and tab records by classification code (SIC, NAICS, or bridge), geography, and type of operation that differ in any way from the specified publication table formats.

- *Multidimensional Reports:* Used with the corporate repository, multidimensional reports provide an analysis tool to evaluate the new NAICS classification system. They provide, among other things, reports showing SIC industries based on their NAICS components and, vice versa, the NAICS industries based on their SIC components. Additionally, they provide the analysts with comparative SIC data showing the basic data from 1997 to 1992 at the broader levels.

Ultimately, the outcome of performing the various elements of macro analysis is the moving of the cleansed tab files to the next phase of census processing: the publication of data and distribution of results.

PUBLICATION OF DATA/DISTRIBUTION OF RESULTS

As for the centralized collection and the decentralized post-collection processing phases of conducting the Economic Census, the publication of data/distribution of results phase includes several innovations. Indeed, a series of improvements, over the course of earlier Economic Censuses, has culminated in several major breakthroughs as the Census Bureau prepares to release 1997 Economic Census data. These breakthroughs in the publication of data and distribution of results have come in response to requests from the data users. They have told the Bureau that they want timely data, available immediately on the day of release, with ready capability to find and use the requested data for multiple economic sec-

tors and years. With respect to the 1997 Economic Census results, the Census Bureau is well-poised to honor this request.

Publication Is Increasingly Electronic

To meet these needs, the Bureau has greatly augmented the electronic component of its publication system. Today, with CD-ROMs and the Internet becoming a large part of the public's information toolkit, data users are requiring an increasing amount of information—particularly in electronic form. The Census Bureau, therefore, will prepare and release the majority of data from the 1997 Economic Census via improved CD-ROMs (taking advantage of improved software technologies) as well as via the Web—with most data on the Web available free of charge.

In turn, the Census Bureau is reducing its output of paper products. To ease this transition from hardcopy to electronic media, some data, tabulated at the national level, will still be issued in hardcopy. In addition, the CD-ROM and Internet products issued from the 1997 Economic Census will provide the capability to do on-demand, publication-quality printing for all key reports that had been issued in print for earlier censuses. In technical terms, the data tables that used to be issued in print will henceforth be accessible in page image forms via portable document format (PDF) files. This will allow users with the free Adobe Acrobat reader to print high quality pages which will be identical in appearance to the previously printed Table Image Processing System (TIPS) generated tables.¹³ Further, the Bureau is planning to archive the 1997 files, as had been done for the 1992 files, so that future users can refer back to the 1997 data in PDF files.

Thus, the Census Bureau has established electronic products as the primary focus of the 1997 Economic Census data dissemination program.¹⁴ Data dissemination via the Web will ensure instantaneous global availability of Census results on the day of release. And users will have a wide range of improved CD-ROM and Internet data access software features at their fingertips, enabling them to locate and use the data with ease. The processes that led up to improvements in these products will now be discussed.

A New Streamlined System to Produce and Disseminate Data Products

An interdisciplinary group—called the Economic Product Team (EPT)—within the Census Bureau was formed early in the publication planning phase for the 1997 Economic Census. This group was assigned an imposing task: develop a streamlined data production and dissemination system, and make that system compatible with a focus on electronic products. The EPT had its work cut out for it: in 1992, there were two separate systems for products—one for printed products and one for manipulable or electronic products. The result of having two separate systems was that there were errors and inconsistencies between the two products. The errors and inconsistencies caused very high resource expenditures, processing bottlenecks, and ultimately, major delays in the release of data products. What would it take to resolve these problems?

The Publication Source File

If two systems created inconsistencies, then the use of one system should resolve them. It did: the “one source” or “publication source file” was devised by the EPT. *Only one*

source of data was used to create all Internet, CD-ROM, and printed products for dissemination to the public. How do data get into the publication source file, and what happens to them after they are put there? Figure 7 displays these relationships.

As mentioned in the post-collection discussion earlier in this article, it is the work of subject analysts to review data and approve it as final. Once tabulated data are approved, the programmers generate the publication source file based upon specifications by subject analysts.

Analysts next provide the instructions that tell programmers what to extract from the file for various data products (e.g., Internet, CD-ROM, and page image). The subject analysts provide these instructions, called "data dissemination parameters," to the programmers electronically via the Interactive Parameter System (IPS).

After this stage has been reached, data from the publication source file can be extracted by the programmers. From this point onward, the creation of data products proceeds down two parallel paths, resulting in (1) the manipulable files and (2) the page image files. That is,

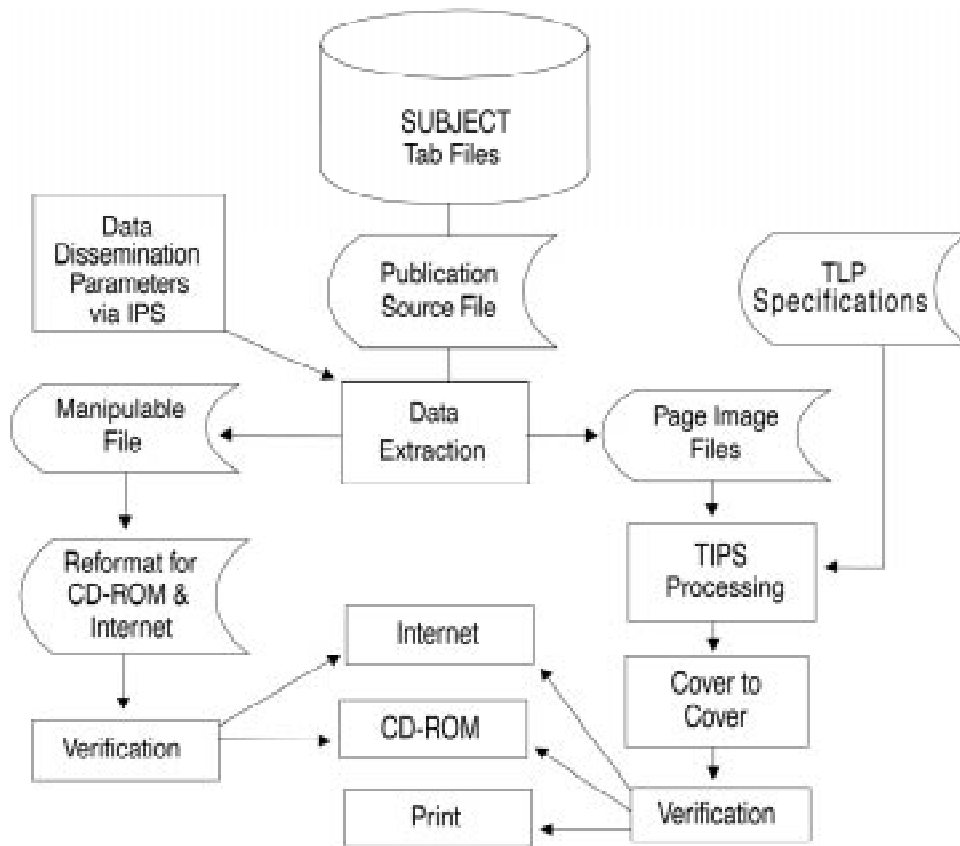


Figure 7

A New Streamlined System to Produce and Disseminate Data Products

- The manipulable files require only a brief format verification, taking not more than a couple of hours before they are ready to be released on the Internet. With this new system, the contingencies that had, in the past, to be met to produce a *printed* report do not delay the release of the data.
- The page image files, in turn, must be combined with the table text, then reviewed, and finally, converted for Internet and/or sent to print. These steps can take anywhere from several days to a number of weeks to complete.

Centralized Programming Efficiencies

The need to provide efficient programming to implement these specifications and instructions led to another important component of the new, streamlined production system: centralization. *Namely, the responsibility for all TIPS programming for the page image products has been centralized within the economic programming area.* Using the publication source file, together with the data dissemination parameters provided by the subject analysts, the programmers are developing a generalized system to extract automatically the appropriate data for TIPS tables. *This same system will, in turn, create the data files that will be the input for the final CD-ROM and Internet files.* This is a major innovation that will significantly reduce the programming workload, essential to the timely issuance of the publications.

The Meta-data Source File

“Meta-data” is an umbrella term used to refer to all supporting materials in a table, or about a table, except the actual numerical results for which the public awaits release every five years. Meta-data, therefore, includes table stubs and data labels, definitions, explanatory text, as well as other auxiliary files required to drive electronic software.

With respect to meta-data, it is the subject analysts that are responsible for providing the appropriate meta-data (for their respective subject areas) to a centralized database. A metadata coordinator then oversees the collection of the meta-data from the subject areas into a “meta-data source file” from which—in an operation similar to that for the publication source file—subject analysts and programmers coordinate the distribution of the appropriate meta-data to Internet, CD-ROM, and page image products. (Some of the meta-data required for the data products for 1997 already exists in an electronic format from 1992. Other meta-data needs to be generated anew for 1997 data).

Important examples of meta-data are the table “shells” or outlines. The Census Bureau’s editors create the table shells based upon specifications (called Table Layout Parameters) by subject analysts: that is, how many rows and columns, and in what relationships to one another, will be needed to present the data? Will data be presented, for example, at the levels of nation, state, county, and/or metropolitan area? And, in turn, at what level of industry classification detail (in terms of the NAICS categories discussed earlier) will data be presented in the tables? Merging these supporting metadata with the actual data files is thus required to produce the complete data product.

Standardization of Major Data Product Components

Given the decided focus on electronic products for 1997 Economic Census data, standardizing data presentation is critically required in the age of the Internet, with its potential for instant comparison of data. Here, radical breakthroughs have been indeed achieved. Sector-by-sector conformity in terms of data-driven stub displays; methods of displaying geographic data; and units of measure will be notable features of 1997 data presentation. Certain artifacts (such as brackets, underlines, or data-driven footnotes) of printed reports previously varied by sector. These variations have been eliminated for 1997. Therefore, in addition to its improving the presentation of data, standardization saves processing resources central to the timely completion of the 1997 Economic Census data dissemination program.

Creation of New Data Access Software

Economic subject analysts and programmers are redesigning and developing new CD-ROM software. Based both upon the results of several usability studies (in which data users came to the Census Bureau and tested software packages capabilities) and also upon specifications from the subject matter areas, the goal is to take the best capabilities of the previous software packages (EXTRACT and GO) and to create, instead, a new windows-based software that provides those capabilities and more.

In addition, a dedicated Census Bureau-wide team is working with the subject areas to create data access software for the Internet. The Internet application will allow the user to do most of the same things that CD-ROM software permits, but will provide the user access to the latest Economic Census data, as well as access to all the other data on the Census Bureau Web site.

To summarize this discussion of data publication and distribution of results, the Bureau has achieved greater processing efficiencies through these innovations:

- The introduction of the publication source file;
- An improved processing and programming infrastructure; and
- The meta-data source file.

The 1997 Economic Census demonstrates substantial trailblazing in product presentation with its standardization of major product components (table layouts, text, and file structures) to promote uniformity across the 1997 Economic Census Product line. This product standardization is critically important today, not only because of its potential for resource savings, but also because improved electronic access—which enables users to mix and match data from various sources more easily—calls for consistency in data presentation.

CONCLUSION

As outlined in the various major sections above, conducting the Economic Census is a very intricate process. It requires synchronization and sequencing of processes as well as the efficient use of staff time and dollar resources. It demands great sophistication in the use of advanced technology to realize the promise of such technology for data collection, post-

collection, and dissemination. Major improvements have been introduced in the form of the new DocuPrint technology and electronic reporting techniques. Similarly, the use of generalized editing methods across subject areas, shared data through the corporate repository, and new problem identification tools—such as graphical data review techniques—add efficiency and quality to the post-collection processing phase. And, the advent of new electronic data products and media—produced and delivered by a streamlined data dissemination system—break new ground in Economic Census data release.

Ultimately, users of 1997 Economic Census data will be able to derive the key messages behind the numbers—both for previously delineated economic sectors, as well as for new NAICS sectors—as never before.

NOTES AND REFERENCES

1. See Judy M. Dodds, "Determining Economic Census Content," *Government Information Quarterly*, 15 (1998):247–262, for a detailed treatment of all the criteria that the Census Bureau must take into consideration—and the important "players" (such as the Bureau of Economic Analysis, other federal agencies, and many other types of data users) that must be consulted—before determining which questions will be on the Economic Census forms.
2. See Mark E. Wallace, "Public and Private Sector Uses of Economic Census Data," *Government Information Quarterly*, 15 (1998): 321–336, which shows how organizational, industry, and geographic levels of measurement form veritable "building blocks" of data that can be combined in limitless ways by data users.
3. See Carole A. Ambler & James E. Kristoff, "Introducing the North American Industry Classification System," *Government Information Quarterly*, 15 (1998):263–273. This article—by the current chairperson of the Economic Classification Policy Committee (the interagency committee chartered to develop NAICS) and by a participant on the interagency subcommittee that developed the manufacturing sector of NAICS—authoritatively covers the emergence and characteristics of the new system.
4. See Paul T. Zeisset & Mark E. Wallace, "How NAICS Will Affect Data Users," published on the Internet at <www.census.gov/epcd/www/naicusr.html>. This brochure also is available in paper (Lanham, MD: Bernan Press 1997).
5. In previous Economic Censuses, "enterprise statistics" were collected by mailing a census questionnaire for ABC Company headquarters to fill out, too, on its payroll and other such characteristics. However, in the 1997 Economic Census, only Form 9901 is sent to ABC Company headquarters, a one-page form that asks for data on company ownership and control. If ABC Company (a multi-establishment company) also happens to have on its physical site a manufacturing plant, a warehouse, or other type of activity, then ABC Company receives not only Form 9901, but also the appropriate census questionnaire for the economic activity taking place at that site.
6. One aspect of measurement that will be greatly improved by using NAICS is the determination of market share. For example, under SIC, the Bed and Breakfast Inn industry was in Subsector 7011, Hotels and Motels. Sharing that category were the following: auto courts; cabins and cottages; casino hotels; hostels; hotels, except residential; inns, furnishing food and lodging; motels; recreational hotels; resort hotels; seasonal hotels; ski lodges and resorts; tourist cabins; and tourist courts. Under NAICS, Bed and Breakfast Inns now have not only their own, separate classification, but are classified as "bed and breakfast inns with 25 guestrooms or more" and "bed and breakfast inns with less than 25 guest rooms." This is the precision for which NAICS will be hailed by data users across the entire spectrum: public, private, individual, organizational, research-oriented or policy-oriented.
7. For the definitive treatment of this subject, see Edward D. Walker, "The Census Bureau's Business Register: Basic Features and Quality Issues." Presented at the Joint Statistical Meetings. Anaheim, CA, August 10–14, 1997.
8. The timely response to census questionnaires by big businesses is particularly important to the success of the Economic Census. The top 1,000 companies—those with over 5,000 employees—account for about 30% of all business activity, and nearly 10% of establishments. For a detailed account of the efforts of the Census Bureau to make large companies aware of their importance to accurate measurement during the

Economic Census, see Robert A. Marske "Increasing Large Company Response to the Economic Census." Presented at the Census Advisory Committee of Professional Associations, October 26, 1995.

9. The enterprise consists of all business organizations under common ownership or control, as well as any affiliated firms in which the enterprise has the power to direct or cause the direction of the management and policies. Although controlling interest is usually defined as ownership of more than 50% of the outstanding voting stock, in some businesses (e.g., the banking industry, which considers 25% of stock ownership as a controlling interest) control may be exercised with a smaller percentage. In general, the Census Bureau accepts the company's listings and judgments of which companies it controls.
10. See Dodds, "Determining Economic Census Content," for several graphics that summarize the equivalent operations for determining Economic Census content. The graphics (and respective accompanying discussions) in both the Dodds article and the present article form a unified account of the Economic Census—from deciding which questions to ask, to the collection and processing of data, to the distribution of results in newly standardized table layouts and formats.
11. See Richard S. Sigman, "Development of a 'Plain Vanilla' System for Editing Economic Census Data," *Working Paper presented at October 1997 United Nations Work Session on Statistical Data Editing*.
12. The Census Bureau will publish the *Core Business Statistics Series*, debuting for 1997. This series is critical to the success of the 1997 Economic Census program. It includes the unprecedented release of data for all economic sectors right after the year in which the census is taken. This series also is important because it will showcase the very first data published on the new NAICS basis, and is key to bridging data between the old SIC system and NAICS. These "bridge" tables will present new data cross tabulated by both old and new classification systems at the same time, identifying the lowest common denominators between the two systems—SIC and NAICS. See Zeisset & Wallace, "How NAICS Will Affect Data Users" and Paul T. Zeisset, "Disseminating Economic Census Data," *Government Information Quarterly*, 15 (1998):305–320.
13. The Census Bureau has successfully created an improved data production and dissemination system for 1997. It is a system that will require fewer resources to create a more standardized data product which can be accessed quickly and easily by innovative and user friendly CD-ROM and Internet software. To provide some perspective regarding this accomplishment, a brief history of the Economic Census publication system processing follows.

Prior to the 1977 Economic Census, all publication tables had been typed or generated by the impact printer, with all titles, column headings, lines, footnotes, symbols, and corrections added manually. Much of this process was literally a "cut and paste" operation. The experimental computerized, photocomposition publication program (the Table Image Processing System [TIPS]), developed for the 1977 Economic Census, was a major innovation to accelerate the production of publications. Nonetheless, this system still had major limitations that slowed the publication process. Therefore, a redesign effort was undertaken for the 1982 Economic Census. Addressing these limitations led to the development of TIPS II. The improved system included automated table composition, minimal manual processing of corrections to text and data, and greater flexibility and timeliness in the release of publications.

For most past censuses, Economic Census printed reports were organized in separate series for industries, geographic areas, and special subjects. For some of these series, preliminary reports containing selected basic statistics were issued several months prior to publication of the final data. The final reports, which were issued after further review and analysis of the reported data, presented more detailed information.

However, even the improvements associated with TIPS II resulted in relatively minor differences in the timing of data release from the 1977 and 1982 Economic Censuses. Later, with advent of CD-ROM technology—allowing random access to database information—electronic data dissemination played increasingly important roles in contributing to continuous improvement in the data release from the 1987 and 1992 Economic Censuses. Also—beginning with 1982 data, increasingly with 1987 data, and tapering off with 1992 data—the Census Bureau released data online via CENDATA. This was a database of the most current and widely used data products and was provided through cooperating private online vendors. Finally, with the advent of the Internet and World Wide Web, the Bureau phased out electronic data dissemination via CENDATA. In fact, most products from the 1992 Economic Census are now available on the Internet.

14. Zeisset, "Disseminating Economic Census Data."

Disseminating Economic Census Data

Paul T. Zeisset*

This article describes the ways that data from the 1997 Economic Census will be reported, both in print and in electronic media. Particular attention is given to the impact of the new North American Industry Classification System (NAICS) on the design of census reports, and to its implications for the assembly of time series from Economic Censuses past and future.

Data from the Economic Census serve as the foundation for the nation's system of statistics about the functioning of the American economy. While many monthly, quarterly, and annual surveys provide the numbers most closely watched by private and government economists for the latest in economic trends, the once-every-five-years Economic Census provides the statistical controls and sampling frames that make many of those surveys possible. Further, the census yields rich data products of its own, providing far greater precision and geographic detail than is possible from the more frequent surveys. In addition, the Economic Census program includes several complementary data series: surveys of minority- and women-owned businesses, two transportation-related surveys, and censuses in Puerto Rico and other outlying areas.

Whether conveyed in print or by computer, the reports of the Economic Census must effectively transfer this wealth of information to those who need it. There is, of course, a critical constraint on these reports: the individual information provided by responding businesses must be kept completely confidential. The statistics compiled are carefully scrutinized so that no information is revealed about the individual businesses that make up the statistics. But, once prepared, these statistics are ready for wide distribution. There is nothing proprietary here: the economic statistics published by the Census Bureau are in the public domain—not even copyrighted. Thus, the distribution of the data can be as wide as possible.

** Direct all correspondence to: Paul T. Zeisset, Economic Planning and Coordination Division, U.S. Census Bureau, Washington, DC 20233-6100 <pzeisset@census.gov>.*

Government Information Quarterly, Volume 15, Number 3, pages 303-318.

© 1998 by U.S. Department of Commerce

Economics and Statistics Administration

BUREAU OF THE CENSUS

All rights of reproduction in any form reserved. ISSN: 0740-624X

BASIC CONCEPTS

The core data from the Economic Census are summarized in terms of business establishments; for example, the number and aggregate employment of establishments in a certain kind of business located in a certain area. An establishment, as defined for census and survey purposes, is a business or industrial unit at a single geographic location that produces or distributes goods or performs services, for example, a single store or factory.

Classifying economic activity establishment-by-establishment is only one of three alternatives. Some census results are classified by company or firm (an entity owning or controlling any number of establishments, including those of subsidiary firms). But because different establishments within the same company can be located in different areas or be engaged in different kinds of business, the establishment basis of reporting yields more precise information than data reported in terms of companies.

On the other hand, users frequently want data in terms of particular products produced or sold. Census forms ask for dollar volume of sales for key products appropriate to each industry, but these data are limited to avoid placing an unreasonable record-keeping burden on businesses. Further, many of the statistics collected in the Economic Census, such as employment or capital expenditures, are associated with particular establishments but cannot generally be reported separately for individual product lines. Thus, only a few specialized data series, like retail Merchandise Line Sales or product tables in manufactures census reports, present statistics by product line. Most of the basic census statistics reflect the classification of establishments, not companies or products.

CLASSIFYING INDUSTRIES

Most data from Economic Censuses are classified by industry, and, since the 1930s, that grouping has been based on the Standard Industrial Classification (SIC) system. For 1997, most census reports will switch to the new North American Industry Classification System (NAICS), as described in another article in this issue.¹ Only a few reports from the 1997 Economic Census will classify data by SIC, as discussed below under Assembling Time Series Data.

NAICS, developed in cooperation with Canada and Mexico, classifies North America's economic activities at 2-, 3-, 4-, and 5-digit levels of detail, and the U.S. version of NAICS further defines some industries to a sixth digit (see Table 1).

The Census Bureau also classifies products, and, in the case of manufacturing and mining, products are classified in a manner consistent with the industry structure. For 1997, the first six digits of the 10-digit product code are the same as the NAICS code for the industry with which the product is most frequently associated. Broad product or service lines also are provided for retail and wholesale trade and other service industries, although their numbering is independent of the industry code.

Both NAICS and SIC categorize each establishment by the principal activity in which it is engaged. Some establishments engage in more than one kind of activity and, thus, may not fit neatly into a single industry category. Nonetheless, each establishment is classified into only one NAICS or SIC on the basis of its primary activity. Its secondary activities are still counted, for example, toward total sales, but they do not affect the classification. For instance, the total sales of furniture retailers (SIC 5712 or NAICS 44211) in a given area

Table 1
NAICS Hierarchic Structure

<i>NAICS Level</i>	<i>Example</i>	
	<i>NAICS Code</i>	<i>Description</i>
Sector	51	Information
Subsector	513	Broadcasting and telecommunications
Industry group	5133	Telecommunications
Industry	51332	Wireless telecommunications carriers, except satellite
U.S. Industry	513321	Paging

should not be interpreted as the total sales of furniture. Stores in that industry may sell other items in addition to furniture, and other kinds of businesses, such as department stores (SIC 5311 or NAICS 45211), also sell furniture. This is an inevitable limitation of the establishment basis of classification.

Despite their limitations, there are major advantages to the use of standard industry classification systems. Their widespread use, inside and outside the government, promotes uniformity and comparability in the presentation of statistics collected by various federal and state agencies, trade associations, and private research organizations.

COVERAGE OF THE CENSUS

Economic Censuses have never covered quite all of the economy. The program expanded steadily up to 1992, when the 1992 Economic Census, together with the censuses of agriculture and governments conducted separately, covered roughly 98% of economic activity. Coverage will be roughly the same for 1997, although with the regrouping of industries in NAICS, the exclusions are shifted around. For example, landscaping and veterinary services—classified as agricultural services under the SIC system—seemed logically excluded from the Economic Census. Now those industries have been moved into professional, administrative, and other service categories, and, since census funding did not expand to allow their coverage, they now seem to make more awkward holes in the coverage of the economy.

The 1997 Economic Census covers 1,056 of the 1,170 industries in NAICS. Specific exclusions are noted in Table 2. Another limitation to the coverage of the Economic Census is that most of the statistics apply only to establishments with payroll, that is, they omit small, single-establishment companies with no paid employees—what are sometimes called “mom and pop” businesses. This limitation is a practical one, since the census is conducted by mail and the best records for developing the mailing list of businesses come from the federal payroll tax (Social Security) system. To gauge the number and sales of nonemployer businesses, that is, those not covered by payroll tax records, the Census Bureau obtains some statistics from the Internal Revenue Service (IRS) derived from business income tax returns. As in recent censuses, statistics about nonemployers will be confined to specialized reports, and most 1997 reports will summarize statistics about only those establishments with paid employees.

Table 2
NAICS Sectors and Their Coverage in the 1997 Economic Census

NAICS Code	Economic Sector
11	Agriculture, Forestry, Fishing and Hunting (<i>Separate census of agriculture, conducted by the Department of Agriculture, covers farming but excludes agricultural services, forestry, and fisheries</i>)
21	Mining
22	Utilities
23	Construction
31–33	Manufacturing
42	Wholesale Trade
44–45	Retail Trade
48–49	Transportation and Warehousing (<i>Census excludes U.S. Postal Service, large certificated passenger air transportation, and all rail transportation</i>)
51	Information
52	Finance and Insurance (<i>Census excludes funds and trusts</i>)
53	Real Estate and Rental and Leasing
54	Professional, Scientific, and Technical Services (<i>Census excludes landscape architecture and veterinary services</i>)
55	Management of Companies and Enterprises
56	Administrative and Support, Waste Management and Remediation Services (<i>Census excludes landscaping services</i>)
61	Educational Services (<i>Census excludes elementary and secondary schools, colleges, and professional schools</i>)
62	Health Care and Social Assistance
71	Arts, Entertainment and Recreation
72	Accommodation and Foodservices
81	Other Services (Except Public Administration) (<i>Census excludes pet care; labor, political, and religious organizations; and private households</i>)
92	Public Administration (<i>Separate census of governments does not present data according to NAICS or SIC systems</i>)

Statistics on manufactures are not much affected by the exclusion of establishments without employees. On the other hand, in the retailing, service, and construction sectors, establishments without paid employees—for instance, door-to-door sales people, consultants, independent contractors—are relatively common. In 1992, nonemployer establishments accounted for about 2.8% of retail sales nationwide, 10.6% of service receipts, and 7.3% of construction receipts. Certain small industries, like barber shops, are dominated by nonemployers, and in a number of others—like real estate operators and agents, tax return preparers, child day care, used car dealers—nonemployers account for more than a quarter of all receipts.

GEOGRAPHIC AREAS

The most detailed Economic Census data are provided for the United States as a whole. Key statistics, albeit progressively fewer, are available for states, metropolitan areas (MA's), counties, and places with 2,500 or more inhabitants. Only limited data are provided for ZIP codes. The level of geographic detail varies by sector, as shown in Table 3.

Table 3
Geographic Areas in the 1997 Economic Census

<i>Sector</i>	<i>States</i>	<i>MA's</i>	<i>Counties</i>	<i>Places 2500+</i>	<i>ZIP Codes</i>
Mining	X				
Utilities	X	X			
Construction	X				
Manufacturing	X	X	X	X	X
Wholesale Trade	X	X	X	X	
Retail Trade	X	X	X	X	X
Transportation and Warehousing	X	X			
Information	X	X	X	X	
Finance and Insurance	X	X	X	X	
Real Estate and Rental and Leasing	X	X	X	X	
Professional, Scientific, and Technical Services	X	X	X	X	X
Management of Companies and Enterprises	X				
Administrative and Support, Waste Management and Remediation Services	X	X	X	X	X
Educational Services	X	X	t	t	t
Health Care and Social Assistance	X	X	t	t	t
Arts, Entertainment and Recreation	X	X	t	t	t
Accommodation and Foodservices	X	X	X	X	X
Other Services (Except Public Administration)	X	X	t	t	t

Note: "t" indicates data are not available for tax-exempt firms at this level.

Within a given area, the more economic activity there is, the more detail is available. Thus, a county with many factories is likely to have more industry detail in a manufacturing census report than a county with fewer manufacturers. All of the data are scrutinized closely to avoid possible disclosure of information about particular firms. This can be frustrating for a user who finds that a desired number has been replaced with a (D) for disclosure, and therefore must rely on data at a higher level of aggregation.

Because of cost of preparation and the potential for statistical disclosure, no incorporated places with fewer than 2,500 inhabitants, unincorporated places, nor census tracts are reported separately in the Economic Census.

TYPES OF REPORTS

Whether in printed reports or in computerized form, most data from the Economic Census look something like those illustrated in Table 4. Each table presents statistics for a set of industries and/or geographic areas. The focus is on economic activity during the census year, for instance, 1997. (Statistics from previous censuses are presented in only a very few specialized tables.) The statistics are complemented by narrative material—basic concepts, methodology, reliability, and detailed explanations of terms—included in the same printed report, CD-ROM, or other system.

Detailed Reports

Detailed reports are issued sector by sector. With the exception of ZIP Code statistics, these reports were issued in print up through the 1992 census; starting in 1997, their data will be available only on CD-ROM and on the Census Bureau's Internet site:

Table 4
Sample Data in a Geographic Area Series

NAICS Code	Geographic Area and Kind of Business	Establishments (Number)	Sales (\$1,000)	Annual Payroll (\$1,000)	Paid Employees for Pay Period Including March 12 (Number)
COLORADO					
44-45	Retail Trade	22,921	28,532,646	283,457	3,488,242
441	Motor vehicle and parts dealers	1,340	6,018,542	18,932	484,044
4411	Automobile dealers	546	5,305,849	13,631	384,357
44111	New car dealers	262	5,024,487	12,503	363,316
44112	Used car dealers	284	281,362	1,128	21,041
4412	Other motor vehicle dealers	173	272,136	1,171	26,057
44121	Recreational vehicle dealers	60	142,413	432	11,438
44122	Motorcycle, boat, and other motor vehicle dealers	113	129,723	739	14,619
441221	Motorcycle dealers	71	86,493	486	9,799
441222	Boat dealers	27	31,333	172	3,303
441229	All other motor vehicle dealers	15	11,897	81	1,517
4413	Automotive parts, accessories, and tire stores	605	434,640	4,089	72,952
442	Furniture and home furnishings stores	1,749	1,543,869	10,380	187,582
4421	Furniture stores	449	447,968	2,899	61,219

- *Geographic Area Series* (published for all sectors) provides detail for establishments with employees as illustrated in Table 4. They include data for the nation, states, and sub state areas listed in Table 3, except ZIP Codes.
- *ZIP Code Statistics* (selected sectors, see Table 3) include primarily counts of establishments by employment- and/or sales-size by industry.
- *Industry Series* (manufacturing, mining, and construction) provides national totals on individual industries, their products, and materials consumed, plus limited data for states.
- *Subject Series* (all sectors) provides national and limited state and metropolitan area data on special topics including Merchandise Line Sales, Concentration Ratios, and Establishment and Firm Size.

Summary Reports by Sector

Summary reports by sector provide highlights of the data in print for 1997. They feature primarily national data and general statistics by state, and are similar in many respects to "General Summary" or "U.S. Summary" reports published in 1992 and prior years. Now that very few reports will appear in print, the summary reports for 1997 also will include illustrations of some of the more detailed data available in electronic media.

Core Business Statistics

Core Business Statistics is new for 1997. The series provides data for most or all industries, economy-wide. An *Advance Report* gives the first data for broad NAICS and SIC cat-

egories. The *Bridge Between NAICS and SIC* shows the relationships between NAICS and SIC categories in detail. *Comparative Statistics* shows national and state totals classified by SIC for both 1992 and 1997—comparisons not possible with other, NAICS-based reports. *Nonemployer Statistics* is the only source for information about nonemployers—12 million small businesses not included in other census reports.

Other Reports

The *Survey of Minority-Owned Business Enterprises*, conducted in conjunction with the Economic Census, measures the extent of business ownership by specific minority groups in the United States: Blacks; persons of Hispanic origin; and Asians, Pacific Islanders, American Indians, and Alaska Natives. A report is issued on each of these three groups. There is also a report on firms owned by women, and each report gives corresponding characteristics for all businesses.

All of the foregoing reports provide data for the United States. There also are reports from complementary censuses covering some but not all sectors of the economies in Puerto Rico, the Virgin Islands, Guam, and the Commonwealth of the Northern Mariana Islands, under the title *Censuses of Outlying Areas*.

Timing of Reports

Users of economic data want information as current as possible, and the timely issuance of the reports is one of the highest priorities in the Economic Census program. Table 5 cites key dates in the publication of 1997 census data. Most final 1997 Economic Census reports will be published in 1999 and 2000. This may not appear to be very timely, but what the user needs to realize is that 1997 is only the reference year. Most data are not obtained from companies until 1998, so that the respondent can provide information reflecting all activity, such as sales or capital expenditures, during the entire calendar year of reference. Overall, the publication schedule for 1997 reflects an ambitious effort to make data available as soon as possible. For more detail in terms of specific sectors and series, see the *Preview to the 1997 Economic Census*.

In an effort to expedite the release of key data, the 1997 Economic Census will publish a single *Advance Report* prior to the publication of more detailed statistics. This will be the first attempt to publish data about the entire economy early on in a census publication program, as much as two years prior to the publication of corresponding economy-wide num-

Table 5
Key Dates in the Publication of 1997 Economic Census Reports

early 1999	Advance Report (in print)
1st-3rd quarter 1999	Industry Series
mid 1999–early 2000	Geographic Area Series
early 2000	Bridge Between NAICS and SIC (in print)
early 2000	Comparative Statistics
3rd quarter 2000	Nonemployer Statistics
mid 2000–early 2001	Subject Reports
early 2001	Summary Reports (in print)
mid 2001	ZIP Code Statistics

bers in previous censuses. Naturally, these advance numbers will be superseded as final reports are published sector by sector.

COMPUTERIZED DATA FROM THE ECONOMIC CENSUS

Much of the published data from Economic Censuses have been made available in computerized form for a number of years. The 1972 Economic Census was the first to introduce a large number of files on computer tape. CD-ROM dissemination began with the 1987 census. Though the Internet had not figured in the early plans for disseminating 1992 data, key census results came to be featured on the Web.

Advantages of Computerized Media

Users have been interested in obtaining their economic summary data in computerized form for a variety of reasons:

- *Ease of manipulation.* From 1972 to 1992, while data on tape or CD-ROM mostly duplicated data also available in print, users chose computerized data largely for their ease of manipulation. Sophisticated users were the first to employ tapes and CD-ROM's to rank, compare, analyze, reformat, and extract data. Users merged information from different databases, as in the combination of retail census and population data to yield per-capita retail sales figures. Then, as CD-ROM software became easier to use, even novice users found it easier to find the data they were looking for on CD-ROM. On CD-ROM, data for all sectors were available on a single device, while in print a number of separate reports were required to cover all sectors. For 1997, both CD-ROM and Internet software will include sophisticated search engines to help users find what they are looking for.
- *More data series.* While most data from 1972 to 1992 appeared both in print and computerized media, the latter were a unique source for several databases too large to be printed cost-effectively, such as ZIP Code Statistics and sub national Merchandise Line Sales. Due to tight printing budgets and, on the other hand, due to the widespread acceptance of CD-ROM and the Internet, only a very few reports will appear in print for 1997, with perhaps only one tenth the number of pages published in earlier censuses. Thus, users interested in detailed data must go to computerized media.
- *Immediacy of access.* The Internet now provides immediate access to data as soon as they are released, bypassing the weeks required to print a report or manufacture a CD-ROM. For the user, the Internet also bypasses what can be a lengthy multi-step acquisition process in which the user may first obtain informational material, glean enough information about the data to place an order, then wait additional days or weeks while the order for CD-ROM's or printed reports is fulfilled and delivered by mail.

CD-ROM's

CD-ROM is certainly the most efficient mechanism for transmitting the large census databases in their entirety. A single device holds up to 680 million bytes of data. Software

on each database CD provides the capability to select, reformat, merge, and rank the numbers, and then export the data to a spreadsheet or other application for further manipulation.

As noted in Table 5, various parts of the output of the 1997 Economic Census will be published across a 2 1/2-year period. The first CD-ROM, to be issued in mid-1999, will include only those industries and states published by that time. That CD-ROM will be reissued once every quarter, and successive discs will be progressively more inclusive. CDs will be sold primarily by subscription, so that the user always has the most inclusive CD-ROM available. Certain large datasets, like ZIP Code Statistics, will have CD-ROM's of their own separate from the main subscription series.

CD-ROM's from the 1997 Economic Census should be much easier to use than their predecessors. Data files on 1997 CD-ROM's have been redesigned to facilitate the analysis of the entire economy, not just one sector at a time. Standard hierarchic industry codes will be used, rather than internal codes once thought to "improve" on the sequencing and presentation of the data. Units of measure have been standardized across sectors, and publication criteria have been made more flexible to allow presentation of data for more industries, particularly those most important in each area.

Software programs on 1987 and 1992 CD-ROM's were menu-driven, but lacked a graphic user interface. CDs for 1992 included four separate programs for simple data viewing, more sophisticated data extraction, printing of multi-sector profiles, and documentation. For 1997, CD-ROM's will integrate all of these functions for users with Windows95 or WindowsNT. New searching functionality should greatly assist the user not yet familiar with the new NAICS structure. For users of Mac or Unix, limited utilities will be provided that convert database files to flat character format.

A separate series of CD-ROM's will provide data in viewable (PDF) format, as described below.

Internet

The Census Bureau's Internet site <www.census.gov> has already garnered a number of awards, yet it is an evolving product. While key data from the 1992 Economic Census are present, the detail does not approach that of CD-ROM. That will change shortly, as all data from the 1997 Economic Census appear on the Internet as well as on CD-ROM.

Data on the Internet are presented in two different ways:

- *Database* format supports functions similar to those on the CD-ROM's, including export to ASCII, DBF, and other formats; and
- *Viewable* formats (primarily PDF—portable document format) allow users to view or print tables that look exactly like the detailed printed reports available from previous censuses. Every report printed from the 1992 Economic Census is available on the Internet in PDF format, and most corresponding data from the 1997 census will also be available in PDF even though the reports are no longer printed. Adobe Acrobat™ software, available free on the Internet, allows users to print any report "on demand" at their own computer printer.

Basic Economic Census data will be available free on the Web, although there may be some specialized services available only to CD-ROM subscribers or to subscribers to CenStats, the Census Bureau's fee-based service.

Access to Microdata: Special Tabulations and Studies

One of the most popular forms of data release for users of demographic data from the Census Bureau is the public-use microdata file. Samples from the Bureau's various household surveys, including the Census of Population and Housing, are made available to data users after detailed geographic information has been removed and other modifications are made to reduce the potential that any respondent could be identified. Public-use microdata files allow users to retabulate the data in a variety of ways to examine different relationships that may not be highlighted in published tables.

Unfortunately, the typical business establishment is far more identifiable than the typical household. Government agencies that regulate or tax businesses, as well as trade associations, publishers of business information, and other private entities, frequently maintain large amounts of information about many specific businesses. Some of this information is made publicly available by the subject business itself (for example, in classified telephone directories or in reports to shareholders). Thus, any file of microdata about unidentified business establishments from a census would have some potential for being matched to information from other sources to indirectly identify, and thus disclose confidential information about, at least some specific businesses. In the absence of methods to keep such records anonymous, there can be no public-use microdata files about firms or establishments.

When users need the census data reanalyzed in a special way, they can contract with the Census Bureau to make a "special tabulation" of its confidential records. The microdata records are handled only by sworn Census Bureau personnel, and the resulting data are screened for possible disclosure prior to release—in the same manner as regular census publications. The Bureau's costs in preparing a special tabulation, typically in the thousands of dollars, must be reimbursed by the customer or group of customers requesting their preparation.

One special project has led to the development of a Longitudinal Establishment Data (LED) file of manufacturing plants, with data assembled to cover a series of census and intervening survey years. This microdata file is not available for public use, but the Bureau has a special staff (the Center for Economic Studies) with its own dedicated computers to work with the file. Appropriately funded outside researchers can be sworn in as Census Bureau staff to work with the data at Census Bureau centers, but data publication requires the same kind of scrutiny to avoid disclosure of confidential information that applies to all other Census Bureau products.

ASSEMBLING TIME SERIES DATA

One of the preeminent virtues of the Economic Census program is that comparable data have been collected at fixed intervals and with consistent definitions across decades. Nonetheless, so long as reports were designed in the context of limited budgets for printing, census reports typically included very little historical data. Comparative statistics, covering the current and most recent previous census, have generally been included for the United States

and, for some sectors, for states. Left to the user is the assembly of time series—such as the growth of retailing in a particular area, or trends in a particular manufacturing industry.

Acquiring Reports from Previous Censuses

While printed reports are typically available for sale for only a few years after their issuance, the Census Bureau has archived all printed material on microfiche since 1968. Users may purchase from the Census Bureau copies of the microfiche or paper copy generated from the microfiche for any title dating back to the 1967 censuses. Collections of older reports are maintained at certain major libraries; individual reports may be borrowed through interlibrary loan.

Volume 1j of the 1992 CD-ROM series includes a national time series from the Annual Survey of Manufactures from 1958 to 1995, and monthly retail sales from 1967 to 1994. Volume 4 of the 1992 CD-ROM series, entitled “Nonemployer Statistics,” includes Geographic Area Series files for 1987 for retail trade, wholesale trade, service industries, and manufacturing in a format that mirrors their 1992 counterparts. More comprehensive data for 1987, and a few datasets for 1982 and 1977 are included on the final 1987 Economic Census CD-ROM (1e).

Selected tape files from Economic Censuses 1972 to 1982 may be obtained from the National Archives and Records Administration.

Industry Comparability

The implementation of NAICS will cause major disruptions in the availability of comparable information across time periods. In the last 30 years, the SIC system was updated 3 times (in 1967, 1972, and 1987) and each time a significant number of new industries was introduced into the existing framework. What is different for 1997 is that the whole framework has changed.²

While data for well over half of the SIC's in use in 1992 can be derived from 1997 NAICS industries, a substantial number of industries cannot be much more than approximated under NAICS. That makes the 1997 Economic Census particularly important, because census questionnaires identify industry components finely enough that data can be categorized under either NAICS or SIC; and as a result certain key data can be published according to the old system as well as the new. The *Comparative Statistics* report will present the number of establishments, sales, employment, and payroll for each SIC for the nation and each state, for both 1997 and 1992. Thus, basic SIC-by-state time series can be carried backward from 1997 to 1987, and farther to the extent that particular industries are not affected by SIC changes in 1987, 1972, and 1967.

NAICS time series can go forward from 1997, but they cannot generally go backward to earlier years, because many NAICS categories require information that was not collected in 1992 and earlier censuses. For instance, NAICS 45321, Office Supplies and Stationery Stores, differs from SIC 5943, Stationery Stores, primarily by the addition of certain office supply stores that were previously classified in wholesale trade. Census questionnaires prior to 1997 did not separately differentiate office supply stores from other kinds of office supply wholesalers, so NAICS 45321 cannot be estimated for prior periods.³

Right now, users have access to correspondence tables between the old and new systems in the *Federal Register* notices that have announced NAICS (see April 9, 1997) and in the formal NAICS Manual (being published in spring 1998). These tables show for each NAICS industry the SIC categories or parts thereof that comprise them, and for each SIC industry the NAICS industries or parts thereof to which their establishments are likely to be reclassified. The 1997 Economic Census *Bridge Between NAICS and SIC* report will take that correspondence a significant step farther by showing the number of establishments, sales, employment, and payroll at the national level for each of those intersections between the old and new systems. For example, *Bridge Between NAICS and SIC* will show the number and sales of those office supply stores that were transferred out of wholesale trade, along with other components of the new retail Office Supply and Stationery Stores category.

At broader levels of classification, the changes between SIC and NAICS are further confounded by the rearrangement of the hierarchy. Another article⁴ describes the subdivision of service industries into five new sectors and parts of four others. Less noticeable, but perhaps more troublesome, are shifts affecting such sectors—like manufacturing, wholesale trade, and retail trade—that retain their status as sector titles in NAICS but are being affected by changes in scope. Retail trade will be roughly 10% smaller under NAICS than under SIC just because eating and drinking places were transferred to the new Accommodation and Foodservices sector, not to mention smaller changes due to transfers between retail and wholesale trade such as the office supply stores mentioned above. Manufacturing also will lose more than 10% of its employment just because significant components have been reclassified elsewhere.

Scope of Economic Census Programs

Prior to 1992, the Economic Census program covered less of the American economy. In 1987 and earlier years, the census did not include Finance, Insurance, and Real Estate; and it included only selected transportation industries within the Transportation, Communication, and Utilities sector. The addition of those components boosted census coverage from roughly 76% of the gross domestic product in 1987 to about 98% in 1992. The coverage of service industries expanded in 1967, 1977, and 1987. Thus, time series available for some industries are relatively short.

GEOGRAPHIC COMPARABILITY

Most students of economic trends confine themselves to looking at the nation, states, and counties. County boundary changes are few and far between, while many places, metropolitan areas, and ZIP Codes change boundaries over time. Geographic comparability of sub state areas may be a moot issue between 1992 and 1997, because there are no plans to publish 1997 data for counties, places, and metropolitan areas on a basis allowing for comparison with 1992 data (that is, SIC). Questions as seemingly routine as “Did manufacturing employment in my area go up or down?” may remain unanswered for 1997.

DELIVERING DATA TO USERS

The collection and tabulation of economic statistics constitute a hollow exercise if there are no effective mechanisms for getting those products into the hands of users. Fortunately, there are centralized sales outlets for Economic Census products in Washington, D.C., and they are complemented by many vendors and other intermediaries all over the country who can help users access the data.

Sales Outlets for Economic Census Products

Economic Census products are sold either by the U.S. Government Printing Office (GPO) or by the Census Bureau itself, through its Customer Services unit. Most Census Bureau printed reports are sold through GPO, which is well equipped to service orders through the mail. Over-the-counter sales of census publications are not particularly common, since GPO has bookstores in only 24 large cities, and most are not well stocked with census titles. On the other hand, commercial bookstores have shown little interest in retailing government documents, in part because GPO is unable to give them as much margin between wholesale and retail as they expect from commercial publishers.

All other products are sold by the Census Bureau's Customer Services Center. These products include CD-ROM's, computer tapes, microfiche, paper prints from microfiche, maps, and those printed reports that GPO elects not to sell.

Users in a hurry appreciate the fact that both GPO and the Census Bureau accept telephone orders, but both require that phone orders be charged either to a major credit card (VISA, MasterCard) or to an appropriate deposit account arranged in advance. GPO's telephone order desk number is (202) 512-1800. The Census Bureau's Customer Services unit can be reached at (301) 763-4100. When in doubt about ordering information or which number to call, dial Census' Customer Services. Counselors in Customer Services can help you confirm that you are ordering the right product, give the GPO stock number (necessary when calling GPO), suggest alternatives if the report desired is no longer stocked by GPO, or refer the caller to a subject-matter specialist in the Bureau if the question is technical. (Users may also request a copy of "Telephone Contacts for Data Users" listing Bureau specialists in dozens of subject areas.)

REPUBLICATION OF CENSUS DATA

There are many different ways to present any given set of information. The publication series of the Economic Census generally provide the maximum detail available, but may not reflect the best organization for any particular application. A number of Census Bureau and private sector publications repackaged Economic Census data to meet different needs or address different audiences.

The Census Bureau publishes several "statistical compendia" which bring together data from a wide variety of sources. Highlights of the most recent Economic Census and surveys are carried each year in the *Statistical Abstract of the United States* (in print and CD-ROM), along with comparable figures from a few earlier years. *Historical Statistics of the United States* (in print only) carries a more limited number of time series back much farther. The *County and City Data Book* and the *State and Metropolitan Area Data Book*

(both in print and CD-ROM), assemble the key general statistics from the latest Economic Census uniformly for all covered areas.

Similarly significant are the printed and computerized data products of several private publishers and many trade associations. Frequently these publications not only rearrange the data but also enhance their usefulness by estimating more current values or providing complementary information from other sources. They may also make estimates for data suppressed in census reports—making the data easier to use, but without compromising the confidentiality of the original responses since the imputed values are only approximations. In other cases, value is added to the census statistics by publishing them together with data from other sources within the industry itself. Unfortunately, many users who rely on these numbers from trade associations and private publishers do not realize that they have the Census Bureau to thank for the precision of the data.

Other Sources for Assistance

Census Bureau Regional Offices

While sale of census reports is one aspect of data delivery, so also is their availability for public reference. The Census Bureau has regional offices in 12 cities around the country, and each has a substantial library of census publications for reference, although not generally for sale. Information specialists are available to assist users in finding specific data of interest.

Depository Libraries

There is an effective program of data dissemination through public libraries, university libraries, and similar institutions. The Federal Depository Library system, administered by GPO, was established by Congress to enhance the availability of all kinds of federal government publications. About half of the 1,400 libraries in the system choose to maintain substantial collections of census documents. To supplement this system, the Bureau furnishes copies of its reports to an additional group of libraries, designated Census Depository Libraries. Libraries not in either depository system or with less than complete collections can still borrow census publications through the interlibrary loan system. Most members of the depository library systems now handle data not only in print or microfiche, but also on CD-ROM.

State Data Centers

The Census Bureau has entered into a cooperative agreement with each state whereby the Bureau provides training, technical assistance, and certain data products without charge. In return, the state, at its expense, maintains facilities for distributing census data and information about the data within the state. Each state data center has set up a network of affiliates within the state—city and regional planning agencies, local libraries, etc.—which, in turn, have been given basic sets of census publications and training in their use. These affiliates serve as statistical resource centers in their respective communities. Most state data centers can prepare, on a fee basis, printouts or other extracts of Economic Census CD-ROM's tailored to meet particular needs.

Promoting Census Products to Users

To disseminate census products effectively, the Census Bureau must make sure that people know about them. The Bureau has a number of programs, in addition to state data centers, to promote census products and educate people in their use.

References in Print

The user wanting to keep up with what is available from the Census Bureau has a number of options. Each month the Bureau publishes *Census and You*, a newsletter with information about new or forthcoming statistics or services, descriptive articles on major Census Bureau programs, announcements of technical developments, and occasional descriptions of statistical work being done outside the Census Bureau.

The *Census Catalog and Guide* provides a systematic list of the printed reports, microfiche, and CD-ROM's available from the Bureau. Reissued every year through 1997, it covers not only new issues during the preceding year but also earlier releases back to 1980. The Catalog incorporates many lists users need for reference, such as the locations of GPO bookstores, Census Bureau regional offices, state data centers, and depository libraries. To keep the public up to date in between the annual issues, the Catalog is supplemented by the *Monthly Product Announcement*, which lists only recently released products.

The *Preview to the 1997 Economic Census* provides information about Economic Census data available, how they are classified, and the timing of the various census reports (much more specific than Table 5).

Press releases help reach a broader audience. Nearly every major report the Bureau publishes is announced to the news media via concise one- or two-page summaries, complete with the appropriate citation of the full report. Releases on reports of general interest are faxed automatically and without charge to the major wire services and networks, hundreds of individual newspapers and broadcasting stations, as well as to a number of professional and trade journals, other specialized media, local chambers of commerce, and others.

Press releases are, of course, only a partial answer to promoting census products. Most press attention is focused on survey results portraying national trends, not on the release of general purpose statistics as from the Economic Census. The media may highlight interesting findings, but they rarely cite the specific report from which the data come—after all, the Bureau is not paying for advertising, but merely providing material it hopes will be found newsworthy.

Promoting Economic Census Data through the Internet

The Internet is quickly bringing Economic Census data to the attention of more new users than any other form of publication, so it logically follows that promotional efforts should be focused on the Web as well.

All of the resources cited in the preceding section are available on the Internet—*Census and You*, the *Catalog and Guide*, *Monthly Product Announcement*, the *Preview to the 1997 Economic Census*, and all press releases. Some of them, like the *Preview*, were posted to the Web long before they saw the light of day as printed reports. Others, like the *Catalog and Guide*, are better on the Web—where descriptive and ordering information is kept up to date, and searchable, through “CenStore.”

The popular *Guide to the Economic Census and Related Statistics* was last published for 1987. Resources were not available to update it for 1992, but the *Guide* will be resurrected as a feature of the Economic Census Web site—where the reference material can be augmented incrementally and easy cross-references can be made both to the data and to other reference material already on the web.

The Economic Census web site <www.census.gov/econ97> was inaugurated in 1997 as a focal point for material promoting company participation in the census. It featured copies of the hundreds of forms used in the census; answers to questions businesses may have; media resources like press releases, quotes, and public-service advertisements; materials for data users, like the *Preview*, examples of data uses, and lists of telephone contacts; and pointers to key data already on the Web. This Website will be kept up to date as the best starting place for people looking for information about the 1997 Economic Census.

CONCLUSION

Within the last decade, electronic media have come to dominate not only data use, but also the processes by which people learn about and acquire Economic Census data. The Census Bureau has worked aggressively to take advantage of these new developments, in order to make census data more timely, more widely available, and easier to use.

NOTES AND REFERENCES

1. Carole A. Ambler & James E. Kristoff, "Introducing the North American Industry Classification System," *Government Information Quarterly*, 15 (1998): 263–273.
2. Paul T. Zeisset & Mark E. Wallace, "How NAICS Will Affect Data Users," published on the Internet at www.census.gov/epcd/www/naicsusr.html. Also available in paper copy (Lanham, MD: Bernan Press 1997).
3. *Ibid.*
4. Ambler & Kristoff, "Introducing the North American Industry Classification System."

Public and Private Sector Uses of Economic Census Data

Mark E. Wallace*

“The uses of these data are limited only by the failures of human imagination.”

Gaylord Worden**

This article describes the principal uses of the data collected in the Economic Census. Namely, the data serve as a framework and statistical benchmark for current economic surveys; as source data for calculating composite measures of the nation’s economy; and as the basis for planning and monitoring of national, state, and local economic policies and programs. The data also are used for research, planning, marketing, and management by private sector businesses. In addition, they are important for measuring and tracking changes in economic activity.

The United States economy is large and complex. Millions of private and public sector decision-makers are involved daily in keeping it healthy and vigorous. They rely on accurate information from the nation’s economic statistics programs to understand the economy’s complexities and to reduce the uncertainties of decision-making.

* Direct all correspondence to: Mark E. Wallace, Chief, Economic Planning Staff, Economic Planning and Coordination Division, U.S. Bureau of the Census, Department of Commerce, Washington, D.C. 20233-6100 <mw Wallace@census.gov>, p. 324.

**This article is based upon the 1987 GIQ article, “Uses of Economic Census Data,” by the late Gaylord Worden, formerly Chief of Industry Division, U.S. Bureau of the Census. The present article, however, adds substantial new information to take account of changes for the 1997 Economic Census and to suggest further data uses.

Government Information Quarterly, Volume 15, Number 3, pages 319-334.

© 1998 by U.S. Department of Commerce

Economics and Statistics Administration

BUREAU OF THE CENSUS

All rights of reproduction in any form reserved. ISSN: 0740-624X

The Economic Census, conducted once every five years, is the foundation of the nation's economic statistics programs. It gathers the most comprehensive collection of data on the nation's economic activity: no other statistical program provides similar data on the economy on such a scale.

Because these data are consistent, reliable, and detailed, they are used in myriad ways to address the economy's structure and performance. They are used to answer specific questions on inputs used and outputs produced by industry or by type of business—both nationally and at successively smaller geographic areas. Moreover, the data collected in a comprehensive Economic Census provide the controls and sampling frames for the many surveys that produce more current, but less detailed, measures of the economy between the five-year censuses.

A CLOSER LOOK AT THE BUILDING BLOCKS OF THE U.S. ECONOMY

Economic Census data are collected in such a way that the data form a series of building blocks that reflect the structure of the U.S. economy. Much like a child's set of legos, these building blocks of data can be combined and re-combined in any number of configurations, always producing new structures of knowledge about how the economy functions.

The principal building blocks in terms of which the data are collected are these:

- Level of business activity;
- Level of geographic detail; and
- Type of industry.

Level of Business Activity

Establishment data, company data, and other data are three chief ways of classifying the level of business activity at which Economic Census data are collected.

Establishment Data

For each of the economic sectors covered by the census, every plant, store, or other business location with employees is identified and included in the count. Each physical site is called an "establishment," hence, the term, "establishment level data." While the "establishment" refers to the actual location of the economic activity, the "company" or the "firm" refers to that aspect of the organization that "owns" or "controls" the establishment. One company may own many establishments. The establishment and the company are one and the same *only* when there is just one establishment.

Indeed, the usual practice of the Census Bureau is to collect data from a company's business headquarters for *each establishment* that it owns.¹ It is this procedure that produces the detailed establishment level data that is the hallmark of the Economic Census.

For each establishment, data are collected on employment, payroll, and other inputs and costs. Comparable data on shipments, sales, revenues, receipts, and other measures of output or production help complete the measure of economic activity. The amount of detail on inputs and production varies significantly by sector. The most specific breakdowns are pro-

vided for the manufacturing sector where Economic Census data are collected on nearly 1,500 input materials and over 12,000 products.

Each and every establishment—based upon what it produces, whether goods or services—is assigned a 6-digit numerical code representing its industrial classification. From the 1997 Economic Census onward, coding of all establishments will be done in terms of the new North American Industry Classification System (NAICS), the significance of which will be discussed below.

Company Data

An additional data collection tool is the assignment of a common identifier to all establishments owned by the same company. This produces “company level data.” Company level data provide a rich dataset for analyzing the structure and organization of economic activity. By linking establishment and company data once every five years during the census, the opportunity is provided for data users to make better use of the combinations of data (on establishments and companies) available in years between the censuses. For example, data used to calculate—both quarterly and annually—the Gross Domestic Product rely upon *establishment* data from many surveys, in combination with statistical information from *company* level reports filed with the Internal Revenue Service.

Other Data

Other economic data collection programs are included in the Economic Census. One sample survey collects inventory and use information on the nation’s fleet of 60 million private and commercial trucks. Another reports on the origin and destination of commodities shipped from selected industries. A special program provides data on minority-owned business enterprises, and another provides data on women-owned businesses.

Still other programs provide specific data on water use by manufacturers and mining operations, and yet another, on types of textile machinery. In addition, there is an Economic Census of Outlying Areas collecting selected economic sector data from Puerto Rico, U.S. Virgin Islands, Guam, and the Commonwealth of the Northern Mariana Islands.

Type of Industry

The 1997 Economic Census will be the first to conduct and report its data collection effort in terms of the new North American Industry Classification System (NAICS)—developed jointly among the U.S., Canada, and Mexico.² Economic Censuses *prior to 1997* collected and reported data on economic activity in terms of the Standard Industrial Classification (SIC) system—initiated in the United States during the 1930s.

Despite periodic revisions, the SIC ultimately became outmoded. It could no longer squeeze rapidly emerging, new types of economic activity into its conventional 10 sectors—agriculture; mining; construction; manufacturing; transportation; communications and utilities; wholesale trade; retail trade; finance, insurance and real estate; services; and public administration.

By contrast, NAICS classifies the economy into 20 sectors. These sectors more accurately reflect today's economy and its increasing domination by the service sector and, in particular, by emerging information industries. The 20 sectors are:

- Agriculture, Forestry, Fishing and Hunting;
- Mining;
- Utilities;
- Construction;
- Manufacturing;
- Wholesale Trade;
- Retail Trade;
- Transportation and Warehousing;
- Information;
- Finance and Insurance;
- Real Estate and Rental and Leasing;
- Professional, Scientific, and Technical Services;
- Management of Companies and Enterprises;
- Administrative and Support, Waste Management and Remediation Services;
- Educational Services;
- Health Care and Social Assistance;
- Arts, Entertainment, and Recreation;
- Accommodation and Foodservices;
- Other Services (except Public Administration); and
- Public Administration.

NAICS accounts both for new types of business activity and for older types of activity carried on in new ways. Also, whereas the SIC rested upon a mixture of production-based and market-based categories to classify economic activity, NAICS surpasses this mixed mode of classification by a consistent use of production-oriented concepts.

Level of Geographic Detail

Each establishment on which the Economic Census collects data is assigned a detailed geographic code. This code makes it possible for the establishment to be classified at one or more geographic levels:

- Nation;
- State;
- Metropolitan area;
- County;
- City or place; and
- Zip code.

The combination of establishment data, by industry, by geographic location is key to the claim that establishment level data serve as the building blocks for statistical information. (See Figure 1.)

- Comprehensive coverage of most of the economy;
- Consistent and basic input and output, or production data across the economy;
- Data for detailed industry classifications;
- Data for small geographic areas;
- Great flexibility in how the data can be aggregated and used; and
- Another data point each five years that is consistent with an already long series of data.¹

Note: 1. The introduction of NAICS will bring about a break in time series data in the short run. In early 2000, the Census Bureau will publish a detailed report, *Bridge Between NAICS and SIC*, covering all industries at the national level. *Bridge Between NAICS and SIC* will present new data cross tabulated by both old and new classification systems at the same time, identifying the lowest common denominators between the two systems—SIC and NAICS. These tables will help alleviate problems for data users when dealing with the time series break in the data. For more information on bridge tables, see Paul T. Zeisset, “Disseminating Economic Census Data,” *Government Information Quarterly*, 15 (1998):305–320.

Figure 1
Advantages of Statistical Building Blocks

PRIMARY PURPOSES AND USES OF ECONOMIC CENSUS DATA

Only the failures of human imagination limit the uses of data from the Economic Census. Because these data measure the structure of activity of a large portion of the economy on a consistent and scheduled basis—and because they are so widely available³—they constitute a major body of facts and information that are used at all levels of government and in the private sector. This section describes the primary and most frequent public and private sector uses of Economic Census data, which are to:

- Serve as framework and as statistical benchmark for current economic surveys;
- Provide source data for calculating composite measures of the national economy;
- Plan and monitor economic policies and programs in the public sector;
- Plan and manage in the private sector; and
- Measure and track changes in economic activity.

Framework and Statistical Benchmark for Current Economic Surveys

It is important to understand the basic role of the Economic Census as *benchmark statistics for the nation’s economic indicators*. It might be thought that the results are not timely and, therefore, are of little value. But timeliness is not the primary purpose of the Economic Census. The results are never truly timely since they are taken at five-year intervals; must be taken in the year after the period covered; and require two to three years to conduct, analyze, and publish.

Timeliness, on the other hand, is the primary objective of the current surveys, which usually are based on relatively small samples of establishments or companies in the target sec-

tor or industries. But because of their small size, the sample surveys provide only minimal detail—certainly by contrast to the extensive detail provided by the the Economic Census.

Current surveys are taken at frequent intervals in order to update the levels and trends of economic activity between the comprehensive censuses: surveys can be annual, quarterly, or monthly. There are annual surveys of manufacturing, retail trade, wholesale trade, and services, and there also are important monthly surveys for manufacturing, construction, and retail and wholesale trade.⁴

The Economic Census provides the best available and most complete list of business establishments that forms the universe from which the sample panels for these surveys are drawn. Being able to draw a sample from a list—known as the Standard Statistical Establishment List—that is completely updated every five years helps assure the accuracy of these sample surveys.⁵ With the rapid changes taking place in the economy, if the development of new lists were any less frequent, there would be serious problems in the accuracy of the *current measures* of economic activity.

Many of the current sample surveys also are benchmarked to (i.e., reconciled with) the Economic Census.⁶ *Statistical benchmarks* are firm and reliable reference points from which an economy can measure both the volume and direction of its change over time. Since the complete coverage in the census provides more accurate data than the surveys (which are subject to sampling error), the benchmarking process improves the sample estimates. In a similar way, some trade associations benchmark—to the Economic Census—the data they collect. Statistics collected in the Economic Census thus form the cornerstone for the collection and adjustment of statistics gathered between the censuses.

Source Data for Calculating Composite Measures of the Nation's Economic Activity

Some of the best known economic statistics series are those that provide *current composite measures* of economic levels and trends. These include quarterly estimates of Gross Domestic Product (GDP) and nonfarm productivity, and monthly series such as the Index of Industrial Production and the Producer Price Index. Data provided by the Economic Census are critical in maintaining the accuracy of these series.

Benchmarking the National Income and Product Accounts (NIPA)—including the level of GDP and all its components—to data from the Economic Census is an extremely involved process, and is carried out by the Bureau of Economic Analysis (BEA).⁷ Since no other data provide the detail and accuracy of the Economic Census, the GDP estimates—as benchmarked to the Economic Census—are the most complete and accurate possible.

The first step in this process is to use source data from the Economic Census as well as from many other sources to prepare an intricate economic picture of the production and use of commodities and services among industries. The BEA develops this picture, known as input-output tables, by tracing how *each* of the economy's industries use the products of *all* industries in producing final products and services for consumption or investment by other industries. This requires the highly detailed product and material data collected in the Economic Census—as well as information on sales by class of customer which is collected in every *other* Economic Census, or once every 10 years. These tables are useful for analyzing how changes in demand for consumer and investment goods, government expendi-

tures, exports, and imports affect *all* industries. These updated input-output tables then are used to derive benchmark estimates of the NIPA.

The Bureau of Labor Statistics (BLS) and the BEA also use data from the census to update the weights assigned to various products in important price series. The BLS uses data—from the census questions on manufactures—on the quantity of products shipped. This is to determine how much weight to assign to the price of each of several thousand products included in the Producer Price Index. The purpose of this calculation is to summarize these data into more aggregate index numbers.

In a similar manner, BEA relies upon census data for its price series maintained for deflating GDP estimates. Updated weights from the census⁸ help maintain the accuracy of price series by reflecting the current mix of products being produced. Accuracy of price series is, in turn, vital for accurate estimates of real economic activity, that is, estimates adjusted to reflect changes in prices.

Two other major ways that census data are used as the foundation for current composite measures of economic activity are for benchmarking and weighting the monthly Index of Industrial Production by the Federal Reserve Board, and the quarterly estimates of nonfarm productivity by BLS. Periodic updating of weights for these series is required because of the changing mix of industries over a five-year period. As this mix changes, the levels of these series can be corrected only by benchmarking to the Economic Census.

Providing this foundation for the composite economic measures is one of the more important uses of Economic Census data. Many decisions—on the content and scope of coverage of the census—are made based on how that decision will affect the data's use in composite measures. Having accurate composite measures is critical for the development of informed public economic policies and for private decision making. All investors, consumers, wage earners, and producers are affected by the accuracy of current composite measures, and by the contribution of these measures to the reduction of uncertainties surrounding decision making.

Planning and Monitoring of Economic Policies and Programs by the Public Sector

Many economic policies and programs require yet more detailed information than that available from composite measures of the national economy. Frequently, the greater detail required includes economic levels and trends by small geographic area; sometimes, it is by industry or product. The Economic Census serves these needs very well.

A common use is for planning or monitoring economic development programs for a local area. Or, the data may be used to assess the geographic distribution of economic activity, or for changes in that distribution to determine the need for regional economic assistance programs. Another important use is to develop plans and programs for the nation in the event of an emergency. Others want to evaluate the performance of programs to encourage the development of minority-owned businesses or small businesses.

These are examples of policies and programs that are common to all levels of government. State and local bodies make frequent use of the data by small geographic area. The census gives them a rich source of data for decisions on how to provide efficient services and plan for economic growth.

These same users in all levels of government rely on the less detailed data from annual, and more frequent, surveys for analysis of economic policies and programs. Since the accuracy of these more current data is vital for these uses, the Economic Census also is critical in this indirect way.

Planning and Management by Private Sector Businesses

While the public sector uses of census data already described also are important, *per se*, to private sector business managers, there are even more specific and direct ways in which the private sector can use Economic Census data. Moreover, it is important to recognize that many of the suppliers of the data (manufacturer, retailer, or service establishment) also are among the primary users of the results.

The basic Economic Census data supplied by the Bureau of the Census typically is used as a *starting point* by business organizations to arrive at the answers to specific questions.⁹ The individual industrial and business units are far better able to perform their functions within the total economy when basic knowledge is provided to them. And, the more knowledgeable they are about how census data can benefit them, the more likely they are to participate in the census—and to respond accurately and quickly. Therefore, a major task facing any statistical agency is to educate the data suppliers on the ways that the data can be used to their advantage.¹⁰

In 1954, a seminal report on the importance of the Economic Census—*Appraisal of Census Programs, Report of the Intensive Review Committee of the Secretary of Commerce*—confirmed this very point. Namely, “if a business has a better basis from which to initiate its own research, and can—as a consequence—effect economies and efficiencies which result in lower prices to the public, then the public (if it were to know this chain of events) would evidence a real interest and exert a real pressure on behalf of the Economic Census.”¹¹ To promote awareness of the direct benefits to be realized from census results—by showing how the data can be applied to improve both production and marketing decisions, as well as strategy—at this juncture, some examples are useful.

Improving Production Strategy

Census data can be used by individual firms in planning and developing their production strategy. In many cases, this strategy depends upon assessing the performance of the firm against other firms in the same industry or geographic area. By comparing itself with those in the same general category, that is, in the same industry, same geographic area, same relative size class, or those firms specializing in the same types of products, the firm compares its own performance to that of the industry as a whole (see Figures 2 and 3).

By comparing changes from year to year (for products, industries, or geographic areas) with changes that have taken place in the firm itself, the company can determine whether it is improving its performance relative to the rest of the industry. If its performance is unduly different, the firm can investigate the possible causes. For example, based upon analysis of the data, the firm might more efficiently control manufacturing schedules, thus providing for proper inventory levels without overloading.

Other comparisons, useful in production planning, can be made from Economic Census data. For example, manufacturing sector data break down the value of industry shipments according to the primary and secondary products that are typically produced in the indus-

Using the latest Economic Census data on manufactures, or from the Annual Survey of Manufactures series, the firm can compare its performance to certain industry averages in terms of the mix of specific materials consumed or the mix of labor and materials' costs. If its mix is noticeably different, and the firm has been losing its market share, it may want to investigate why. Averages or ratios that may be used for comparison include the following:

- Payroll per dollar of sales;
- Cost of materials per dollar of shipments;
- Annual wages per production worker;
- Production worker wages per hour;
- Nonproduction workers to production workers;
- Capital expenditure per employee or per dollar sales; and
- Unit value (value/quantity) for individual products.

Figure 2
"How To Succeed in Business"

The various measures that could be considered for judging the performance of the individual operating unit can be extended to as many data items as are collected. Census reports provide many ratios for each industry over a number of years in order to make firm/industry comparisons easy. Some basic questions that can be answered with the data are:

- What is the changing mix of manufacturing industries, and which are growing or declining most rapidly?
- Are multi establishment companies becoming more vertically integrated or horizontally diversified?
- Are small firms increasing their share of road building activity?
- What changes are occurring in manufacturing employment in the Cleveland metropolitan area?
- Is employment growing in some primary metals industries and declining in others?
- How does the change in manufacturing activity in North Carolina compare with other southeastern states?
- How has the mix of labor and material costs changed in the past 15 years for the manufacturers of dairy products?

Figure 3
Judging Relative Performance

try. Some of this industry product mix evolves naturally as a by-product of the manufacturing process. Secondary production may be a logical extension of using some of the waste from an earlier stage of production.

In other cases, secondary products have evolved because individual firms have found it advantageous to produce commodities that can be marketed together with their primary product. The individual firm can examine how its product mix compares with other firms in the industry and, thus, determine whether there might be a more effective product mix.

Improving Marketing Strategy

Census data also permit the individual firm to evaluate its position in a market or to determine the existence of a potential market.

Data users in manufacturing industries can determine the answers to such inquiries as “How specialized is the wood furniture industry?” If this information is too aggregated, individual firms frequently request that the Census Bureau provide *special tabulations* of individual products produced or individual materials consumed by manufacturing establishments according to geographic areas that fit their marketing or sales district, that is, “How specialized is the bedroom furniture manufacturing industry *in North Carolina?*” (see Figure 4).

If the company produces a product that is used in other manufacturing processes, it can determine the industries that are most likely to use its product, and—by studying the geographic location of those industries—identify the most fruitful marketing areas. For example, “What are some of the products in which aluminum is being used more? What materials is it replacing?”

Similarly, if a firm produces team athletic equipment, it can ask, “What areas have the highest concentration of construction spending on schools?” (see Figure 5).

Finally, if the firm is producing a product that is used by, or distributed through, other economic sectors (such as retailing, wholesaling, or construction), the firm can use data from the Economic Census covering those sectors to identify the best potential markets among these types of businesses. Similarly, a firm can use this information to lay out sales territories and to pinpoint markets for advertising purposes.

Data users in the distributive trades and service industries might ask some basic questions such as:

- Are department stores accounting for a smaller or larger share of total clothing sales?
- What areas have the highest concentration of retail sales per capita (see Figure 6)?
- Which states have the biggest increases in business services activity? Has the ranking of states by level of business services receipts changed in the past 10 years?
- Do minority-owned businesses account for a larger share of economic activity than they did 10 years ago? In which types of economic activity are minority-owned businesses increasing their shares most rapidly? In which states are Hispanic-owned businesses increasing most rapidly?

Many organizations making these kinds of analyses have seen the possibility of having the Census Bureau further tabulate the data.

Quite frequently, they request that the Census Bureau regroup establishment data, product data, or materials consumed data into geographic or other groupings that better fit their individual needs.

Such tabulations are done when organizations making the request can pay the cost, provided that the results will not disclose the operation of individual companies.

Figure 4
Special Tabulations Are Helpful

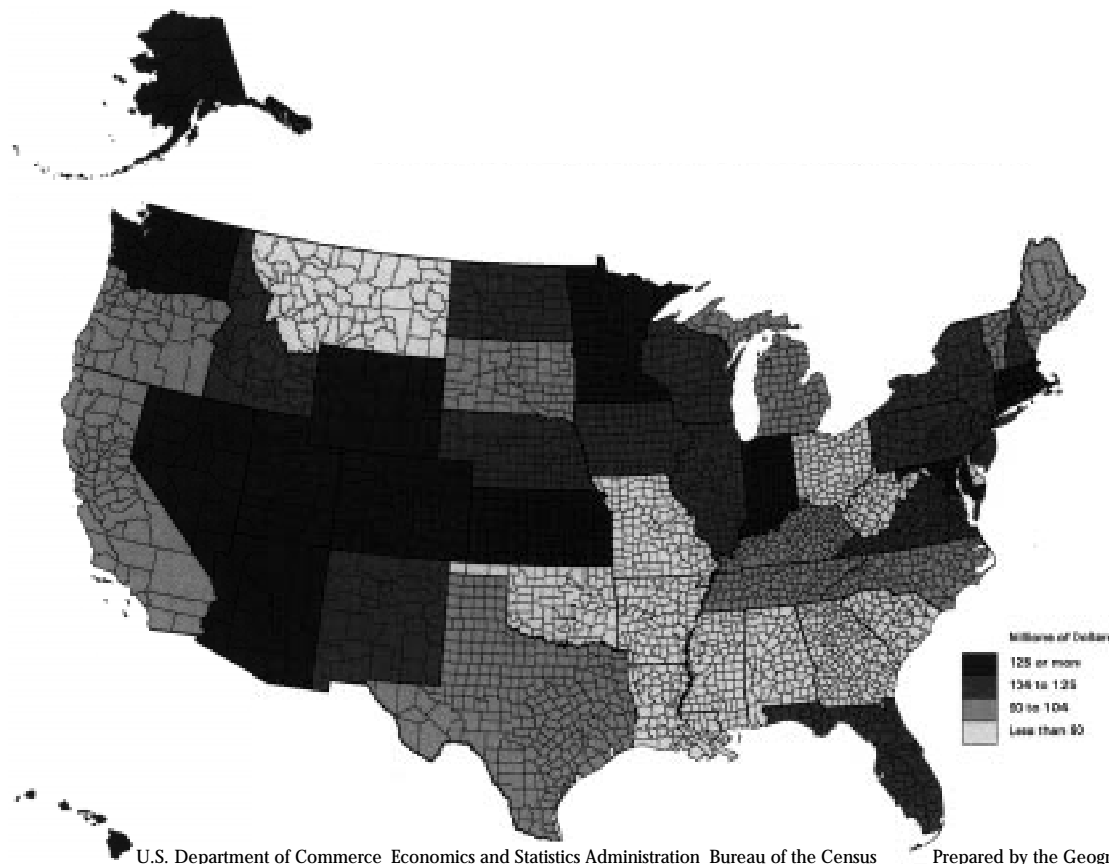


Figure 5
Construction Spending on Educational Facilities Per Capita, by State: 1992

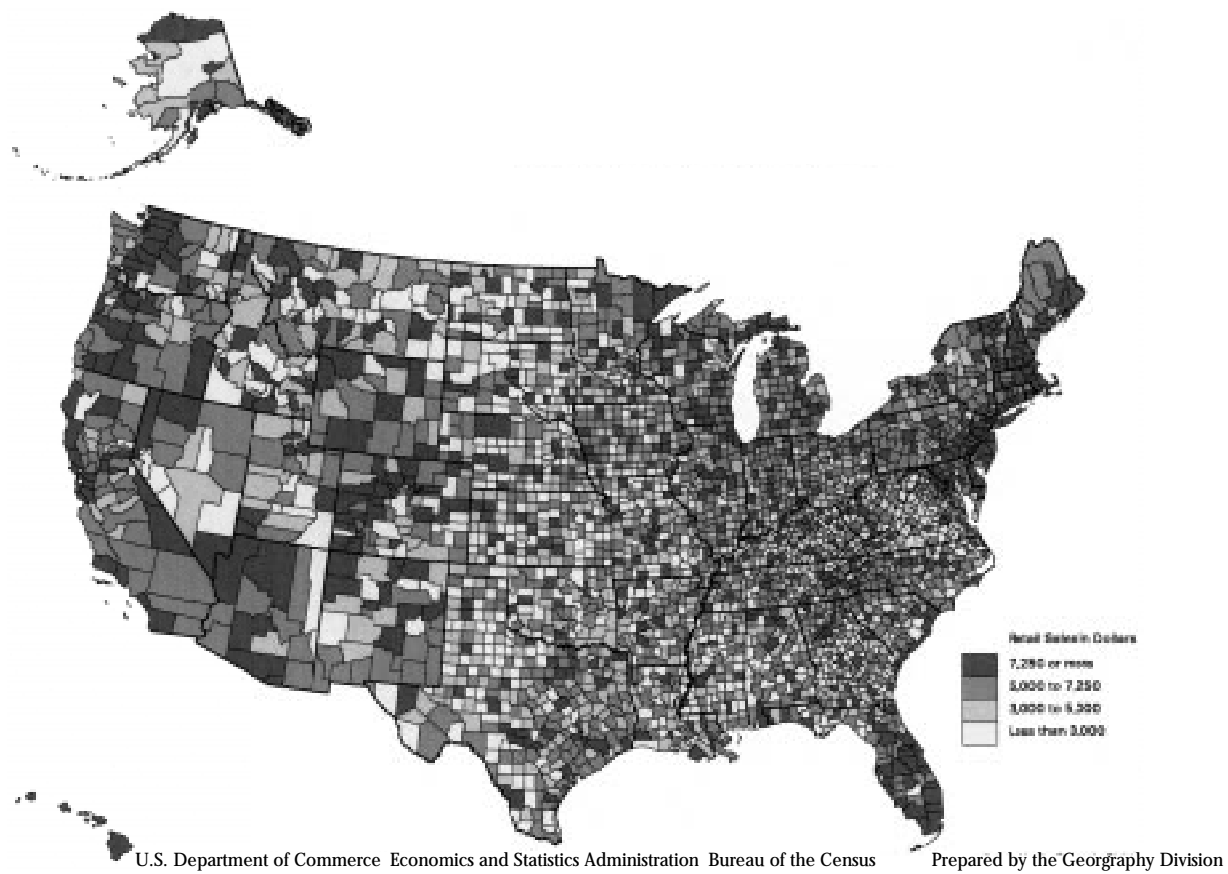


Figure 6
Retail Sales Per Capita, by County: 1992

Some individual firms look to their trade associations or private research firms for the summary data needed for such internal analysis. While these organizations are excellent sources of key figures about an industry's performance, frequently the firm is unaware of the original source of many of these data. Trade associations republish Census Bureau data, at times modifying the data to meet the needs of a particular industry.

Not infrequently, the associations or research firms benchmark their own data series to the Census data or have special tabulations of the data made by the Census Bureau. Sometimes, a failure to acknowledge the Census Bureau as the source of the data occurs because there is no legal requirement to cite data that are in the public domain. At other times, they are meticulous in citing the sources of information, but the harried business user overlooks these footnotes.

Figure 7
Census-Originated Data Marketed by Private Research Firms

- Are food store receipts higher in Waterloo or in Cedar Rapids, Iowa? Were receipts the same in 1987?

In sum, planning and management by private sector business rests—however knowingly or unknowingly (see Figure 7)—upon data from the Economic Census.

Assess and Promote Economic Health

Providing the source data for the national economic accounts and for input into legislation, development planning, programs and public policy decisions; special industry or area reports by magazines, trade associations, local development agencies, and the like.

Gauge the Competition. Calculate Market Share.

Measuring market potentials geographically, according to kind and size of business and market share; and by number, size, and type of prospective buyer.

Design Sales Territories and Set Sales Quotas.

Allocating outlets, salespersons, advertising expenditures, etc. to markets.

Determining routing schedules for salespeople, individual sales agents' territories and quotas, and expense budgets.

Site Location.

Determining the location of new stores, shopping centers, warehouses, and manufacturing plants; or, conversely, examining which locations to vacate.

Locate Business Markets, Distributors, or Resellers.

Determining and measuring new trends in distributions, thereby assisting in the location of warehouses to permit efficient flow of merchandise from manufacturer through retailer to consumer.

Evaluate and Enhance New Business Opportunities. Perform Research.

Providing data needed in planning marketing surveys.

Figure 8
Uses of Economic Census Data

Measuring and Tracking Changes in Economic Activity

The comprehensive and detailed data from the Economic Census are thus employed by all types of public and private sector users to address myriad questions about changes in economic activity (see Figure 8).

Because these building blocks of data can be put together in so many ways, they are highly valuable for such analytical activities as charting long-term trends in the economy; identifying what industries and businesses exist, their relative importance, and their geographic location; and measuring what kinds of material they consume, how much labor they employ, and how much capital they require.¹²

CONCLUSION

The comprehensive Economic Census—conducted by the Bureau of the Census at five-year intervals—forms the foundation of the nation's economic statistics programs. The need for the benchmark statistics only the census can provide is greater today than ever before, and promises to grow in intensity. This census plays a critical role in allowing millions of private and public decision-makers to make more informed economic plans and policies.

Unequivocally, the detailed and comprehensive data collections and disseminations should continue to be performed every five years. The Economic Census—to an extent that no sample survey could ever approach—is the premier vehicle for measuring the increasingly rapid changes taking place on the economic horizon.

And—through the introduction of NAICS—coverage of the service and information sectors will make the 1997 and all succeeding Economic Censuses even *more* indispensable as we move into the twenty-first century.

NOTES AND REFERENCES

1. It should here be mentioned, however, that very small companies do not file Census reports, a decision made by the Census Bureau to avoid imposing undue paperwork burdens on companies below a certain size. For 1997, reports will be required from about five million establishments of larger companies; 15 million establishments, associated with smaller companies, will not be required to report.
2. For a description of the North American Industry Classification System, see Carole A. Ambler & James E. Kristoff, "Introducing the North American Industry Classification System," *Government Information Quarterly*, 15 (1998):263–273.
3. For the ways in which both the range and availability of data products have been improved since the last Economic Census, see Paul T. Zeisset, "Disseminating Economic Census Data," *Government Information Quarterly*, 15 (1998):305–320.
4. All of the Census Bureau's survey results are available on the U.S. Census Bureau's World Wide Web site: <www.census.gov>. More specifically, the Bureau maintains a site for the 1997 Economic Census: <www.census.gov/econ97>. This site leads to further information: NAICS; Economic Census questionnaires; key dates; latest results; and a compilation of data for the latest principal economic indicators available from the Census Bureau.
5. See Shirin A. Ahmed, Lawrence A. Blum, & Mark E. Wallace, "Conducting the Economic Census," *Government Information Quarterly*, 15 (1998):275–304, for a complete description of the SSEL. Although the SSEL is completely revised during an Economic Census, this database is, nevertheless, compiled and

updated on a continuing basis by the U.S. Census Bureau in the intervening years. It contains basic economic data on U.S. businesses.

6. In the benchmarking process, sample survey estimates for the census year are revised to agree with the totals enumerated in the census. Survey estimates for subsequent periods similarly are adjusted in line with the benchmark period.
7. See Judy M. Dodds, "Determining Economic Census Content," *Government Information Quarterly*, 15 (1998):247–262, for a discussion of the important relationship between the BEA and the Census Bureau with respect to the content and use of Economic Census data.
8. Producer Price Index weights are revised when data from the quinquennial industrial censuses, as well as sufficient budgetary resources, become available. The weights represent the total net selling value of commodities produced, processed, or imported in this country and flowing into primary markets. Each census provides the latest comprehensive data on the net selling value for most of the commodities produced or processed.
9. There are virtually endless possibilities, not only for direct use of census data, but for deriving answers to business questions through *calculating ratios or relationships* between census numbers and other statistical measures. Examples of such *indirect uses* of Economic Census data are:
 - To estimate current sales, capital expenditures, or other measures available from the Census for a specific industry, product, or geographic area. Estimates of change (since the census benchmark year) can be applied to the census figures. These estimates of change may be based on current surveys, trade association statistics, a company's own operation or study, or whatever measure has been determined to be appropriate. Frequently, the appropriateness of the estimate of change that has been selected can be tested by applying comparable estimates for earlier periods to data for earlier census years, then comparing the results with the latest census enumeration.
 - Current estimates frequently are derived by simply extrapolating long-term trends. These estimates usually are modified by the use of current data that show the extent of deviation from such long-term trends. Or the more sophisticated user may apply complex correlation or regression statistical techniques to arrive at current estimates. In either case, the long-term trend data series is the starting point.
 - The use of ratios or averages (described earlier) is, perhaps, the most versatile of the ways the Census data can be used indirectly. Ratios tend to be much more stable over time than the actual data values. And this stability, or the trend in the change in the ratio, can be tested by computing comparable ratios over successive censuses. By using such ratios together with current estimates for one of the ratio's components, current estimates for the other component are derived easily. For example, it may be determined that materials costs represented 45 percent of the value of shipments for a particular industry in the most recent Economic Census. The ratio of .45 may be applied to projected shipments for a future period to provide a crude estimate of materials costs for that period. Similar estimating techniques are used routinely in all types of planning. But their application to census data frequently is overlooked.
10. The "educational" relationship is reciprocal: Dodds, "Determining Economic Census Content," elaborates upon the role of many categories of data users (federal agencies, trade associations, accounting organizations, the business community, and others) in conveying to the Census Bureau which questions on the census forms would provide the most useful data.
11. *Appraisal of Census Programs, Report of the Intensive Review Committee to the Secretary of Commerce, Committee on the Bureau of the Census*, February 1954. This report is generally referred to as "The Watkins Commission Report," after Dr. Ralph J. Watkins who was appointed to form the Committee. A fuller treatment of this historical report is contained in the U.S. Census Bureau's *The Economic Census—Two Moments of Truth: 1954 and 1997*, September 1997. This brochure, dedicated to Shirley Kallek, Census Bureau Associate Director for Economic Fields (1974–1983), shows parallels between the 1954 and 1997 Economic Censuses.
12. Illustrative uses of Economic Census data, by large and small businesses, and by local, state, and federal government agencies are as follows:
 - *Gauge the Competition*: A manufacturer compared statistics for his company with industry-wide figures in census reports. He became concerned when he found that they achieved less value added per employee than the competition—represented by industry averages. Census figures helped him to convince the com-

pany's Board of Directors to reduce administrative staff and take other measures to increase productivity and profitability.

- *Calculate Market Share:* A restaurant supply wholesaler calculated that it had roughly an 11% market share (its own sales divided by state totals for similar businesses) in its primary sales region in the northern mountain states. The wholesaler used that figure as a target when it expanded into Arizona and New Mexico.
- *Design Sales Territories and Set Sales Quotas:* An insurance company uses counts of establishments and sales by kind of business to redesign sales territories and set quotas and incentive levels for agents. By comparing census figures to its own records on customers, company executives found which kinds of businesses were better prospects than others.
- *Site Location:* A major food store chain uses retail census data and population figures to estimate potential weekly food store sales in the trade area for each of its stores. These estimates allowed the company to calculate market share for each existing store, and to evaluate prospective sites for new stores.
- *Locate Business Markets:* A man who had developed software for managing quality control operations made a list of industries most likely to use his product, then ranked the top industries based on census figures on value added and growth. He customized his software to appeal to those top prospects. Census data on CD-ROM made it easy to find areas where large plants in the target industries were located.
- *Locate Distributors or Resellers:* The publisher of a TV magazine for free distribution at stores wanted the distribution of retailers by ZIP Code in order to design sales territories. ZIP Code data are grouped by employment size ranges, so that data users can distinguish small, medium, and large businesses. The publisher's sales agents had found that owners of small stores were more willing to listen to their pitch than were owners of large stores. Therefore, the publisher was able to group ZIP Codes until each agent's sales territory had roughly the same number of small stores. This arrangement helped equalize the chance of each agent to make a successful pitch to those most willing to listen.
- *Evaluate New Business Opportunities:* A manufacturer of industrial chemicals used data on production of semiconductors and other high technology products to assess the feasibility of introducing a line of advanced composite materials.
- *Enhance Business-opportunity Presentations to Banks or Venture Capitalists:* An entrepreneur used census data to support her loan application, as she sought financing to start a tailoring and alterations shop for women executives. She used data from the Census of Service Industries on her line of business, in conjunction with data on women in managerial occupations from the Census of Population, in order to persuade lending agents at the bank that there were (1) sufficient women who needed her service, and (2) few enough other (competing) alterations shops—so that the chances that her business would be successful were high enough to justify their loan risk.
- *Research:* A professor at Harvard University studied a series of votes in Congress related to free trade issues. He used Census of Manufactures data to explore the correlation between each state's industrial structure and the way that the state's congressional representatives voted on these issues.
- *Assist Local Businesses:* A state economic development agency identified industries with the most export activity using "Exports from Manufacturing Plants." The agency gave those industries top priority as it launched a program to assist companies in finding trade leads.
- *Public Policy and Statistics:* Federal, state, and local agencies look to Economic Census data to gauge the effectiveness of programs such as minority contracting guidelines, trade policies, and job retraining. The Federal Emergency Management Agency uses the ZIP Code CD-ROM to inventory manufacturing locations by industry and size. They estimate potential losses to productive capacity that might result from a major flood or other disaster. Some of the broader questions listed above also can be answered with data from annual, or more frequent, sample surveys. The ability to measure and track trends in economic activity with these more current surveys is, however, inescapably dependent upon the Economic Census which provides the framework and context for the current surveys.

Evolution of the United States Economic Censuses: The Nineteenth and Twentieth Centuries

William F. Micarelli*

The economic censuses reflect growing industrialization and the spread of communications in the United States since the early 19th century. Temporary organizations took these censuses with increasing detail almost every 10 years from 1810 to 1900. Demands for more frequent enumerations and current data were major factors in the establishment of a permanent census office in 1902. The 20th century features censuses of manufactures every two years and later at five-year intervals, construction industries; mineral industries; minority- and women-owned businesses; retail and wholesale trades; service industries; financial, insurance, and real estate industries; truck inventory and use survey; commodity flow survey; transportation, communications and utilities.

In the 1950s, the censuses were integrated to ensure complete, unduplicated, comparable data for all of their components. Enumeration was increasingly by mail and, for small establishments, by the use of administrative records in lieu of returns. The introduction of mechanical, electronic tabulation, and computers and CD-ROMs increased the variety of data products available and how the information could be accessed.

The most recent¹ quinquennial economic census, for the year 1992,² covered retail trade; wholesale trade; service industries; transportation, communications, and utilities; finance, insurance, and real estate; construction industries, manufactures, and mineral industries; and the truck inventory and use survey. The program also included the 1992 Survey of Minority-Owned Business Enterprises, the 1992 Survey of Women-Owned Businesses, the 1992 Characteristics of Business Owners Survey, and the 1992 Enterprise Statistics

* Direct all correspondence to: William F. Micarelli, Chief, History Staff, Office of the Director, U.S. Census Bureau, Washington, D.C. 20233-3720.

Government Information Quarterly, Volume 15, Number 3, pages 335-377.

© 1998 by U.S. Department of Commerce

Economics and Statistics Administration

BUREAU OF THE CENSUS

All rights of reproduction in any form reserved. ISSN: 0740-624X

Program. The Census Bureau took all of these in the 50 states and the District of Columbia. The 1992 Economic Census of Outlying Areas collected data on retail and wholesale trades, service industries, manufactures, and construction industries in Puerto Rico, the U.S. Virgin Islands, Guam, and the Northern Mariana Islands. The enumeration in Puerto Rico was the most detailed.

THE NINETEENTH CENTURY

1810³

The first economic census was part of the Third Decennial Census of the United States in 1810, when the census of population included questions on manufacturing. In an act passed May 1, 1810, Congress directed "That it shall be the duty of the several marshals, secretaries, and their assistants aforesaid, to take, under the direction of the Secretary of the Treasury, and according to such instructions as he shall give, an account of the several manufacturing establishments and manufactures within their several districts, territories, and divisions."⁴ The act did not outline any specific questions or prescribe a schedule; it left these matters to the Secretary of the Treasury's discretion.

To facilitate the collection of data, the Treasury Department divided manufactured products into 25 broad categories, encompassing more than 220 kinds of goods. As they enumerated the population, the U.S. marshals and their assistants charged with taking the decennial census visited the manufacturing establishments in their assigned areas to obtain information, generally on the quantity and value of products manufactured. Paid \$40,000 for this "account of manufactures," these officials performed their tasks from August 1810 to July 1811. However, it was not until March 1812 that Congress authorized \$2,000 for the Treasury Department to "employ a person to digest and reduce [the returns]" and prepare a statistical report that would basically cover the kind, quantity, and value of goods manufactured, and the number of manufacturing establishments in each State, Territory, district, and county. The report, published in May 1813, noted in its summary that there had been serious undercounting and omissions in the enumeration.⁵ Although the censuses valued total manufactures at about \$173 million, the actual figure probably exceeded \$200 million.

1820

The manufactures census of 1820 was similar to that of 1810. However, in addition to a question on the location of establishments, 14 additional inquiries elicited information on raw materials employed (kind, quantity, and cost), number of employees (men, women, and boys and girls), machinery (whole quantity and kind of machinery and quantity of machinery in operation), expenditures (capital, wages, and contingent expenses), and production (nature and names of articles manufactured, value, demand, and sales). Again, the federal marshals and their assistants collected the data and published a digest of the returns, this time under the auspices of the U.S. Department of State. Statistics appeared for each State, territory, and district, but there was no attempt to compute U.S. totals because the data were again admittedly incomplete. This was attributed to insufficient funds allocated to pay the marshals and the fact that many establishments apparently neglected (or refused) to provide the required information. In addition, 1820 and 1810 data were not comparable

because household manufactures (goods produced at home) were counted in 1810 but not in 1820. The 1830 Decennial Census made no attempt to obtain economic data, partly as a result of incompleteness in the 1810 and 1820 censuses and perhaps because of the comparatively slow rate of economic growth in the 1820s.

1840

With extensive growth in the 1830s in commercial fishing, commerce, and mining (and considerable pressure to resume the collection of economic statistics), the decennial census of 1840 encompassed not only a census of manufactures but also included a series of questions about mining and fisheries to measure the extent of commercial activities. The marshals and their assistants used one form, "Schedule of Mines, Agriculture, Commerce, Manufactures, Etc.," to collect data on these subjects. The census divided manufacturing into 30 categories on the basis of the manufactured product (machinery, paper, furniture, etc.), plus an "all other manufactures" classification. In general, census takers collected statistics on the quantity and value of goods produced, amount of capital invested, number of employees, and number of establishments. There were questions on the following classifications of minerals: iron; lead; gold; other metals; coal; domestic salt; and granite, marble, and other stone. These inquiries generally covered quantity and value of minerals produced, employment, and capital invested in mining operations. Commercial fishermen were to report the quantity (and sometimes the value) of fish products taken, the number of men employed, and the capital invested.

Commerce and trade activities also accelerated during the early and middle decades of the 19th century, as evidenced in part by the fact that volume of trade (total imports plus total exports) increased almost twofold, from about \$126 million in 1821 to approximately \$248 million in 1841. To measure the extent of commercial activities, the 1840 Decennial Census included, for the first time, a series of questions on the number of business enterprises in various categories (commercial houses in foreign trade, commission houses, lumber yards, grocery stores, etc.), capital invested, and number of employees.

The marshals tabulated the returns for manufacturing, fishing, commerce, and mining and published statistical tables on the "commerce and industry of the country." However, as in the 1810 and 1820 censuses, the 1840 census results, even though "corrected" in Washington, reflected considerable undercoverage. Many historians and statisticians consider the economic data tabulated and published for these three censuses to be of little value except as indicators of the gross outlines of manufacturing development.

These inauspicious beginnings of economic census-taking resulted from several interrelated factors, in addition to customary handicaps such as wide geographic dispersion, poorly defined boundaries, and inadequate transportation. The federal marshals who supervised the field operations had many other duties and often could not devote adequate time and attention to the census of economic activity. The marshals' assistants, the actual enumerators, often received sketchy instructions or none at all. Although they might not normally have required detailed training or instructions to obtain answers to straightforward population questions (such as age and sex of members of a household), it is reasonable to assume that they might have had some conceptual or practical problems eliciting answers to more complex economic questions (such as the cost of raw materials consumed in manufacturing during the year).

Even assuming that enumerators were perceptive enough to know what information they were seeking and how to ask for it, there was still a serious question as to whether the respondent could and would provide it. The prevailing philosophy in political economy was that of *laissez faire*—a minimal role of government in economic affairs—and many entrepreneurs were suspicious and uncooperative when asked to provide information about their business to federal agents. To deal with these circumstances, the instructions given the marshals stated that:

You [marshals] will perceive the strong necessity for acquainting the people in advance with the nature of the inquiries to be made of them, and to give them time for preparation to answer the questions promptly....If [the inquiries] be made known and generally understood before the enumeration commences, the answers to the interrogatories will be prepared in time for the domiciliary visit of the assistant, and the responses promptly made.

The instructions went on to say that:

Objections, it has been suggested, may possibly arise on the part of some persons to give the statistical information required by the act, upon the ground of disinclination to expose their private affairs. Such, however, is not the intent, nor can be the effect, of answering ingenuously the interrogatories. On the statistical tables no name is inserted—the figures stand opposite no man's name; and therefore the objection can not apply. It is, moreover, inculcated upon the assistant that he consider all communications made to him in the performance of his duty, relative to the business of the people, as strictly confidential.⁶

In other cases, the census takers found that the respondents' records were inadequate or nonexistent, and the owners or operators simply could not provide more than sketchy estimates.

Tabulating the statistics also presented problems because, in most cases, the federal marshals supervising the enumeration had to compile and classify the data for their jurisdiction and generally prepare tables for publication. This decentralization inevitably introduced some irregularities in the reported information because the marshals, who were not trained statisticians, frequently used divergent procedures in performing these duties.

1850

As a result of acknowledged inaccuracies in the previous censuses, Congress passed an act on March 3, 1849 to establish a Census Board, consisting of the Secretary of State, the Attorney General, and the Postmaster General as members, for the purpose of improving the 1850 census results. The act also provided for a full-time secretary; in effect, this official functioned as the director of the census.⁷ He had to design and have printed suitable schedules for the 1850 census, and to collect and publish data on manufacturing, mining, fishing, and commerce that would reflect a full view of the industrial development of the United States. The Census Board consulted with prominent statisticians in government and the academic and business communities to develop six questionnaires,⁸ one of which (schedule 5) was for the collection of the economic data. It was to be completed for each corporation, company, or individual accounting for annual production valued at \$500 or more for the year ending July 1, 1850. Schedule 5 asked for "name of business, manufacture, or product;" amount of capital invested in real and personal estate in the business; quantities, kinds, and values of raw materials used; kind of motive power (water or steam),

machinery, structure, or resource used in the manufacturing process; average number of male and female workers employed; average monthly cost of male and female labor; and quantities, kinds, and values of annual production. Enumerators received written instructions of how each question should be answered and examples of properly completed questionnaires.

Although federal marshals still supervised field operations, they no longer had to compile and assemble for publication the statistics for their respective jurisdictions. Instead, clerks performed this work in a central office in Washington, DC. The Census Office published general census results in June 1853 and made available partial data for manufactures in September 1854, but it did not release complete economic statistics for the 1850 census until December 1859. The total value of manufactures (including fisheries and the products of mines), as reflected in the 1850 census, exceeded \$1 billion. This represented a 500% increase over the \$200 million estimated for 1810, as against a growth in population of only 75 percent. The 500% increase in value should be viewed in the light of the decrease in the wholesale price index (for all commodities) from 131 in 1810 to 84 in 1850. Even given some undercounting, most statisticians have concluded that 1850 census data—both economic and demographic—are considerably more accurate than in previous censuses.

The Census Board appointed Joseph C. G. Kennedy, a statistician and Pennsylvania newspaper editor-owner, to serve as secretary of the Board in 1849. The Secretary of the Interior appointed Kennedy superintendent of the Census Office in 1850. He was largely responsible for the improved accuracy of the census results. In 1853, Kennedy resigned to become U.S. representative to the first and second International Statistical Congresses in Brussels (1853 and 1854), where he consulted with leading European statisticians and became familiar with government statistical programs in Europe. The Secretary rehired Kennedy in June 1858 to supervise the preparation of the report on economic statistics. At the completion of this assignment, the Secretary appointed Kennedy superintendent of the 1860 Decennial Census.

1860–1879

With the exception of some minor modifications in the schedules used, the censuses of 1860 were similar to those of 1850. The Census Office published four volumes, including one devoted exclusively to economic statistics. A major innovation was Superintendent Kennedy's analysis of the census statistics. He used the data as a basis for describing "all the great elements of a nation's prosperity as they existed in the year 1860."

In his section on "products of industry" (included in the *Preliminary Report on the Eighth Census*, published in 1862), Kennedy described the increasing impact of manufacturing and commerce in the United States, estimating that one-third of the entire population in 1860 was supported, directly or indirectly, by manufacturing. He compared various industries, and interpreted the data to show how and why sections of the economy expanded, stabilized, or decreased, and illustrated interrelationships among the production and socioeconomic factors. For example, he credited the expanded use of the sewing machine in industry with adding "thousands of industrious females" to the labor force, as well as promoting the growth of the garment industry. He praised the "cultivated intellect" of the federal army mobilized for Civil War duty and cited the increasing number of print-

ing presses as being a prime factor in making books and newspapers readily available for average citizens to improve their intellects.

The Civil War (1861–1865) had a marked effect on economic development in both the North and the South. The need for war materiel provided major stimulation to industry, particularly in the North, where industrial capitalism to a large degree supplemented merchant capitalism. Wartime requirements for woolen cloth, clothing, iron, guns, munitions, and other products led to production methods that hastened the Industrial Revolution in the United States. The need to mobilize a federal army of more than 2 million men brought an attendant economic mobilization, the first in the nation's history. The federal government actively encouraged industrialization during and after the Civil War by tariff protection, a central banking system, large grants to railroads, and generally conservative monetary policies.

Faced with a naval blockade and an economy based on cotton, the Confederate government attempted to develop manufacturing. Industrialization increased (particularly cotton cloth and leather goods) and the government took over some essential industries. In the wake of the war, with slavery ended and the plantation system turned in the direction of tenant farming and sharecropping, the South was forced to develop a more diversified economy emphasizing manufacturing and commerce.

Many other factors encouraged this transformation throughout the United States after the war. There was a successful blend of abundant natural resources, adequate supplies of capital and labor, technical advances in virtually all industries, readily available markets, and rapidly expanding and improving transportation networks.

The Civil War emergency had compelled the federal government to adopt explicit policies to promote industrial development. With the implementation of such policies, which continued after the war, came an increased need for and interest in economic statistics, statistics which could best be supplied through the periodic censuses.

(Before 1860, the American economy was basically agrarian, but, by 1900, the value of manufactured goods was double that of agricultural products. During that 40-year period, the United States advanced from fourth to first place among the world's industrial nations, as measured by the value of manufactures. The following statistics, all collected in economic censuses, reflect this expansion: In 1859 there were only about 140,000 industrial establishments in the country, employing 1.3 million workers and producing goods with a gross value of \$1.9 billion. By 1899, there were about 509,000 establishments providing jobs for 5.3 million workers and producing goods with a gross value of \$13 billion. Value added by manufacture increased from \$854 million in 1859 to \$5.5 billion in 1899; but note that, when the Census Office tabulated the 1900 manufactures census results, excluding neighborhood and household industries and hand trades from the 1900 results (for 1899), the number of manufacturing establishments was reduced from about 509,000 to approximately 205,000 and value added by manufacture from \$5.5 billion to \$4.6 billion.)

As industrial specialization increased, it became more difficult to develop general questions applicable to all establishments. Many unique schedules, tailored to the characteristics of each industry, had to be designed to obtain meaningful statistics. At the same time, the concentration of economic power brought a growing public demand for government regulation of business, which culminated in the antitrust movement. As the government

exercised increasing power over economic affairs, it required more and better data upon which to base its far-reaching decisions.

During 1869 and 1870, Congress attempted to draft new census legislation to supersede the 1850 law under which the 1850 and 1860 censuses had been taken, but which was deemed inadequate to meet the changing conditions of 1870. However, the Members could not agree, and the 1870 Decennial Census had to follow the old law. Congress did modify slightly, however, the 1870 schedule for “products of industry” to collect additional or better information on machinery and machine power sources, cost of labor, and number of months the establishment was in operation. For example, the inquiry concerning motive power and machinery was subdivided so as to show specifically the kind of motive power, number of horsepower (if steam or water), and the number of machines used. The inquiry concerning the average number of hands employed was made to cover males above 16 years of age, females above 15 years, and children and youth, instead of the number of males and females, as formerly noted. However, the census volume on statistics on industry and wealth contained basic tabulations closely resembling those of 1850 and 1860. Innovations for the 1870 censuses included the use of tally machines (for the population schedules) and the introduction of maps and charts to portray census results in a statistical atlas.

1880

At least in part to meet the nation’s changing economic structure brought about by the Industrial Revolution, Congress passed a new census law in March 1879⁹ that implemented major changes in economic data collection for the censuses of 1880. This law provided for:

- Many additional special schedules tailored to various specialized businesses.
- Expansion in the scope of the censuses;
- Utilization of census supervisors and “experts,” appointed by the President and confirmed by the Senate, to conduct the censuses (instead of federal marshals, who had been responsible for the enumeration since 1790). In the economic area, “experts” and “special agents” (not regular enumerators) were authorized to collect, classify, and analyze statistics on manufacturing, mineral industries, or commercial fisheries in 279 large cities and towns. These specialists were college professors, engineers, economic statisticians, and others with training and experience in the appropriate subject-matter areas; and
- Penalties which made it a misdemeanor for “any supervisor or enumerator, who, having taken and subscribed by this act, shall, without justifiable cause, neglect or refuse to perform the duties enjoined on him by this act, or shall, without the authority of the Superintendent, communicate to any person not authorized to receive the same, any statistics of property or business included in his return, . . . [upon] conviction [he] shall forfeit a sum not exceeding five hundred dollars; or, if he shall willfully and knowingly swear or affirm falsely, he shall be deemed guilty of perjury, and, on conviction thereof, shall be imprisoned not exceeding three years or be fined not exceeding eight hundred dollars; or, if he shall willfully and knowingly make false certificates or fictitious returns, he shall be deemed guilty of a misdemeanor, and,

upon conviction of either of the last named offenses, he shall forfeit and pay a sum not exceeding five thousand dollars and be imprisoned not exceeding two years.”

The act also provided that “if any person should receive or secure to himself any fee, reward, or compensation as a consideration for the employment of any person as enumerator or clerk, or shall in any way receive or secure to himself any part of the compensation provided in this act for the services of any enumerator or clerk, he shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be fined not less than five hundred dollars nor more than three thousand dollars, in the discretion of the court.”

The Census Office expanded the number of general economic questions to 29, and designed 49 special schedules, containing more than 2,000 inquiries, for particular industries in the manufacturing area. Although there was considerable overlap of questions (i.e., the same item appearing on several special schedules, or on the general schedules and also on one or more special schedules), more than 700 of the inquiries were unique.

Whereas questions on mining and mineral industries had been included on the “products of industry” schedules in the 1850, 1860, and 1870 censuses, the Census Office used 42 special schedules to collect data on this subject in 1880. These special schedules contained almost 3,000 inquiries, including over 1,600 unique items. Those for copper mines contained more than 120 questions, but 53 was the median number of items on the special schedule for minerals.

There were five special schedules just for commercial fisheries. The 87 questions generally elicited information on the amount and kind of fish taken, type of equipment used, employment, and finances. There was a basic schedule for all commercial fishermen, plus more detailed schedules for dealers in fresh and salt fish, respectively, and two for river fishing activities.

The post-Civil War period witnessed the rapid growth of the communications and transportation industries (particularly railroads). The first transcontinental railroad was completed in 1869, and rapid construction of new railroad facilities was manifest throughout the latter decades of the 19th century. Track mileage increased from 31,000 in 1860 to 93,000 in 1880 and to 167,000 in 1890. The Civil War and the nation’s westward expansion gave impetus, too, to the telegraph industry. In 1854, there were only 34,000 miles of telegraph wire, but by 1880, 291,000 miles of wire were carrying over 30 million messages annually. Growth of the telephone industry was even more expeditious: The first commercial telephone exchange was opened in 1878, only 2 years after the invention of the instrument, and, by 1880, 54,000 telephones were in use. The 1880 censuses marked the first major effort to compile detailed statistics on transportation and communications.¹⁰ Congress directed the Superintendent of the Census to collect and publish data on steam railroads, steamboat companies, incorporated express companies, and telegraph companies. Several special schedules (466 inquiries) were used for this purpose. Most of the questions (375 items) were designed to compile voluminous statistics on the railroads’ financial and physical characteristics.¹¹ Financial characteristics included income, expenses, and analysis of earnings, while physical characteristics encompassed such things as track mileage, amount and kind of rolling stock (locomotives and cars), and fuel used to power locomotives. The census requested a detailed report from each railroad on virtually every facet of

its operations, including timber conservation practices and a tabulation of employees and others killed or injured in accidents.

In addition to the questions about railroads' current characteristics, there was a special inquiry on the history of their construction from which the Census Office tabulated statistics on mileage built and existent, by groups of states, for individual companies, annually from 1830 to 1880.

The rise of organized labor was still another outgrowth of the Industrial Revolution in the United States. At the same time, business and industrial leaders with common interests frequently formed trade societies and associations. The need for information on these developments prompted the government—for the first and only time in the economic censuses—to include a series of inquiries on labor unions and trade societies (number, objectives and methods, membership, receipts, and expenditures) and on the number, location, causes, and results of strikes and lockouts. The census used four special schedules containing a total of 101 questions to collect this information.

The 1880 census also contained a special survey on wages and prices. Three special schedules, consisting of a total of 167 questions, collected statistics on wages in the manufacturing industries and building trades, and on average retail prices of the "necessaries of life."

The first casualty insurance policy was not issued in the United States until 1832, and the first fidelity bond, 1840. But by 1860, the insurance industry had grown to the extent that a few questions on this subject (primarily on life insurance) had been included in the 1860 census. The 1880 census covered life, fire, and marine insurance companies, and the census used 15 special schedules to compile statistics on their organizational and other characteristics, finances, and insurance in force. However, staff encountered considerable difficulty in collecting and tabulating the data and, except for a preliminary statement in the statistical compendium, no report was issued on this subject.

The Census Office published the compendium summarizing census data in early 1883, but because of budgetary problems, it did not release the basic census volumes reporting manufacturing statistics and transportation-communications data until October 1883, and the mineral industries volume, until July 1886. Several special monographs (e.g., on water power used in manufacturing; precious metals; and petroleum, coke, and building stone) appeared in the mid-1880s. The planned statistical atlas had to be left to a commercial publisher, who hired the former census geographer to compile it. The Census Office resumed producing atlases after the 1890 census, however.

The economic statistics compiled in the 1880 census were more comprehensive than in any previous census. The use of experts and special agents generally resulted in more complete and consistent returns, which led to more accurate data on the nation's economy.

1890

The 1890 Censuses of Manufactures and Mineral Industries followed the basic procedures established for the 1880 censuses; for instance, specialists and agents canvassed in 1,042 important manufacturing and commercial centers, bulletins announced preliminary census results, and in many instances, the same schedule formats were used. The 1890 censuses also marked what was probably the first use of administrative records (those kept by governmental or private organizations on their day-to-day operations) to compile eco-

conomic census data. Congress directed that statistics be collected on the recorded indebtedness (i.e., real estate mortgages) of private corporations and individuals. Special census agents went to real estate recorders' offices to abstract information about mortgages made during the period 1880 to 1890. This included a description of the property, provisions of the mortgage, and the addresses of the mortgagor and mortgagee. Then, the Census Office mailed schedules (and postage-free return envelopes) to the mortgagors (or the mortgagees if the mortgagors did not respond), asked them to supply additional information about their mortgages (whether or not they had been fully paid and, if not, how much was owed) and return the completed schedules to the Census Office.

There was a census of manufactures in Alaska for the first time in 1890.¹² The Office expanded considerably the inquiries on transportation (first asked in 1880), with coverage extended to sailing vessels and rapid-transit facilities in cities. (These latter primarily included cable railways, railways operated by animal power, and electric street railroads. By 1888, there were 38 electric rail systems in use in American cities.)

1900

The census of 1900,¹³ which was limited by law to an exact parallel of the 1890 census, included coverage of manufactures, mines and quarries, street and electric railroads, and, for the first time, central electric light and power stations.

The census generally compiled manufacturing information on the number of establishments, capital invested, number of wage earners and total wages paid, cost of materials, and value of products. Most manufacturing establishments reported information on the one general questionnaire (about 530,000 of the 644,000 total returns), but there was still some criticism from respondents that the 32 special questionnaires required too much information in too much detail.

Special agents again compiled manufacturing data in selected areas: 1,891 specialists (supervised by 20 "expert special agents") collected data in 1,340 cities and towns. In disseminating the results, the Census Office prepared 59 unique bulletins on various special subjects in manufacturing, such as shipbuilding, slaughtering and packing, and lumbering. The Office also released bulletins on manufacturing for each of the states and territories except Alaska and Hawaii. (Data for Alaska and Hawaii appeared in the regular census reports.) Manufacturing data were published in four volumes and summarized in a statistical abstract and the atlas.

Statistics on mines and quarries, street and electric railroads, and central electric light and power stations were initially published in bulletins and later in final reports somewhat less detailed than the bound volumes on manufactures. Data on mining covered the same general topics as before (number of mines and mine operators, wage earners and total wages, cost of supplies, other operating expenses, and quantity and value of minerals extracted), by geographic area and by type of mineral.

For street and electric railroads, Census Office employees assembled statistics on such topics as number of companies, length of rail lines, cost of construction and equipment, employees, and passengers. Data compiled for central electric light and power companies included number of stations, cost of construction and equipment, earnings, expenses, and power generated.

THE TWENTIETH CENTURY

1902

After several decades of hearing pleas from government decisionmakers, members of the academic community, business leaders, and other experts for more data—and more current data, Congress established the Census Office as a permanent agency in March 1902. (The name changed to the Bureau of the Census in 1903, when it became part of the new Department of Commerce and Labor. Legislation continued to refer to “the Census Office,” however.) This legislation made it possible to have economic censuses more frequently than once every 10 years and, indeed, mandated a number of specialized interdecennial censuses (subsequently taken between 1902 and 1937). These included street railways and telephone and telegraph companies. The Bureau expanded the “street railways” category in 1922 to include motor buses and in 1932, trolley buses. The “telegraph” classification included only land telegraph and ocean cable systems for 1902, but the Bureau enlarged the definition for 1907 to take in wireless systems. Censuses of water transportation covered 1906, 1916, and 1926. Other special enumerations included a census of the express business for 1907. A census of commercial fisheries was taken in 1908 and again in 1963 and 1967, but was discontinued thereafter for lack of interest by data users.

As part of the 1902 Permanent Census Act, Congress directed, “That in the year 1905, and every ten years thereafter, there shall be a collection of the statistics of manufacturing establishments....” This was in addition to the coverage of manufactures in the decennial census, which meant that the Bureau compiled data on this topic every five years (quinquennially). The schedules used in the 1905 enumeration of the industrial activity in 1904 were the same as those used in 1900. The Bureau developed new enumeration techniques: It constructed a card index containing names and addresses of manufacturing establishments on the basis of 1900 census results, city directories, trade publications, state and local government lists, and similar sources. Then, in October 1904, the agency sent preliminary circulars to these establishments, asking that they answer a few questions (name and address, period of operation, and kind of business). Based on the results of this prec canvass, the Bureau updated the card index and mailed census schedules to establishments in early December 1904. Then, beginning in January 1905, 835 canvassers (regular Census Bureau employees and temporary employees hired for the duration for the operation) visited companies that had not completed and returned their schedules. Also, the agency redefined the scope of the census to cover only manufacturing establishments under the “factory system,” excluding the neighborhood and household industries and trades¹⁴ that had been previously included. To provide for comparability, the Bureau retabulated the 1900 manufactures census results under the new definition. With neighborhood and household industries and hand trades excluded from the 1900 results (for 1899), the number of manufacturing establishments shrank from about 509,000 to approximately 205,000, and value added by manufacture, from \$5.5 billion to \$4.6 billion.

1909

The Census Bureau took the first economic census of Puerto Rico (for manufactures) for the year 1909 and, excepting 1929, had one at 10-year intervals through 1949. Censuses of

manufactures were then taken concurrently with censuses of business, covering retail and wholesale trade and selected service industries, for the years 1954 and 1958, and since 1963, as part of the regular economic census program. In 1952 and 1956, the Commonwealth Government of Puerto Rico conducted censuses of manufactures with more limited coverage than in the states.

1910

For manufacturing establishments, the Bureau used one general and 60 special questionnaires. These establishments were given the opportunity to complete and mail in questionnaires, but again, special agents canvassed in a field enumeration companies that did not complete and return their schedules. For mines and quarries, only one schedule was used to collect data for the Census Bureau and the U.S. Geological Survey. (This was done in 1910 so that the "operators of mines and quarries should be called upon by the Federal Government to fill out or furnish information for only one schedule, instead of two emanating from different bureaus.") Census assigned a total of 1,227 special agents, plus 76 of its regular employees, to canvass the factories, mines, and quarries. In a few sparsely settled areas, population census enumerators visited the manufacturing and mining establishments.

The coverage in 1910 differed from that of 1905 only in that the Bureau secured information, for the first time, from custom sawmills and gristmills and steam laundries. However, the number of industries for which the agency published a separate tabulation was reduced to 264, mainly as a result of consolidating some of the 1905 categories. Under the definitions at the time of the two previous censuses of manufactures, mills that did not produce for sale but only sawed lumber or ground grain for toll did not fall under the factory system. The census covered steam laundries because they had become an important industry. The data-collection forms for manufactures consisted of one general schedule applicable to all industries and 60 special schedules, each relating to a single industry. The general schedule was materially simpler than that employed for the censuses of 1900 and 1905, and the same was even more true of most of the special schedules. In the enumeration of mines and quarries, the Bureau pursued the same policy of using general and special schedules.

An amendment to the 1902 census act, passed February 25, 1910,¹⁵ required the Bureau to enumerate the number of animals slaughtered for food purposes and the number of hides produced during the year. This necessitated a canvass of all butchering establishments, many of which would not have been included under the general rules defining the factory system.

The act authorizing the 1910 census also strengthened the confidentiality restrictions, particularly as they related to economic data.¹⁶ It was this law that placed restrictions on the publication of census statistics. As a matter of administrative policy, responses on schedules for earlier economic censuses had been considered confidential, but the 1910 law specified that information furnished by business, manufacturing, and mining establishments:

Shall be used only for the statistical purposes for which it is supplied. No publication shall be made by the Census Office whereby the data furnished by any particular establishment can be identified, nor shall the Director of the Census permit anyone other than the sworn employees of the Census Office to examine the individual reports.

The Census Bureau acknowledged the importance of confidentiality by noting in the volume containing 1910 manufactures census results that:

{ex}It is essential to the success of the manufactures census that every concern should be assured explicitly by law that its business will not be disclosed to competitors, to the general public, to State and local officials, or even to officials of the Federal Government outside of the Census Bureau. Only with such a pledge of confidential treatment can the Bureau of the Census report expect manufacturers to furnish data promptly and accurately.¹⁷

1915

The 1915 Census of Manufactures was a repetition of the 1905 census. One feature of the preparatory work for this census that distinguished it from previous enumerations, however, was the effort to secure the assistance of prominent manufacturers and of representative commercial and trade groups of all kinds. The staff wrote letters to such people and seven groups, inviting cooperation and requesting suggestions, particularly in reference to the inquiries carried on the various special or supplementary schedules. The Director of the Census and the Chief Statistician for Manufactures made trips to a number of cities (e.g., Philadelphia, New York, Boston, and St. Louis) to obtain suggestions on the form and content of the schedules. In addition, the Bureau enlisted the aid of Members of the Senate and House of Representatives, the Department of Agriculture, the Bureau of Corporations, and the state statistical organizations. Census employees tabulated data for 1914 for 344 industries and 271 industry subgroups. Plans called for the prompt publication of bulletins containing preliminary results, but when the United States entered World War I in April 1917, the preparation of these bulletins (and the two volumes and the abstract containing final results) was delayed because of demands on the Public Printer for war-related work. The Bureau did not issue the last of the bulletins until August 1918, just before the census volumes were published.

Because of the urgent need for industrial data during the war, there were a number of special economic censuses—something not done in prior times of emergency data needs. For example, the agency compiled statistics of New York's daily landings of fresh catches from U.S. fishing boats and receipts by rail and steamer during the last four months of 1917. In late 1917 and early 1918, the Bureau took a number of mail censuses for the War Trade, War Industries, Shipping, Federal Reserve, and Commercial Economy Boards, the Food Administration, and the Council of National Defense. These covered such commodities as iron and steel; wool machinery and woolen manufactures; kapok fiber, jute, and silk; leather stocks, boots, shoes, and manufactured leather goods; antimony and graphite crucibles; commercial greenhouses; materials used in the manufacture of explosives; and the production of dental gold.

1920–1929

The 1920 censuses included manufactures and mines and quarries (including oil and gas wells). They were patterned after those of 1910 with two exceptions described below:

- In addition to collecting data for establishments that had not returned schedules, the field enumerators corrected defective schedules (i.e., those with inconsistent or incomplete responses) that had been returned by respondents. The censuses covered 358 industries and 98 industry subgroups, but combined data for 7 industries to avoid disclosure of data for individual firms. For the census of manufactures, the Bureau published three volumes and a special abstract (plus the usual preliminary bulletins).
- The agency used a punchcard tabulating system, introduced in the 1890 Census of Population, for the first time for manufactures and mines and quarries. (While this system was periodically improved between 1890 and 1915, the agency did not use it for processing economic data until the development of the integrating tabulator (between 1917 and 1919), which not only recorded and added units but also numbers.)

For mining, the published statistics generally reflected geographic distribution of operations, land controlled by mining operators, characteristics of organization, scale of operations, and amount and kind of power used. The one-volume general report contained analytical tables (arranged to facilitate comparisons with the mining statistics published annually by the U.S. Geological Survey) and tabulations on selected mineral industries by state.

The government's interest in economic affairs and its need for detailed statistics to assist in decisionmaking (brought about in large measure by the demands of the war effort, post-war demobilization, and reconversion) prompted Congress to direct, in the act providing for the decennial census of 1920, the collection and publication "for the years [1921, 1923, 1925, 1927], and for every tenth year after each of said years, statistics of the products of manufacturing industries...." Since the decennial censuses would cover the years 1929, 1939, etc., censuses of manufactures, thus, were authorized on a biennial basis. Data would show the: (1) absolute and relative magnitude of the various branches of industry and their growth and decline and (2) industrial importance (with increase or decrease) of individual states and large cities. Statistics were to be collected that would reveal certain matters of economic and sociological importance, such as the size of establishments and hours of labor.

To reduce the expense of the biennial census and expedite processing and publication of results, the Bureau did two things for the 1921 census. First, it omitted certain items that had been included in the quinquennial censuses of manufactures. These included capital invested, age and sex distribution of employees, rent and taxes, primary horsepower used, and kind and quantity of fuel used in manufacturing. Second, the Bureau collected only limited statistics on number of wage earners and value of production from manufacturing establishments reporting products valued at less than \$5,000 for 1921. (In the quinquennial censuses, data had been obtained from establishments with annual production valued at \$500 or more.) For 1921, about 22% of the establishments had products valued at less than \$5,000, but these plants accounted for less than 1% of the wage earners and total production.

For 1921, the census gathered data on 348 separate industries (98 of which were subdivided to show greater detail) on such things as the number of proprietors or firm members,

number of salaried employees, number of wage earners, amounts paid in salaries and wages, amount paid for contract work, and cost of materials.

In planning the first biennial census of manufactures, Bureau officials consulted extensively with the National Association of Manufacturers, the Bureau's General Advisory Committee (which included representatives of the American Economic Association), committees from civic associations (e.g., chambers of commerce), representatives of important trade associations, and statisticians in the government and private sectors. These sources helped develop schedules, publicize the census, and generally encourage industry's acceptance of the project.

The 1921 canvass was a combination mailout/mailback operation and field enumeration, and respondents returned more than half of the schedules by mail. The Bureau issued preliminary summary reports of census results as press releases, each relating to a particular industry or group of industries. A summary bulletin presented statistics for the United States, by industries, and for all industries combined by state. All data were then consolidated into a one-volume report published in 1924.

The procedures and coverage of the 1923 census were virtually the same as those of 1921, but the mail operation was more successful than in 1921 due in part to the cooperation of chambers of commerce. In many large cities, chamber representatives, sworn in as census agents, took complete charge of the canvass. Approximately 65% of the returns were received by mail and, by June 1924, almost 95% of the establishments had been canvassed by mail or by personal enumeration. The Bureau collected and tabulated data for 333 industries, of which it subdivided 87 to provide greater detail. As in the 1921 census, preliminary statistics first appeared in press releases; then final data were assembled in industry bulletins and a final one-volume report was published in January 1926.

The 1925 census covered 324 industries, and respondents returned about 75% of the schedules by mail, again with the close cooperation of the chambers of commerce and other professional groups. Census staff prepared press releases of preliminary results, plus the usual industry bulletins, and released the one-volume final report in December 1927.

For the 1927 census, manufacturers of confectionery and ice cream and fabricators of sheet iron completed schedules only if they produced products with an annual value of \$20,000 or more. (This was in recognition of the fact that many of the smaller firms were primarily engaged in retail trade, not manufacturing.) Over all, the census encompassed 335 industries, and approximately 65% of the respondents returned their schedules by mail. The press-release, industry-bulletin, and final-volume publication sequence was again followed, with the final volume published in April 1930.

1930

The 1930 Decennial Census had, in addition to the censuses of manufactures and mineral industries, censuses of construction industries, distribution (which included retail and wholesale trades and special topics), and hotels. These censuses encompassed activities for the year 1929.

The construction census was a response to the post-World War I boom in this sector of the economy. In 1920, less than 850,000 workers were employed in contract construction, and total private construction for that year was valued at \$5.4 billion. By 1928 (the last full

year before the start of the Depression), more than 1.6 million workers were employed in this field, and total private construction was valued at \$9.2 billion.

In planning this first census of construction industries, the Bureau worked closely with an advisory committee representing national contractors' associations and individual construction companies. This cooperative effort produced one basic questionnaire designed to collect information on the: (1) organization of the establishment, (2) number of salaried employees and total salaries paid, (3) number of skilled and unskilled workmen employed, (4) total annual wages, (5) length of working day and week, (6) expense for equipment, operation, and overhead, and (7) total value of materials and building equipment installed.

The construction census was a mailout/mailback operation. To mail the questionnaires to the correct companies at the right addresses, the Bureau prepared a directory from lists of names and addresses provided by contractors' associations, private statistical agencies, builders' exchanges, chambers of commerce, and other business and trade associations. The agency sent letters to city officials and postmasters, asking that they submit (or list) names and addresses of known construction establishments in their jurisdictions. Bureau clerks obtained additional names from classified telephone directories, city directories, and other sources. Ultimately, the directory encompassed about 144,000 unduplicated names and addresses. The questionnaire was to be completed by all persons and establishments engaged in construction business of any kind (except industrial concerns, public utilities, municipalities, or common carriers that maintained construction crews to repair or maintain their own property). In two follow ups, the Bureau mailed reminder letters to nonrespondents. In cities with populations of at least 100,000, enumerators canvassing for the population census personally contacted nonrespondents. However, census employees compiled detailed statistics only for establishments that reported gross business of at least \$25,000 during calendar year 1929. A punchcard system mechanically tabulated construction census results (and, in fact, virtually all 1930 census data), but a series of clerical cross-checks and reviews by experienced statisticians ensured maximum accuracy and consistency. The government published the results in December 1932 in one bound volume.

The 1930 census of distribution consisted only of a field canvass, using procedures that had been tested and refined in 11 cities in 1927. The retail trade census covered operations of "all establishments doing business in a retail manner." Thus, in addition to retail stores per se, it encompassed restaurants and some semiservice businesses, such as garages, which sold merchandise in addition to their services. The agency classified retail establishments on the basis of the following types of operation: Single-store establishments; two- and three-store independents; local branch systems; local, sectional, and national chains; and miscellaneous types of operations.

Enumerators personally visited each of approximately 1.5 million stores to obtain answers to questions on one of the six questionnaires designed for this operation. In cities with populations of at least 10,000, only special enumerators took the census of distribution. In smaller cities and rural areas, the population census canvassers also visited retail outlets. The census compiled data on the number of stores, personnel, payroll, stocks, sales, operating expenses, seasonal employment characteristics, credit business, receipts from sales of meals and automotive services, value of returned goods and allowances, and type of organization. The Bureau published preliminary results as press releases and, in Febru-

ary 1933, issued a one-volume final report that included a summary of data by states, counties, and incorporated places, and separate tables for each state.

The same field enumeration procedures, with four questionnaires, were used for the approximately 168,000 wholesale establishments. The wholesale trade classification embraced all establishments engaged in the purchase, sale, or distribution of goods on a conventional wholesale basis, plus other special categories such as cash-and-carry wholesalers, drop shippers (middlemen who secured orders from buyers and had merchandise shipped directly from the manufacturer to the buyer), manufacturers' sales branches, and cooperative marketing associations. For the purposes of this census, the wholesale field covered virtually all merchandising establishments not in the retail group. The census compiled data on the number of establishments, number of employees, salaries and wages, stocks, net sales, credit sales, sales to ultimate consumers, and sales to industrial consumers. Clerks tabulated these statistics by kind of business (chemical products wholesaler, drug wholesaler, etc.), by geographic area (division and state), and by type of organization (proprietorship, partnership, etc.). Special tabulations yielded wholesale statistics for cities with populations of at least 100,000, where almost half of the establishments were located. The Bureau published preliminary results as press bulletins and released the final bound volume in December 1933.

The census of hotels, which included only those with at least 25 guestrooms, was originally planned as a mailout/mailback operation. The staff compiled a directory of names and addresses of about 27,000 hotels, and census employees mailed questionnaires in February 1930. Because of changes in ownership, duplications, and classification problems, a field canvass was necessary, using population census enumerators, to supplement the mail operation. Ultimately, clerks compiled statistics for approximately 15,500 hotels (70% of which returned questionnaires by mail, while enumerators canvassed the rest). The agency published tabulations on the number of hotels, number of rooms, seating capacity of dining rooms, receipts, employment, salaries and wages, and number of proprietors and firm members. These data were classified by plan of operation (American, European, and mixed), type of occupancy (transient, permanent, or mixed), and geographic division and state.

The procedures, coverage, and publication program for the 1930 manufactures census closely resembled those of the biennial censuses for 1921 through 1927.¹⁸ There were 165 questionnaires for canvassing 238 industries.

The scope of the 1930 Census of Mines and Quarries, however, differed considerably from that of 1920 in that it did not cover the petroleum and natural gas industries, nor did the census collect data for capital, land holdings, rents, royalties, and taxes, as well as a detailed breakdown by kind of employees. This census included, for the first time, the sand and gravel, glass-sand, and molding-sand industries, and the quarrying of limestone carried on in connection with the manufacture of lime and cement; added inquiries as to distribution of sales, equipment purchased, and mobile power equipment; and consolidated and reclassified a number of industries. The agency, however, basically left unchanged the data-collection methods and the publication program. There is no historical record as to why certain industries were added nor why those covered in earlier censuses were not included for 1929.

The 1930 census publication program included several special reports on economic topics—i.e., distribution of sales of manufacturing plants, products of manufacturing industries, materials used in manufacturing, and location of industrial plants. In addition, the census collected statistics on unemployment as an adjunct to the population census. With the addition of the censuses of distribution, construction industries, and hotels, the continuation of the manufactures and mineral industries censuses, and the coverage of special topics, the 1930 Decennial Census was broader in scope than any previous economic census in the United States.

1931–1933

In efforts to reduce federal expenditures and balance the budget, Congress decreased the Census Bureau's funding and personnel authorizations for the 1931 and 1933 biennial censuses of manufactures. The 1931 census covered 310 industries, but discontinued some inquiries (e.g., on salaried employees, power equipment, and coal consumption). The Bureau mailed questionnaires in January 1932, and about 60% were returned by mail. Officials of local chambers of commerce and, in large industrial centers, census field employees, followed up nonrespondents by telephone. Funding was inadequate for a large crew of canvassers, so there were few field follow ups. Budget restrictions also delayed the publications of census results.

The agency reduced the number of special questionnaires for 1933. It made greater use of the general questionnaire and a short-form version for smaller establishments. Again, this census used the mailout/mailback enumeration method, with telephone follow ups, and about 75% of the questionnaires were returned by mail. The volume containing final census results warned data users that the smaller field force available for personal follow ups had resulted in "some incompleteness of coverage."

President Franklin D. Roosevelt's "New Deal" policies, however, provided emergency relief measures, some of which directly involved economic census projects. An example of this was the 1933 business census, which encompassed retail distribution, wholesale distribution, and a new category, "Services, Amusements, and Hotels." The service classification consisted of personal services (e.g., barber shops and beauty parlors), mechanical repair services (e.g., radio shops), and miscellaneous services (e.g., parking lots). The agency collected data exclusively in a field canvass, which the Civil Works Administration funded as part of its emergency project to provide temporary employment for 4 million people during the winter of 1933–1934.

1935

The expanded scope of the 1935 manufactures census provided for about the same level of detail as in the 1930 census. Although the Bureau developed a mailing list and mailed questionnaires in January 1936, it instructed companies to hold their questionnaires until enumerators visited their establishments in a door-to-door canvass in all cities, towns, and villages. The field workers canvassed every manufacturing concern, even those that had not received questionnaires by mail.

The 1935 Census of Business covered retail trade, wholesale trade, the construction industries, and service establishments (personal, business, repair, custom, and miscella-

neous services) in an extensive field operation. The Works Progress Administration funded the operation as a public works project for the unemployed. In addition, the census included a miscellaneous business category consisting of many types of establishments not canvassed in any previous census. This miscellaneous category consisted of:

- Advertising agencies (questionnaires were mailed, but there was extensive field follow up);
- Radio broadcasting stations (mailed questionnaires and one follow up letter, plus field follow up);
- Real estate agencies (field enumeration exclusively);
- Insurance companies (mailout, plus field follow up);
- Banks (data collected by mail by the Federal Reserve Board, Comptroller of the Currency, and Federal Deposit Insurance Corporation, plus field follow up supervised by the Census Bureau);
- Financial institutions other than banks, such as stock brokerage firms and finance companies (field enumeration exclusively);
- Hotels and tourist courts (field enumeration exclusively);
- Places of amusement (field enumeration exclusively);
- Transportation—motor buses, trucks for hire, and warehousing (field enumeration exclusively); and
- Nonprofit organizations, office-building management firms, and miscellaneous business (field enumeration exclusively).

The announced goal of the 1935 census was to canvass “every recognizable place of business” to provide for the “first factual appraisal ever available on the effects of a serious business depression.” The census collected a mass of data, some of which staff tabulated at a special Bureau branch established to provide work in Philadelphia, where the unemployment rate was higher than in Washington, DC. The Bureau published final business census results in 14 volumes (three each for retail trade, wholesale trade, selected service industries, and construction; one for transportation and warehousing; and one for the miscellaneous topics), plus a series of special reports. The agency also published a one-volume census of manufactures report. The sheer scope and complexity of the operation, the limited time available for planning, and the difficulty in supervising the large contingent of field workers and clerks resulted in misclassifications, undercounting, tabulation difficulties, and other problems. The 1935 census, however, yielded some valuable data.

1937

For 1937, the Bureau conducted only the biennial census of manufactures, and the Congress funded the operation through regular census appropriations rather than as an emergency public works project. Although the number of special questionnaires was reduced, the amount of detail concerning products was greater than in any previous census. For example, there were questions added concerning finished-product and work-in-progress inventories. Enumerators canvassed 351 industries, using one general, one administrative, and 143 special questionnaires.

The Bureau derived a mailing list from 1935 census files, trade directories, license lists, and other sources. It mailed questionnaires in January 1938, and dispatched two follow up letters to nonrespondents in February and March. Census field employees visited establishments during the period April to June 1938, after which the agency made a final attempt to obtain outstanding questionnaires by mail. The results appeared first as press releases with preliminary data, then as pamphlets with final results, and ultimately as a volume published in December 1939.

1940

The 1940 Decennial Census included the censuses of business (retail and wholesale trades; selected service establishments, places of amusement, hotels, tourist courts, and tourist camps; and construction), manufactures, and mineral industries, covering activities for the year 1939. The business census was exclusively a field canvass. In 1940, the Bureau did not canvass most of the establishments classified in the 1935 miscellaneous business category (e.g., banks, advertising agencies, and radio stations). The agency shifted coverage of places of amusement and hotels and tourist courts to the selected service industry group. The 1935 retail classifications were modified for 1940, and a special table on "reconciliation of classifications" was published to facilitate comparing the 1935 and 1940 tabulations. The Bureau also altered the scope of the census of selected service establishments, both by the addition of the miscellaneous business classifications (as noted above) and by internal adjustments. The agency recommended that users of the data, because of the numerous additions and deletions, not compare the 1935 and 1940 aggregates. For the construction industries, the Bureau eliminated the size cutoff for tabulating detailed statistics used in previous censuses (annual business of at least \$25,000), and, for the wholesale trade category, kept the scope essentially the same as in previous censuses. The agency also extended the censuses of retail and wholesale trades and selected service industries to Puerto Rico in 1940 (and for the subsequent economic census years, except for 1948).

Coverage of the census of manufactures remained approximately the same as that of 1937, but the enumeration shifted from a mailout/mailback operation with field follow up to a canvass. There was a new inquiry on capital expenditures for plants and equipment, and the question on personnel requested detailed breakdowns for various categories of non-manufacturing employees and by sex of manufacturing workers.

The census of mineral industries did involve a mail canvass, and most establishments returned their report forms by mail. The Bureau enumerated the bituminous coal industry by mail with the close cooperation of the Bituminous Coal Division of the Bureau of Mines, U.S. Department of the Interior. That Bureau's field offices distributed and collected the questionnaires.

In addition to the usual press releases and pamphlets, Census employees compiled economic statistics in 10 volumes (five for the census of business, three for the census of manufactures, and two for the census of mineral industries). The country's entry into World War II interrupted the final tabulation and preparation of planned special reports. Some of these (e.g., subject reports in the retail area) were abandoned, and the Bureau did not publish the last volume until June 1943.

During World War II, the government discontinued the periodic economic censuses in favor of war-related current surveys to provide statistics for the Office of Price Administration, the War Manpower Commission, the Office of Defense Transportation, and other agencies in charge of defense efforts. Title 14 of the Second War Powers Act, passed March 27, 1942, allowed the Secretary of Commerce to dispense with or curtail any regular census of the Department of Commerce in order to undertake other urgent statistical work vital to the war effort. Executive Order 9152 of April 29, 1942, specifically canceled the 1941 Census of Manufactures. The 1943 Census of Manufactures was similarly dispensed with under proper authority. The 1945 census was suspended because the Congress failed to appropriate the necessary funds.

The first economic census taken after World War II, and the first major one since 1940, was the manufactures census for 1947. This was almost entirely a mailout/mailback operation¹⁹ taken in accordance with the prewar law authorizing biennial censuses on this topic. (Title 14 of the Second War Powers Act (but not the entire act) expired on March 31, 1947. Therefore, under the then-existing law, a census of manufactures for 1947 would be taken in 1948 and other censuses in 1950 would cover 1949 unless other legislation was enacted.) A number of significant new features highlighted the 1947 Census of Manufactures:

- The Bureau used the Old Age and Survivors Insurance (OASI) records of the Social Security Administration as a basis to ensure coverage in the census, and staff reconciled the OASI establishment and industry classifications and those of the census. This not only improved the basis for accurate and economic coverage for the census, but also was an important initial step in further integrating Census Bureau and other federal agencies' statistics;
- To ensure efficiency in response and improvements in coverage, the Bureau sent a prec canvass card to about 525,000 possible manufacturing firms before mailing the questionnaires. The prec canvass form contained inquiries on company name and address, corporation affiliation, manufacturing process used, types of products, and number of employees. Using the returned cards, the Bureau was able to eliminate quickly many addresses that should not have been listed as manufacturing establishments, and determined in advance which of the 212 types of industry questionnaires should be sent to a given establishment. The Post Office Department also cooperated by verifying the presence or absence of a manufacturing plant at specified addresses on lists for particular localities. During the period January to March 1948, the agency used about 325,000 census questionnaires to collect statistics on 435 manufacturing industries. Field office employees telephoned nonrespondents and companies whose answers were deemed incomplete or inadequate. After the staff culled duplicates and out-of-business and out-of-scope firms from the file, it tabulated statistics for approximately 141,000 manufacturing establishments;
- For the first time since 1933, the agency used a simplified questionnaire for small establishments to reduce the reporting burden and processing cost.
- For the first time, the Bureau collected statistics on work hours from all industries, and gave more prominence to the total number of employees rather than to production workers. Thus, the size distributions in presenting statistics were set up in terms of the

total number of employees rather than the number of production workers. The census collected questionnaires from firms manufacturing products valued at \$5,000 or more during the census year. This step was taken mainly to provide coverage more comparable to that used in other federal programs;

- In addition to statistics for individual products ordinarily published in the census of manufactures, the staff grouped value figures into about 1,000 product classes, and used these classes where the number of reporting establishments was too small to permit showing data for individual products; for instance, state data were published for all product classes in addition to selected products;
- The Bureau discontinued the publication of statistics on cost of materials and value of products for the United States as a whole, for the major industry groups and for all geographic areas, because of the unknown amount of duplication contained in these totals resulting from transfers, especially between industries. The agency, however, published these figures for most individual industries, and released data on value added by manufacture and number of employees for industry groups as well as individual industries;
- Staff made a quality check involving an intensive field canvass of selected areas below the state level to establish the completeness of the census, the nature of problems involved in coverage, and types of establishments missed or misclassified;
- The agency based classification of industries on the 1945 *Standard Industrial Classification [SIC] Manual*. (In previous censuses (those before World War II), the Census Bureau had developed its own classifications; see Figure 1); and
- The Bureau tabulated and published data for 147 standard metropolitan areas.²⁰

Standardizing the collection and publication of economic statistical data had been long the goal of the Federal Government. In 1939, the U.S. Central Statistical Board in the Bureau of the Budget (BOB), (the predecessor, several times removed, of the Statistical Policy Branch of the Office of Management and Budget (OMB)), observed that several Federal agencies were engaged in industrial classification of business enterprises and were using various classification systems that sometimes differed from one agency to another. Such a situation made the comparison of industrial data produced by different agencies difficult and often misleading. Recognizing the need for a standard classification of industries, the Board's objective was to arrive at a standard list of industries.

This objective was met fairly quickly through the efforts of an Interdepartmental Committee on Industrial Classification and a Technical Subcommittee on Industrial Classification. Draft lists and descriptions of industries and alphabetical indexes were produced separately for manufacturing and nonmanufacturing industries during 1938–1940. After review, the BOB (now OMB) published the first *Standard Industrial Classification (SIC) Manual* for manufacturing industries in 1941 and for nonmanufacturing industries in 1942, and issued the subsequent editions of the *SIC Manual* discussed below.

The Census Bureau followed the 1941 manufacturing classifications in coding industrial occupations in the 1940 Decennial Census of Population, and then manufacturing SIC's revised in 1945 for the 1947 Census of Manufactures. For the 1948 Business Census (i.e., retail trade, wholesale trade, and selected service industries), the agency relied on the 1942 SIC codes for nonmanufacturing industries. By 1954, these dual classification systems were combined in the 1954 *SIC Manual*, used for the 1954 Economic Censuses. The SIC system was substantially revised for the 1957 censuses and again for 1967. The manual underwent yet another major revision for the 1972 censuses. The 1972 *SIC Manual*, in conjunction with minor changes instituted after the 1972 censuses, was utilized for the 1977 Economic Censuses. Though the Government revised the

manual again for 1982, the changes were not implemented because of insufficient funds. Some, but not all, of the 1982 revisions, plus major changes not considered for earlier ones, were implemented for 1987.

The many SIC revisions instituted since the 1940s were the result of work undertaken by economists, statisticians, and classification specialists representing Federal agencies that used the SIC system as well as from recommendations made by the Census Bureau's Advisory Committees of the American Economic Association, the American Marketing Association, and the American Statistical Association; businesses; trade associations; and State and local government agencies. In addition to the Census Bureau, Federal participants represented such agencies as the Bureau of Economic Analysis (BEA), the Bureau of Labor Statistics (BLS), the Social Security Administration (SSA), the Internal Revenue Service (IRS), the U.S. Tariff Commission (now the U.S. International Trade Commission), Bureau of Mines, Department of Agriculture, Department of Transportation, Board of Governors of the Federal Reserve System, Small Business Administration, Federal Emergency Management Agency, National Science Foundation, the Federal Trade Commission, and the Interstate Commerce Commission.

For the 1987 revisions, the Government gave special consideration to industry changes that would increase comparability of the SIC with the United Nation's International Standard Industrial Classification and that would increase the Government's capability to assess the impact of international trade on domestic industries, such as making the domestic SIC system comparable with the Customs Cooperation Council's Harmonized System.

Finally, since the SIC system was developed during a time when the bulk of the American economy was involved in manufacturing; consequently, during a period of years after World War II when the economy underwent vast changes, the anomalies within SIC system became painfully obvious. In November 1991 an International Conference on the Classification of Economic Activity was held to focus on the need to reexamine the classification system. By July 1994, the Office of Management and Budget announced that Mexico, Canada, and the United States had agreed to develop a North American Industrial Classification System (NAICS) that would produce common industrial classifications for all three countries. The adoption of the NAICS for the 1997 Economic Census required the Census Bureau to introduce 360 new industrial classifications and to revise 330 more for industries previously classified under the SIC code.

The NAICS will enable users to derive data for roughly two-thirds of the four-digit SIC code industries, either because the industries have not been changed (other than the numerical code), or because any new industries involved are subdivisions of the old industry. However, many other industries were significantly altered, either expanded or fragmented by the NAICS (approximately 330 NAICS industries represent substantial revisions to the scope of existing industries previously defined by the SIC system), and over 360 entirely new industries were defined. The Office of Management and Budget will publish tables showing the full NAICS hierarchy, as well as tables showing the NAICS industries matched to the 1987 SIC code, and vice versa. (A detailed explanation of the NAICS will appear in the *History of the 1997 Economic Census*, which probably will be published at the end of the year 2000.)

Figure 1
Development of Industrial Classification Systems

As in the past, the 1947 census results appeared first as preliminary reports, then as final reports, and finally were assembled in three volumes—general summary, statistics by industry, and statistics by state.

1948

After the 1947 Census of Manufactures had begun, Congress considered Senator Albert W. Hawkes' (R., NJ) bill to shift the years in which the various economic censuses would be taken and to conduct the census of manufactures every 5 years instead of 2 and the censuses of business and mineral industries every 5 years instead of 10. Congress estimated that this would save the government \$1 million during the first 10-year period alone. In

addition, the law would provide the Census Bureau with the authority to “make such surveys as are deemed necessary to furnish annual and other interim current data on the subjects covered by the censuses provided for in this and other Acts” and it gave the agency “authority to place on a mandatory basis annual surveys collecting needed information of the type collected in a complete Census.”

These last two provisions were largely responsible for the widespread business and editorial backing of the legislation. Among the organizations that advocated passage of the bill were the U.S. Chamber of Commerce; chambers of commerce of Los Angeles, CA, Philadelphia, PA, Richmond, VA, and Seattle, WA; the Chicago Association of Commerce and Industry; and the American Marketing Association. Editorial backing for the bill or its principles appeared in such varied publications as the *New York Herald Tribune*, *Editor and Publisher*, *Advertising Age*, *Industrial Marketing*, and the *Northwestern Miller*. As far as is known, there was no significant opposition.

Therefore, on June 19, 1948, Congress passed what became Public Law 80-671 (incorporated into Title 13, *U.S. Code*, when the Bureau’s censuses and surveys were codified in 1954) that authorized “censuses of manufactures, of mineral industries, and of other businesses, including the distributive trades, service establishments, and transportation . . . in the year 1949 and every fifth year thereafter, and each census shall relate to the year immediately preceding the taking thereof.” The law further specified that, because there had been a census of manufactures for 1947, one would not be taken in 1949. One immediate result was the authorization of an Annual Survey of Manufactures (ASM) at the time the transition was made from the 2-year to the 5-year censuses of manufactures after 1947. The ASM was designed to carry forward the main outlines of the establishment statistics in the noncensus years.

The first application of this law was for the 1948 business census, which included retail trade, wholesale trade, and selected service industries.²¹ After the Bureau had divided the country into 37,000 enumeration districts and established 308 temporary field offices, it distributed questionnaires to respondents during the period May to November, 1949. The first phase of the project was a listing operation during which enumerators systematically canvassed each business establishment to secure basic information (e.g., name of business and proprietor, type of business, and whether it was part of a multiestablishment company) and entered the information in a listing book for each enumeration district. The field workers listed all recognizable businesses (except medical, dental, and law offices; government offices; and also farms). For most single-establishment companies, they left the appropriate questionnaire with instructions that it be completed and returned to the census office by mail. (There were 12 questionnaires—five for selected service establishments, five for wholesalers, and two for retail stores.) For multiestablishment firms, the central office staff completed the questionnaires for all establishments, unless the management specifically requested other arrangements.

The second phase was the data-collection/coding-editing operation. Most companies completed and returned their questionnaires without further contact, and clerks “checked in” the firms in the listing books for each enumeration district. The agency mailed reminder letters to nonrespondents, and field workers revisited those who had not complied. Field office employees carefully coded and edited questionnaires so that field workers could visit firms whose returns were incomplete or contained inconsistent or illogical information.

Other procedural changes included preliminary editing of questionnaires in the field offices and payment of field enumerators on a per diem rather than a piece-rate basis.

Before the temporary offices closed, there were several coverage checks, including matching operations with Social Security Administration lists and comparisons of county totals with those of neighboring counties or counties with similar economic characteristics.

Significant changes in the scope of the 1948 business census included the exclusion of the contract construction industry; the limitation of the census to those areas where coverage was mandatory under the new law (the 48 states, the District of Columbia, Alaska, and Hawaii, but not Puerto Rico); a reduced emphasis on employment and payroll information; and the compilation of data on the number of trucks operated by business establishments. The census collected only a limited amount of information from most small single-establishment firms, but obtained more detailed data from a sample consisting of every 10th small independent retailer, from all large retailers (those independent retailers with 1948 sales volume in excess of \$100,000), and all multiestablishments or chain organizations.

After the field canvass, a post-enumeration survey re-enumerated 2,500 representative small (substate) areas. This survey revealed undercoverage of 8.2% of service establishments and 3.6% of retail establishments. In general, the undercoverage reflected failure to list and canvass small businesses, particularly those with no employees.

As usual, the Bureau published preliminary results first and then final reports, which were later assembled in bound volumes (three for retail trade, two for wholesale trade, and two for service industries). In addition to the usual tabulations (receipts, sales, payroll, number of establishments, etc.), there were special tabulations on sales of retail stores by merchandise line and sales of wholesale outlets by commodity line. The publications presented statistics for 147 standard metropolitan areas, in addition to states, counties, and cities.

1954–1955

As noted above, Public Law 80–671 specifically authorized censuses of business, manufactures, and mineral industries in 1954, covering calendar year 1953. Although the Congress appropriated funds for planning and preparatory operations in fiscal years 1952 and 1953, it disallowed the fiscal year 1954 budget request for the actual census-taking. Instead, there was money only for limited special surveys of manufactures and business. This congressional action forced the Bureau, in May 1953, to terminate work on the economic censuses and created considerable opposition in many government departments and agencies and in the business and academic communities. In light of this opposition, the Secretary of Commerce, in October 1952, appointed a number of professors, business executives, economists, and other specialists not affiliated with the Census Bureau to an “Intensive Review Committee.” In March 1954, this group added its strong recommendation that the economic censuses be resumed. As a result, Congress enacted legislation (which became Public Law 83–467) in June 1954 that provided that “the censuses of manufacturing, of mineral industries, and other business, including the distributive trades and service establishments, directed to be taken in the year 1954 relating to the year 1953, shall be taken instead in the year 1955, relating to the year 1954.” Thus, the economic censuses, for the first time, became an integrated economic statistical program in which data for retail trade, wholesale trade, manufacturing establishments, and construction, mineral, and service industries were collected for the same benchmark years.

The 1954 Census of Business (retail and wholesale trades and selected service industries) marked the Bureau's first attempt since 1890 to compile census statistics from administrative records. While employers were enumerated via the mailout/mailback procedure, the agency did not require nonemployers in retail and service trades to complete census questionnaires; instead, it derived selected data items (e.g., employment, payroll, and sales) for retail nonemployers with 1954 sales of at least \$2,500 and for service nonemployers with 1954 receipts of at least \$1,000 from the 1954 income tax returns filed with the U.S. Internal Revenue Service (IRS). The Bureau excluded wholesale firms without employees from the census. (Just prior to the 1954 censuses, and after consultations with the Census Bureau, the IRS revised its income tax forms to distinguish physical location from mailing address and to determine whether a firm's activities were within the scope of the census.) The enumeration excluded retail and service nonemployers with sales and receipts below the cutoff points. Nonemployers, although large in number, accounted for only a small percentage of retail sales volume and service receipts in 1954. Experience also had demonstrated that these small firms were the ones most likely to be missed in an enumeration, since many were operated from the owner's home and/or on an intermittent basis.

While the Bureau collected data for employers exclusively in a mail operation for the business census and for the censuses of manufactures and mineral industries, it made extensive use of administrative records in developing the mailing lists. The starting point was the IRS list of all employers who made one or more quarterly payments to the Social Security Trust Fund under the Federal Insurance Contributions Act. Since this list did not contain kind-of-business classifications necessary to determine which questionnaire should be mailed to a particular establishment, the Bureau had to match the IRS list with other lists containing kind-of-business classifications (e.g., the Social Security Administration's (SSA's) employer master file). The names on these lists could usually be linked through the use of the employer identification number (EIN) assigned to each case by the SSA, and matched mechanically on punchcard collating equipment. To secure accurate and up-to-date information on establishments of multiestablishment companies and to correct and consolidate the IRS list, the Bureau conducted a prec canvass by mail in the fall of 1954. It asked multiestablishment companies to complete and return questionnaires on which they listed their establishments with corresponding information about name and address, employment, type of activity, etc.

The economic census mailout occurred in early 1955. The census of manufactures used 192 different questionnaires, each tailored to a particular industry or group of industries, to compile statistics for 450 industries defined under the standard industrial classification (SIC) system. Each type of questionnaire contained common items (e.g., employment, payroll, work hours, and cost of materials), but there were different questions on such subjects as product mix and raw materials to suit the characteristics of each industry. Bureau employees prepared for the mailing list using the process described above and, for large companies, the mailing register for the 1953 ASM. (The ASM was instituted for 1949 because of the need for intercensal years. Since that time, it has been a current program in the years between censuses.) In census years, the ASM panel of establishments served as the nucleus of the census of manufactures. The survey covered all large plants (those having 100 employees or more from 1954 through 1967 and, from 1972, those with 250 employees or more) and a representative sample of the smaller ones. All large plants

remained in the ASM over time, but the Bureau replaced smaller ones every 5 years. During census years, the ASM questionnaire served as the first two pages of the census questionnaire for survey respondents. The survey part was primarily a plant report and, instead of asking information on specific products (as in the census of manufactures), it wanted manufacturers to report shipments by class of product.

Respondents returned the questionnaires by mail, and nonrespondents received follow up letters. Census field office employees telephoned or visited those who still did not respond. The mailout and follow up operations involving large companies (generally those with at least six employees) were under the direct control of the Bureau's Suitland, MD headquarters. Field offices controlled mailout and follow up operations for the smaller companies. Coverage-control procedures ensured that all establishments on the mailing list were accounted for.

There were similar methods for the mailout/mailback canvass of the mail universe portion of the censuses of business and mineral industries. For mining companies, the Bureau supplemented the mailing list with information provided by such agencies as the Bureau of Mines and the Federal Power Commission. In total, approximately 280,000 manufacturing, 1.8 million business (retail and wholesale trade and selected services), and 32,000 mining establishments completed questionnaires. Census-derived data for more than 1 million retail and selected service companies from tax returns, resulting in an estimated savings of \$3 million in data-collection costs.

The 1954 censuses also marked their transition to electronic computing. In 1951, the Bureau acquired the United States' first large-scale nonmilitary computer, UNIVAC I, in time to tabulate part of the 1950 Decennial Census. UNIVAC I still required punchcards as input to its magnetic tape, but it could be used extensively, not only for calculating, but also for editing and imputing data and for driving high-speed printers that prepared offset copy.

The availability of computers (and the adoption of the general procedure of having all questionnaires for multiestablishment firms completed at company headquarters) also enabled the Bureau to initiate its first enterprise statistics program. This regrouped data for establishments under common ownership or control into tabulations showing various economic characteristics based on the classification of the owning or controlling company (enterprise).

As in past censuses, the Bureau published 1954 census results in preliminary bulletins, final reports, and bound volumes. In addition to the usual summary, industry, subject, and area reports, there were special tabulations for central business districts, newly defined geographic entities encompassing the downtown business areas of large cities. Using the 1954 definition of a central business district, the Bureau published retroactive retail trade and selected service data for 1948.

1958

The scope, coverage, questionnaires, procedures, and tabulations for the 1958 censuses closely resembled those of 1954. The Bureau mailed questionnaires during the period January to May, 1959. Innovations for the 1958 censuses included:

- The use of more sophisticated computers. Processing operations performed by computer greatly expanded to mailing list controls, more extensive editing, certain kinds

of coding, and other functions that had been previously performed manually or with punchcard equipment.

- Establishment of a census operations office in Jeffersonville, Indiana, for the extensive preparatory operations and mass clerical procedures? preparation of mailing packages, mailout, receipt, check-in, clerical editing and coding, and card punching. Clerks took prints of the IRS's microfilmed tax returns and edited, industry-coded, and cardpunched the data from these administrative records. Bureau headquarters then transferred the data on the cards to electronic tape and processed them by computer.
- A new statistical area for the business census, the "major retail center" (MRC; an outlying business area, such as a shopping center). The Bureau published data for these major retail centers in standard metropolitan statistical areas (SMSA's), together with information for central cities and their central business districts (CBD's), in a new series of reports for 97 SMSA's.
- Economic censuses for the first time in Guam and the Virgin Islands.

1963

The 1963 Economic Censuses expanded to include censuses of transportation (for the first time²²) and commercial fisheries.

Previously, nearly all available transportation statistics were byproducts of federal and state governments' regulatory and promotional activities. Statistics were adequate for some aspects but inadequate or nonexistent for other areas of equal or greater public importance.

Because of the inadequacy of transportation data and the need for appropriate action by the Department of Commerce to overcome this deficiency, the President had signed Public Law 80-671 in 1948, which authorized a census of transportation in 1949. Congress did not provide funds, however, so the Bureau did not undertake the census. Subsequently, Congress appropriated money to develop methods for the census, then scheduled for 1953. Most of this work was accomplished on a reimbursable-cost basis for other governmental or nongovernmental organizations requiring data not currently available. However, Congress did not approve funds for a transportation census in either the 1954 or 1958 Economic Censuses.

In July 1961, Congress held hearings to discuss the need for a census of transportation, with particular reference to plans for undertaking the census in 1963. Thereafter, that body appropriated funds, and work commenced in April 1963.

The 1963 Census of Transportation was necessarily a pioneering effort with respect to the economic areas covered as well as the survey techniques used. The primary objective was to close, or at least narrow, major gaps in statistical knowledge without duplicating data already available from other governmental or private sources. This objective led to a program consisting of four individual surveys, each aimed at a specific gap in knowledge, rather than a single unified project as was common in other economic censuses:

- The Passenger Transportation Survey produced statistics showing national and regional passenger patterns for 1963 and their relationship to socioeconomic and geo-

graphic factors. Census representatives collected data in four quarterly personal interviews from a probability sample of about 6,000 households.

- The Truck Inventory and Use Survey (TIUS) yielded data on the nation's truck resources, such as the number of trucks classified by physical characteristics, occupational use, intensity of vehicle utilization, and geographic distribution of vehicles. The Bureau mailed questionnaires to a sample of about 100,000 truck and truck-tractor owners selected from state motor vehicle registration records.
- The Commodity Transportation Survey (CTS) compiled data concerning the geographic distribution of tons and ton-miles of commodities, by type, shipped by the manufacturing sector of the United States. The survey obtained the basic information from a probability sample of bills of lading or other shipping records maintained in company files.
- The Motor Carrier Survey supplied statistics concerning for-hire carriers not subject to economic regulation by the Interstate Commerce Commission. This involved a complete mailout/mailback enumeration of bus companies and public warehouses that also provided trucking services, plus a mailout/mailback enumeration of a probability sample of trucking firms.

The census of commercial fisheries, resumed at the recommendation of the Interior Department's Bureau of Commercial Fisheries after a 55-year hiatus, involved a mail canvass of commercial fishing operations reporting employment to the Social Security Administration. The questionnaires contained inquiries on employment, payroll, receipts, characteristics of vessels, and landed catch. The Bureau did not ask part- and full-time fishermen without paid employees to complete questionnaires. Rather, the agency used a sample of administrative records for nonemployers to compile limited statistics. Because the mailing list was later revealed to be incomplete, there was a supplemental vessel survey for 1964.

The 1963 censuses of retail and wholesale trades, selected service industries, manufactures, and mineral industries closely resembled their 1958 counterparts. The main differences again were that the Bureau used newer model computer systems and expanded the use of electronic equipment, including:

- Computerized geographic coding of establishment addresses;
- Substitution of magnetic tape for punchcards in developing the census mailing lists from IRS lists;
- Automated procedures to control mailout and follow up operations;
- A high-speed telephone-transmission system to expedite mass transfer of data from Jeffersonville to the computer facility at headquarters;
- A computerized system for work and progress reporting of census operations; and
- Implementation of computer-programmed news stories for releasing census results and automatically mailing them to news media.

Again, the Bureau obtained selected items of information, such as value of receipts and sales, from tax returns for nonemployers. The agency also used administrative records to assemble mailing lists and obtain preliminary industry classifications for employer firms to

be included in the mail canvass. In total, the agency asked about 3 million firms to complete questionnaires (which were mailed from November 1963 to March 1964), and it derived statistics for approximately 1.5 million nonemployer firms from administrative records based on a 50% sample.²³

1967

For 1967,²⁴ the Census Bureau increased the scope of the economic censuses. Major elements of this expansion consisted of:

- Reinstitution of a census of construction industries (the first since 1939). For the first time, this was taken in Puerto Rico as part of the economic censuses;
- Expansion of coverage of the census of selected service industries to include architects and engineers, law firms, and arrangement of passenger transportation (travel agents and tour operators).
- Three surveys as the census of transportation?the National Travel Survey (NTS).²⁵ The Truck Inventory and Use Survey (TIUS), and the Commodity Transportation Survey (CTS). (The fourth part of the 1963 program, a survey of nonregulated motor carriers, was part of the 1967 and 1972 Censuses of Selected Service Industries. For 1977, it was reinstated in the transportation census as the Nonregulated Motor Carriers and Public Warehousing Survey).
- Modification of the prototype 1963 CTS by doubling the sample size in the major population centers as a means of improving the quality of the point-of-origin to point-of-destination commodity flow data, and extending the survey's scope to include printing and publishing establishments (except those printing or publishing newspapers and periodicals). These types of establishments were not in the 1963 survey.

The 1967 Economic Censuses thus included censuses of retail and wholesale trades, selected services, construction and mineral industries, manufactures, commercial fisheries, transportation, and the enterprise statistics program.

The 1967 Census of Commercial Fisheries mail canvass collected statistics on the number of vessel operators; catch, and fishing gear; and various vessel characteristics. While the Bureau obtained some basic information (gross receipts and industry classification) from the IRS and SSA for part- and full-time fishermen without paid employees, it did not publish the 1967 data from administrative records because of serious classification problems.

A major change in the use of administrative records for the 1967 censuses was that data for all nonemployers (establishments without paid employees) in retail trade and selected service and construction industries were obtained from IRS income tax records. In addition, the Bureau expanded the use of these records to compile statistics for selected single-establishment small employers (firms with few employees during 1967). For retail trade and selected service industries, different payroll cutoffs for various kinds of businesses determined which firms would be excused from completing questionnaires. The number-of-employees equivalent to the payroll cutoff for manufacturing firms was 10 employees and five for mineral industries establishments. For construction industries with employees, Census used administrative records only to select the mail sample and not to compile sta-

tistics. Thus, data for more than 1 million small-employer establishments, canvassed by mail in previous censuses, were compiled from tax returns in the 1967 censuses. In total, the Bureau used administrative records for 2.9 million establishments, and asked 1.9 million establishments to complete questionnaires.

The Bureau devised various new techniques for handling mass data for the 1967 censuses, and utilized new computers and auxiliary electronic equipment. Other significant changes in processing methods included the expansion of the geographic coding file to facilitate computer coding of establishments located in small cities, development of specifications and computer programs to perform complementary disclosure analysis (to ensure that data for individual establishments were not revealed), and extended use of computer editing to replace some operations previously performed manually.²⁶

1972

Except that there was no census of commercial fisheries after 1967, the 1972 Economic Censuses were essentially the same as those for 1967. In addition, for the first time, they covered construction industries in Guam and the U.S. Virgin Islands. For the 1972 census program as a whole, staff mailed 2.9 million questionnaires between December 1972 and February 1973. In addition, there was information from administrative records for approximately 2.6 million establishments.

As well as incorporating the improvements and expansions introduced for 1967 (see above), the 1972 censuses included a prec canvass of all out-of-scope activities of companies that reported on an establishment basis in previous economic censuses. Also, the NTS sample size increased (from 6,000 households for 1963, and 18,000 for 1967) to 24,000 households for 1972.

The Bureau classified all 1972 data according to the new 1972 *SIC Manual*. For selected data items, the reports contained "bridge" tables that showed 1972 data classified under both the 1967 and the 1972 SIC systems. The 1972 revision recognized a number of additional separate industries, eliminated statistically insignificant ones, and contained modified definitions of many others within the scope of the economic censuses by shifting products and services from one industry to another within each SIC division.

The 1972 program included a Survey of Minority-Owned Business Enterprises (SMOBE) that the Bureau had begun with a 1969 study analyzing data from the 1967 Economic Censuses. The SMOBE presented tabulations by major SIC industry or industry group by race (Black, Asian American, American Indian, and "Other") and Hispanic origin for metropolitan areas and, from 1972 on, for counties and places with specified numbers of minority-owned firms. The SMOBE usually limited the published data to legal form of organization and receipt- and employment-size of firm.

Economic census data users had stressed the importance of early availability of the information on a detailed industry and geographic basis. As a result, work on the 1972 censuses emphasized improving the timeliness of the publication program. The first reports in key publication series from each of the censuses appeared within 1 year of the period covered by the censuses. This achievement represented an average gain of 6 months compared with the release of the 1967 census information. A further achievement was the completion of publication of the major series 9 to 12 months earlier than for 1967. Finally, the 1972 censuses witnessed the introduction of a systematic, standardized program to issue public-use

computer tapes, which consisted of the same summary data as the printed reports, for data users with their own processing facilities.²⁷

1977

The 1977 Economic Censuses program covered retail trade; wholesale trade; service, construction, and mineral industries; manufactures; and transportation; the survey of minority-owned business enterprises; the enterprise statistics program; and a census and a survey of women-owned businesses. The Bureau mailed more than 3 million questionnaires between December 1977 and April 1978, and obtained data for about 4 million small firms from administrative records. The census of women-owned businesses was a compilation of economic data from existing records and presented a general economic picture of women-owned businesses. Finally, the special survey of women-owned businesses collected more specific information about the demographic and economic characteristics of women-owned businesses and their owners.

For the 1977 censuses, a 1976 recordkeeping practices survey obtained information on the ability of respondents to provide data not previously requested in the Bureau's economic censuses and surveys. As a result, the Bureau decided to:

- Collect additional data needed to improve the gross national product accounts;
- Expand the coverage of the service industries census;
- Develop a common set of commodity lines for all types of operations in the wholesale trade census;
- Develop a better geographic coding system to improve the classification of data by areas;
- Improve the quality of the national travel survey; and
- Carry out evaluation programs.

The staff gave high priority to the growing need for more data to compare domestic output to imports and exports in expanding product line detail for the 1977 Censuses of Manufactures and Mineral Industries. Section 608, "Uniform Statistical Data on Imports, Exports, and Production," of the 1974 Trade Act mandated that a comparability study be made of the commodity classification systems used by the United States for imports, exports, and domestic production. This study, in 1975–1976, was a joint effort of the Bureau of the Census and the International Trade Commission. These federal agencies proposed modifications for each of the three existing systems so that data collected for individual products or groups of products would be more compatible with each other, and some of the product-line classifications for the 1977 censuses were developed or revised as a result of the study. The censuses incorporated all new product-line classifications identified during the trade act review for which questionnaires had not already cleared the Office of Management and Budget. Those changes identified after clearance were not used for 1977 but were included in the 1982 censuses.

There were changes in the practice, begun in 1954, of having a quinquennial prec canvass of all known multiestablishment companies. The primary objective of the prec canvass was to update the Bureau's file of company and establishment address records, so that the agency could mail the appropriate questionnaires more economically and efficiently to

each in-scope establishment operated by these firms during the census year. It also assured completeness of company reporting in the census. However, since the prec canvass occurred only once every 5 years, the file of company and establishment address records became obsolete within a very short period of time. As a result, after the 1972 Economic Censuses, the Bureau developed and implemented a standard statistical establishment list (SSEL), and began an annual company organization survey (COS) designed to update the address files in the SSEL. The SSEL consisted of a central, multipurpose computerized name and address file of all known single- and multiestablishment employer firms (and nonemployer agricultural firms) in the nation. Through the combined use of the SSEL file number and the EIN (assigned to each legal entity by the IRS), the Bureau could link together and identify the affiliation of parent companies, subsidiary firms, and their establishments throughout all phases of economic activity.

Unlike the 1967 and 1972 Censuses of Transportation, the 1977 coverage included nonregulated motor carriers and public warehousing as well as the national travel, truck inventory and use, and commodity transportation surveys. While the Bureau based the last three surveys on probability samples, it based data for nonregulated motor carriers and public warehousing firms with employees on an enumeration of establishments in the same manner as the other economic censuses. In addition, the staff made a number of changes and improvements in the probability surveys.²⁸

1982

The 1982 program consisted of censuses of retail trade; wholesale trade; service, construction, and mineral industries; manufactures; and transportation; the survey of minority-owned business enterprises; the survey of women-owned businesses; the survey of characteristics of business owners (an expanded version of the 1977 special survey of women-owned businesses (see p. 51)); and the enterprise statistics program. The Bureau mailed more than 3 million economic census questionnaires and classification forms between mid-December 1982 and March 1983. The agency began the mailout of questionnaires for the 1982 Truck Inventory and Use Survey in October 1982 and completed the operation in June 1983; the Commodity Transportation Survey was in 1984 (for 1983). In addition, staff obtained data for about 3 million small firms (which were not sent questionnaires) from administrative records.

Because of the need to revise the inventory question in the 1982 Censuses of Wholesale Trade, Construction and Mineral Industries, Manufactures, and the 1982 Enterprise Statistics Program, the Bureau carried out several inventory test surveys in 1981. The objectives were to measure response rates and accuracy for several plausible and controlled data-collection methodologies. Based on the response evaluations, the agency adopted a revised inventory inquiry for the 1982 Economic Censuses (and its annual surveys). This meant that only the term "last in/first out reserve" was used and that it was related to a standard definition. The question also included the value of inventories not subject to last in/first out costing.

Between June 1 and July 31, 1981, the Bureau tested proposed revisions to the 1982 Truck Inventory and Use Survey. For example, would it be feasible to use two different questionnaires in 1982 rather than one, as had been done in the past? The results of the test demonstrated that although the use of two different questionnaires increased the Census Bureau's processing burden, it provided the respondent with a survey instrument more

closely related to the characteristics of the sampled vehicle. In addition, other results led to the revision of the sequence and wording of many of the questions in the 1982 survey questionnaire to improve their clarity and to reduce reporting errors.

The 1981 Recordkeeping Practices Survey sought to determine if establishments maintained alternative document systems that were better suited to gather commodity-flow data requested in the Commodity Transportation Survey (CTS). The results of the practices survey prompted the following changes in the CTS:

- Instructions to respondents emphasized using the sales-invoice document system versus the traditional bills of lading. (Bills of lading would be accepted if respondents decided not to use sales invoices.)
- Respondents received stronger worded instructions for using the serial number sequence.
- The staff intended to make special provisions for establishments that wanted to use automated data-processing systems in responding, but these were not implemented.

The 1982 CTS did not take place in 1983 (for 1982) as noted earlier, but in 1984, to allow time for the staff to test and consider alternative data-collection methods. They divided establishments into three groups to test one of three techniques: (1) The systematic method, (2) the first-15 method, and (3) the summary method.²⁹ The 1983 test did not result in a workable methodology for shipment sampling. The Bureau, therefore, decided on a much less detailed survey for 1983, which would only provide summary CTS data.

Unlike the 1977 Census of Transportation, the 1982 census did not include a national travel survey or collect data on nonregulated motor carriers. Data on public warehousing and arrangement of passenger transportation appeared in the census of service industries reports.

The 1982 census excluded some of the service industries that had been covered for the first time in the 1977 census (e.g., hospitals; elementary and secondary schools; colleges, universities, and professional schools; junior colleges and technical institutes; labor unions; and political organizations) because the information for these service industries appeared to be available from other sources, such as the Department of Education and the Bureau of Labor Statistics. The need to reduce census cost also was a factor. For the first time, the Bureau obtained data on retail trade, wholesale trade, manufacturing, and construction and service industries for the Northern Mariana Islands.

Despite known inadequacies that would prevent complete publication processing, the Bureau had adopted an experimental computer program—Table Image Processor System (TIPS) for the 1977 Economic Censuses publication program. The staff had designed this system to photocompose (in conjunction with its own computer-output-to-microfilm device and the Government Printing Office's Video Computer-output-to-microfilm system) large volumes of tables for the census reports. Prior to the 1982 censuses, the Bureau examined the experimental TIPS and determined that 34 refinements to that system would be needed. Of the refinements, at least three were major: The ability to: (1) place any kind of table anywhere on a page, (2) produce multiple tables on a page, and (3) produce multibanked tables (those with the boxhead repeated horizontally or the stub repeated vertically within the same table and on the same page). Since only about one-third of the required refinements could

be realized by modifying the TIPS, the system, as then designed, was not capable of meeting the 1982 Economic Censuses' publication requirements. Therefore, the staff undertook a major redesign of the photocomposition system in 1981. The result was the Table Image Processor Systems II (TIPS II), which remedied most of the original system's deficiencies.³⁰

1987

The 1987 program consisted of the same censuses as for 1982. These encompassed approximately 12.4 million establishments, with information collected through a combination of 3.7 million mail questionnaires and data for about 8.7 million small firms from the administrative records of other government agencies.

There were a number of significant changes in specific censuses. For *retail trade*, the Bureau increased, by 20 percent, the number of merchandise-line questions, providing data users with more detailed information on the kinds of merchandise sold by different kinds of retail stores. The 1982 major retail center (MRC) series of reports marked the sixth and last in a series that, since 1958, had traced the movement of retail businesses from the central business districts (CBD's) to outlying shopping centers, particularly suburban centers. In the more recent past, the role of CBD's in retail trade had declined dramatically in most metropolitan areas. Since the migration of retail business to the suburbs appeared to be complete, it was decided to no longer publish CBD data separately. Conversely, the substantial increase in the number of suburban shopping centers changed not only the nature but also the cost of the MRC program. Costs rose significantly not only because of the increase in the number of centers but also because the boundaries of each center had to be delineated on site, with each store listed by name and type of business. Each store then had to be clerically matched to census listings for the geographic area in which the center was located. Even the changes made for the 1977 censuses, which revised the size criteria and delegated the delineation and enumeration process to local Census Statistical Areas Committees or other local organizations, failed to keep enumeration costs at a manageable level. Consequently, the agency decided to discontinue the MRC program after the 1982 censuses.

To meet the increasing need for small-area data, however, the census of retail trade provided data (for employer establishments only) for each five-digit ZIP Code in the *ZIP-Code Statistics Series* reports. Information here, including establishments counts classified by employment-size groups and sales-size ranges, was issued via electronic media only, such as CD-ROM, diskette, and computer tape.

Other 1987 changes consisted of removing nonemployer establishments from the *Geographic Area Series* reports (i.e., each report presented statistics for establishments without payroll only) and adding a new *Nonemployer Statistics Series*. This series included a separate report for each of four geographic regions on the number of establishments with and without payroll and sales for each type of varied retail classifications for each state, and within each state, for metropolitan statistical areas, counties, and places with 2,500 inhabitants or more.

Finally, the new *Special Report Series* presented the *Selected Statistics* report. It contained selected aggregate data by kind of business, including ranks and ratios not provided in the other final reports, for the United States, states, and metropolitan statistical areas.

For 1987, the *service industries* census collected information on health services as well as on other industries, such as educational services; social services; museums, art galleries, and botanical and zoological gardens; membership organizations, except religious organizations; and rooming and boarding houses. The Bureau obtained data on privately owned and operated hospitals (collected for 1977 but not for 1982) for 1987 and, for the first time, gathered information on government-owned and -operated hospitals.

The census collected additional information on international service transactions. For 1982, there had been tabulations for exported service receipts for architects, engineers, and surveying services; management, consulting, and public relations services; equipment rental and leasing services; and computer and data processing services. For 1987, four additional industries reported data on exported services—advertising agencies; accounting, auditing, and bookkeeping services; research, development and testing services; and legal services.

As with the census of retail trade (see above), the 1987 Census of Service Industries also provided data for individual ZIP Codes (for employer establishments only) and statistics for nonemployer businesses.

The *transportation* census originally consisted of the Truck Inventory and Use Survey (TIUS), the Commodity Transportation Survey (CTS), and expanded census coverage of transportation establishments (to include all motor freight transportation, water transportation, and transportation services). The 1987 TIUS was substantially the same as for 1982. The CTS had to be canceled, in January 1988, after the government reduced the fiscal year 1988 funding for the economic censuses and many other federal projects because of the mandated deficit-reduction guidelines established by the 1986 Gramm-Rudman-Hollings Deficit Reduction Act (Public Law [P.L.] 99-177).

For *construction industries*, the Bureau introduced a conceptual change. Previous censuses collected receipts as the primary measure of construction activity; but, for 1987, it collected the “value of construction work done.” (Receipts could be different from the value of work done, since work can occur in one year and receipts in the prior or succeeding year. In practice, receipts for most contractors approximated “value.” For key industries, however, such as operative builders and developers, receipts and work done might be different. In addition, receipts did not include work a contractor performed for its own account and use, which could be substantial.) The number of construction questions increased from 8 to 24, tailored to particular industries, so that respondents might complete the questionnaires more easily and provide more detail data, especially for the kind of construction work performed and the type of construction involved (e.g., residential and commercial).

Finally, the agency expanded its efforts to capture construction activities of establishments not classified as construction establishments by the SIC system. The Bureau added force-account construction questions to the census of manufactures questionnaires for the chemical, petroleum, and steel industries. (Force-account construction is construction work performed by an establishment primarily engaged in some business other than construction, for its own account and use, and by employees of the establishment.) Additional information on secondary construction activity was also collected by adding questions to manufactures questionnaires covering steel industries and installation of metal and wood

buildings, and to the census of retail trade questionnaires covering hardware and building supply stores.

The Bureau published more comprehensive data on manufacturers that exported, and improved production statistics to make them more comparable with foreign trade statistics. It did this not only because of the revision of the SIC system for 1987, but also because in January 1989, the United States adopted the Harmonized Coding system as the official classification for import and export statistics.³¹

For 1987, the census of *manufactures* collected aggregate data on the foreign content of domestically produced products for the first time. Industry and government agencies consulted about the manufacturing questionnaires requested that the Bureau measure the cost of foreign-made materials used by domestic manufacturing plants to produce goods. Many data users asked for information on the foreign content of each material input consumed in an establishment, but the agency found that this information was not easily reportable and, in many cases, not available. Therefore, the 1987 ASM asked about 55,000 establishments for information on the aggregate amount of materials, parts, and supplies purchased from foreign countries.

For 1987, the Bureau added several recordkeeping inquiries to 12 questionnaires covering industries where partial fabrication was prevalent, such as apparel; motor vehicles; footwear; electronics industries, such as computers and semiconductors; motors and generators; toys; and sporting goods. The responses permitted a better understanding of what was being reported in domestic statistics. If misreporting was widespread and companies in these industries were including foreign costs of materials, fabrication, or labor in their domestic statistics, the census could miscalculate value added.

The agency dropped special inquiries on metalworking operations from the census questionnaires. Finally, because of budgetary constraints, published concentration data appeared at the four-digit industry level but not at the five-digit product class level as in the past.

The 1987 Economic Censuses saw significant data-processing changes. With the acquisition of several minicomputers, analysts now had interactive access to micro-records and summary data. These additional analytical tools reduced the amount of paper listings and improved data quality.

Another processing improvement involved upgrading the agency's automated photocomposition system—the TIPS II. Placement of laser printers in each of the subject-matter divisions (Business, Construction, and Industry) that were compatible with the photocomposition system significantly reduced the time required to produce photocomposed proof copies of data tables and, therefore, contributed to the release of the final publications several months earlier than was done for the 1982 censuses.

Finally, the Bureau established the Economic Programming Division, in January 1987, to better utilize computer programming personnel. All employees working on the census or census-related surveys, such as the Annual Survey of Manufactures, were consolidated into one division. This permitted streamlining many programming activities, and computer staff moved among projects as required.

Other important changes occurred in geographic presentation. Effective June 1983, the Office of Management and Budget established a new set of metropolitan areas—metropolitan statistical areas (MSA's), consolidated metropolitan statistical areas (CMSA's), and

primary metropolitan statistical areas (PMSA's)—to replace the two former types of metropolitan areas—standard metropolitan statistical areas and standard consolidated statistical areas. The Census Bureau used the two-level system to report data for 21 metropolitan areas for the 1987 Economic Censuses: It designated each area, as a whole, as a CMSA consisting of two or more PMSA's. Metropolitan areas that were not subdivided into PMSA's retained their designation simply as MSA's.

The Bureau instituted changes in its publication program. In prior censuses, published preliminary reports preceded final reports. In the manufacturing and mineral censuses, preliminary industry reports were followed by preliminary geographic series, and then the final industry and area reports. For the 1987 Census of Manufactures, the Bureau discontinued the preliminary geographic series. It consolidated the 443 industry preliminary reports (published for the 1982 censuses) into 83 bulletins covering related manufacturing industries. The preliminary U.S. summary report included data at the four-digit SIC level, while the state reports contained information only at the two-digit SIC level. The final industry series was also available in 83 bulletins, followed by the final geographic area and subject series.

The census of construction industries continued to published preliminary industry and final industry and final geographic area reports.

For 1982, the censuses of retail trade, wholesale trade, and service industries had a preliminary industry series followed by final geographic area, industry, and special reports. For 1987, there were no preliminary industry reports produced; rather, two-page press releases appeared for each state approximately 6 weeks before the publication of the final state reports. (The press releases were not preliminary reports, but highlighted data published in the 584 reports. Of this number, 125 were preliminary reports and 459 were final publications.)³²

1992

Several important changes were implemented for the 1992 Economic Census. This census marked the most significant expansion in the census scope in 50 years. For the first time, 1992 covered financial, insurance, real estate industries, communications, and utilities. Also, the Census Bureau included for 1992 those transportation industries not covered in the 1987 program; that is:

- Standard Industrial Classification 40, Railroad Transportation;³³
- Standard Industrial Classification 41, Local and Suburban Transit and Interurban Highway Passenger Transportation;
- Standard Industrial Classification 45, Transportation by Air; and
- Standard Industrial Classification 46, Pipelines, Except Natural Gas.

Thus, about 95 new industries were added, increasing coverage to about 98% of economic activity up from 75% for 1987. Based on the results of the 1989 Recordkeeping Practices Survey;³⁴ the 1989 Transportation, Communications, and Utilities test census; and the 1989 Financial, Insurance, and Real Estate Industries test census,³⁵ the Census Bureau used a statistical unit other than the establishment for some of the financial, insurance, transportation, and utilities industries. The agency continued to collect employment

and payroll data for each location, but obtained revenue and expense data at the legal-entity level within a state.

Across the censuses and between industries, the basic output measures varies from sales for retail trade establishments, to: (1) operating receipts for taxable service establishments, (2) revenue for tax-exempt service establishments, (3) value of shipments for manufacturers, and (4) value of construction for construction establishments.

Among the newly covered industries, there were various industry-specific output measures. Several of these industries had, as operating revenue, items which for most industries were nonoperating such as rents, interest, and investment income, as well as gifts, grants, and contributions. For the 1992 Census of Financial, Insurance, and Real Estate Industries, the Census Bureau requested total revenue. The supplemental inquiry requesting major sources of revenue separated the components to allow users to tailor output measures for their own use. These sources of revenue also provided important information for identifying secondary activity. For the 1992 Census of Transportation, Communications, and Utilities, the Bureau asked for operating revenues basis data. However, the broadcasting and cable industries questionnaire contained a supplemental inquiry on nonoperating revenue.

Gross receipts or sales (less returns and allowances) has been the usual dollar volume figure obtained from the Internal Revenue Service for census use. For 1992, the Census Bureau also requested administrative gross rents and interest income from the Internal Revenue Service for partnerships and corporations. These data did not comprise total revenue (e.g., dividend and royalty income and net capital gains were not included), but did include additional major sources of revenue for the newly covered industries.

In general, census data were made available for the nation as a whole, states, metropolitan areas, counties, and places. Some retail trade and service industry data were made only available at the ZIP-Code level. For the newly covered industries for 1992, the statistics were made available for the United States and states. For some new industries in the transportation, communications, and utilities and financial, insurance, and real estate industries group, the data also were provided for selected metropolitan areas.

Section 501 of the Internal Revenue Service Tax Code grants exemptions from taxation for certain activities, including credit unions, some kinds of insurance companies, fraternal beneficiary societies, and public broadcasting. While planning for the 1992 Economic Census, the Census Bureau considered whether tax-exempt entities required special treatment in the expanded areas. Since most of these industries derived their revenue in much the same way as their taxable counterparts, the Bureau decided that there would be no differentiation in the basic tabulations.

The lack of data on the contribution of services to the volume of exports had been recognized for some time, and there was increasing interest in collecting export data for the non-goods producing sector. In the 1982 census, therefore, the Bureau requested data on exported services for the first time from selected service industries. In 1987, other industries were added. For 1992, the agency asked respondents to report information on exported services for additional service industries as well as for selected financial services including depository banking, business credit and other nondepository institutions, securities brokers and dealers, and electric utilities.

Construction³⁶ expenditures were requested for several industries where construction was known to be a potentially significant secondary activity. The item was put on questionnaires sent to real estate owner-operators, land developers, pipeline companies, and communications and utility companies.

In general, the basic content remained substantially the same as that for 1987, with the following enhancements: In the census of manufactures, the number of purchased services was expanded from three to eight, and the Bureau collected additional information on the auxiliary questionnaire. Also, the instructions to those who received a questionnaire for 1992 were clarified. The receipts inquiry for the census of construction industries was completely restructured to improve data quality and response. Inquiries on manufacturing output and materials consumed were streamlined, thus reducing reporting burden and improving the response rate. As a result of the 1988 Women-Owned Business Act (P.L. 100-533), the Census Bureau collected information on women-owned corporations for the first time for 1992.

In an effort to improve and accelerate response, the Bureau implemented several initiatives, including the following:

- Use more effective direct-mail techniques.
- Standardized the size of most economic census questionnaires. They were 8 x 14 inches, but a few questionnaires remained at 8 x 11 inches. The census of manufactures and mineral industries no longer used 10 x 17-inch questionnaires.
- Instructions were improved and transmittal letters were streamlined.

For 1992, the agency increased the emphasis on mandatory reporting. Outgoing envelopes were overprinted with a message indicating that a Census Bureau questionnaire was enclosed and that response was required by law. The mandatory message was tried in the 1989 test census and proved effective in increasing the response rate.

The Census Bureau implemented more effective follow up strategies, including the use of questionnaire follow up for single-establishment companies and, for the first time, questionnaire follow up for multiestablishment companies through the use of automated printing technologies. (The time, space, and cost associated with manually assembling mailing packages for large complex companies had made questionnaire follow up for them infeasible.)

A proactive company contact program was implemented. In December 1991, the agency mailed an information booklet to the 10,000 largest companies, alerting them to the upcoming 1992 Economic Census. The booklet provided the companies with some key information. In addition, the 1,000 largest companies were targeted for special handling. They were offered a single Bureau contact person, and the companies were asked to reciprocate by identifying a contact within their respective companies.

In November 1992 (about 1 month before the Bureau mailed the questionnaires), analysts called each company contact person at the 1,000 largest companies to alert them that the questionnaires would soon be mailed and called again in January 1993 to be sure the firms had received the census packages. First that did not respond by April 1993 were contacted again by telephone. For those companies that did not report by late June, Bureau analysts again encouraged reporting and/or collected the data by telephone. For 1992,

much greater emphasis was placed on the data-collection operation; for instance, an 800 telephone number appeared on all questionnaire mailings.

Finally, the Bureau developed and used for the first time an electronic data interchange standard for use only in the 1992 Census of Retail Trade. The agency met with some of the largest retailers that had extensive electronic data interchange experience to encourage them to participate.³⁷

CONCLUSION

Over the past 187 years, the information in the economic censuses has increased in direct proportion to the growing complexity of the nation's economy. At one time, this meant continually escalating demands on respondents; more recently, several efforts have eased their burden: reporting by mail, redesigned questionnaires, and increased use of administrative records. Nevertheless, data users in the administration, in Congress, and in the private sector often have pressed for even more statistics and detail. The advent of electronic data processing made filling users' requests potentially easier, but budgetary constraints just as often forced compromise—cutbacks in detail here, entire programs canceled there. Yet, the published reports from the economic censuses continue to provide an unequalled panorama of the country's economy from early 19th century to the present. The structure and practices of the nation's business and industry continue to evolve; the censuses will evolve with them, just as they have since 1810.

NOTES OF THE EXISTENCE OF ARCHIVAL DATA

While the published reports from the economic censuses from 1810 to 1992 are readily available in libraries, the researcher who wishes to use the basis records behind these reports, that is, records of individual firms, for historical or analytical purposes faces no easy task. Fragmentary returns for manufactures from the 1810 Decennial Census exist on microfilm (as part of the population records) and may be seen at National Archives and Records Administration centers and in libraries that acquired copies. Industry schedules for some states for 1850 through 1880 also may be found on National Archives and Records Administration microfilm and/or in manuscript form in state depositories. From time to time, Congress authorized destruction of virtually all the economic census records from 1890 through 1939 (without microfilming), as they were taking up costly storage space. Punchcards likewise were destroyed for the same reason. Thereafter, the National Archives, to which old files had been offered, made such decisions. Magnetic tape came into use with the 1954 and later censuses, and the basic records were kept only in that form (without name identification). Records in the National Archives and Records Administration's hands are opened for public use after 50 years.³⁸ The older tapes are virtually useless, however, because technological advances made the equipment needed to "read" them obsolete years ago. Thus, only when the basis records from the 1972 Economic Censuses become available at the archives in 2022, for example, might the researcher have direct access to a significant body of material.

NOTES AND REFERENCES

1. As this article went to print, the collecting of economic data for 1997 was underway.
2. The Census Bureau used the term "economic censuses" to cover all of its economic data-collection activities between 1954 and 1987. For 1992, on the advice of the Advertising Council, the Bureau used the term "economic census" primarily to assist its promotional activities and because data users frequently did not understand what "economic censuses" meant.
3. For details on the economic censuses taken between 1810 and 1890, see Carroll D. Wright & William C. Hunt, *The History of Growth of the United States Census...* (Washington, DC: GPO, 1900), p. 20 ff.
4. See Wright & Hunt, *The History of Growth of the United States Census...*, p. 22.
5. See Wright & Hunt, *The History of Growth of the United States Census*
6. The 1840 census marked the first evidence of official concern with the need to regard economic census data as confidential. Subsequent censuses had similar instructions.
7. See Wright & Hunt, *The History and Growth of the United States Census...*, p. 40.
8. For a time, the government used the words "schedule" and "questionnaire" interchangeably to refer to the report form completed either by a respondent or a census enumerator; however, in more recent years, the Census Bureau has generally used the term "questionnaire" in the economic censuses.
9. See Wright & Hunt, *The History and Growth of the United States Census...*, pp. 59-67.
10. The 1850 Decennial Census collected some data on telegraph facilities.
11. The special schedules asked questions (but fewer and in less detail) of steamboat companies (21), express companies (30), telegraph companies (24), and telephone/telegraph companies (16).
12. In the early 1880s, Ivan Petroff, a special Census Office agent, traveled to Alaska (in accordance with instructions from the Superintendent of the Census) to ascertain and report on the number of inhabitants. As a result of his work, he (1) produced a brief statistical review of Alaska in geographic divisions, with tables of population; (2) provided a review of the fur trade, fisheries, mineral, and agricultural resources; (3) gave a description of the geography and topography of Alaska; (4) furnished an historical sketch of Alaska from its discovery to the year 1880, and (5) wrote notes on Alaskan ethnology. However, this effort did not constitute an economic census of that territory. U.S. Census Office. Tenth Census of the United States: 1880. Vol. VIII, Part II, *Population, Industry, and Resources of Alaska*. (Washington, DC, GPO: 1884).
13. Statistics for manufacturing were for the year 1900. Data for mining, street and electric railroads, and electric light and power stations were for 1902, but the Census Office released these results as part of the 12th Decennial Census publication series.
14. Examples of these industries include custom tailoring, carpentering, taxidermy, and, in general, contract work done for individual customers. The census also excluded establishments that produced products with an annual value of less than \$500.
15. See *Legislation Relating to the Bureau of the Census* (Washington, DC, GPO: 1917), p. 23.
16. See *Census Bureau Legislation, Department of Commerce and Other Executive Departments* (Washington, DC, GPO: 1936), pp. 13-14.
17. See *Legislation Relating to the Bureau of the Census*, pp. 18-19.
18. As noted earlier, one major difference in coverage was that whereas the first four biennial censuses of manufactures included only firms reporting annual production valued at or above \$5,000, the Bureau returned this cutoff to \$500 for the 1930 census, inasmuch as this was the decennial enumeration.
19. Field enumerators canvassed approximately 15,000 sawmills, which had highly mobile and sporadic operations.
20. These were the forerunners of the present Office of Management and Budget-designated metropolitan statistical areas—one or more counties around central city or urbanized areas with 50,000 or more inhabitants. Contiguous counties were included if they had close social and economic ties with the area's population nucleus.
21. The law authorized censuses of mineral industries and transportation in 1949, but Congress did not appropriate funds for them and they were not taken until 1954 (minerals) and 1963 (transportation; see discussion under 1963 below).
22. Earlier censuses taken by the Bureau covered only specific areas of transportation, such as the censuses of water transportation taken periodically between 1880 and 1926, and the censuses of street railway, trolley bus, and affiliated motorbus operations covered by the early censuses of electrical industries taken at 5-year intervals between 1902 and 1926.

23. For a detailed account of the 1963 Economic Censuses, see *1963 Economic Censuses: Procedural History*.
24. In 1967, Congress modified Title 13 of the *U.S. Code* (the law under which the Bureau operated), so that the period covered by the economic censuses would be the years ending in “2” and “7” instead of “3” and “8.” This revision was introduced to distribute more evenly the staff and computer workload generated by the economic and demographic censuses.
25. For 1963, the NTS was called the Passenger Transportation Survey. As did its predecessor, the NTS measured national and regional travel patterns and their relationship to the socioeconomic characteristics of persons who traveled.
26. For a detailed account of the 1967 Economic Censuses, see *1967 Economic Censuses: Procedural History*.
27. For a further description, see *1972 Economic Censuses: Procedural History*.
28. The changes are contained in the publication *History of the 1977 Economic Censuses*, chapter 10.
29. For a description of these three methods, see chapter 2 of the *History of the 1982 Economic Censuses*.
30. For a detailed account of the 1982 censuses, see *History of the 1982 Economic Censuses*.
31. In January 1989, the United States adopted the Harmonized Commodity Description and Coding System (Harmonized System) as the nomenclature for classifying both exports and imports. The Harmonized System collects information based on the metric standard.
32. For a detailed account, see *History of the 1987 Economic Censuses*.
33. Data for railroads collected by other agencies were included in the Census Bureau’s publications, but were excluded from the 1992 Economic Census data-collection operation. This also applied to Standard Industrial Classification 45 with respect to large certified passenger air carriers.
34. In December 1990, the Bureau completed its 1989 Recordkeeping Practices Survey report. The survey targeted large multiestablishment companies and tested the collectability of data items already on the economic census questionnaires, as well as proposed new items. Analysis of the survey’s responses revealed problems collecting data for some of the latter, including breakouts of employment by function at the establishment level, space utilization, etc. On the other hand, companies found relative little difficulty in reporting detailed information on purchased services.
35. The two test censuses obtained an 80-percent response rate. (For more detailed information, see “1989 Transportation, Communications, and Utilities Test Census” and the “1989 Financial, Insurance, and Real Estate Industries Test Census,” Chapter 2, *History of the 1992 Economic Census*. (Washington, DC: GPO, 1980.)
36. The Bureau also conducted a construction industries test census in 1989, in which questionnaires were sent to 6,000 construction company addresses. The test covered such things as alternative questionnaire design and question sequence. (For more detailed information, see “1989 Construction Industries Test Census,” chapter 2, *History of the 1992 Economic Census*.)
37. While participation was limited to retail trade for 1992, the Bureau adopted the electronic data interchange standard for reporting in the 1993 and subsequent Company Organization Survey. For details, see *History of the 1992 Economic Census*.
38. Title 44, *United States Code*, Section 2104; National Archives and Records Service, *Guide to the National Archives of the United States* (Washington, DC: GPO, 1977), p. 106. The comparable period for population and housing census records is 72 years.

About the Authors

Shirin A. Ahmed is Assistant Division Chief for Post-collection Activities in the U.S. Census Bureau's Economic Planning and Coordination Division. She holds a B.S. in Business and Economics from the University of Maryland and an M.A. in Economics from Georgetown University. Starting at the Bureau in 1979, Ms. Ahmed has worked on all processing phases associated with the current surveys for Services Division. Since 1994, she has been actively involved with the post-collection activities for both the Economic Census and the current programs.

Carole A. Ambler is Chief of Service Sector Statistics Division at the U.S. Census Bureau. She also is the current chairperson of the Economic Classification Policy Committee (ECPC)—the interagency committee chartered by the Office of Management and Budget to develop the North American Industry Classification system. Prior to this appointment, she served as coordinator of the ECPC and was responsible for coordinating the project among various U.S. government agencies, Canada, and Mexico. She joined the Bureau in 1966 after graduating from Indiana University with a degree in Business Economics and Public Policy.

Lawrence A. Blum is Assistant Division Chief for Collection Processes in the U.S. Census Bureau's Economic Planning and Coordination Division. He joined the Bureau in 1967 after graduating from Utica College of Syracuse University with a B.S. in Mathematics. He has been involved in all phases of the Economic Census and is currently responsible for data collection operations for the quinquennial Economic Census and the current programs.

Judy M. Dodds is the Assistant Division Chief for Census and Related Programs in the U.S. Census Bureau's Manufacturing and Construction Division. She joined the Bureau in 1970 after graduating from Florida State University. She has worked on various programs throughout the Bureau. She is currently responsible for the Census sectors of Construction, Manufacturing and Mineral Industries, as well as the Annual Survey of Manufactures, the Current Industrial Reports, and the Manufacturing Energy Consumption Survey.

Kathy V. Friedman is on the Economic Planning Staff in the U.S. Census Bureau's Economic Planning and Coordination Division. She has written, compiled, or managed the production of a variety of Census publications since joining the Bureau in 1988. She also served as distribution manager for the 1990 Decennial Census promotional campaign, and is currently at work on the 1997 Economic Census and its forthcoming products. Before coming to the Bureau, she received her Doctorate in the Sociology of Law at the University of North Carolina, Chapel Hill, after which she spent several years as a Legislative Assistant on Capitol Hill.

James E. Kristoff is Chief of the Industry Classification Branch in the U.S. Census Bureau's Economic Planning and Coordination Division. He joined the Bureau in 1976 after graduating from the University of Maryland with a degree in Agriculture Economics. He is responsible for industry classification activities at the Bureau. He also served on the interagency subcommittee that developed the manufacturing sector of the North American Industry Classification (NAICS) system. He has been involved in all phases of implementing NAICS into the Economic Census, including the development of the bridge code system to be published in the Bureau's *Bridge Between NAICS and SIC* (forthcoming in 2000).

William F. Micarelli is Chief of the History Staff in the Office of the Director at the U.S. Census Bureau. As Economic Census Historian 1971–1995, he wrote and published numerous histories of Economic Censuses, as well as many brochures in the Bureau's *FactFinder for the Nation* series. As Chief, 1995 to the present, he managed the first monograph series on Computer Assisted Survey Information Collection, the writing of the 1997 Economic Census and Census 2000 histories, and the release of oral histories on former Census Bureau Directors and other high-level Census administrators. In addition, he administers the Bureau's library. He received his Doctorate in History from Catholic University, graduating Summa Cum Laude in 1969.

Mark E. Wallace is Chief of the Economic Planning Staff in the U.S. Census Bureau's Economic Planning and Coordination Division. He joined the Bureau in 1976, after graduating from Valparaiso University with a B.S. in Business Administration. He previously served in Services Division as Assistant Division Chief for current Retail and Wholesale Programs, and as Chief of the Retail Census Branch. He is currently responsible for directing Economic Programs data product development, dissemination, and marketing.

Paul T. Zeisst is a Special Assistant on the Economic Planning Staff in the U.S. Census Bureau's Economic Planning and Coordination Division. His work has included supervising publication of the *Statistical Abstract of the United States*; designing public-use microdata from household censuses and surveys; writing guides and indexes; and developing software for the Bureau's CD-ROMs. In his current role, Mr. Zeisst directs marketing activities for the Economic Census. He has authored many articles, including two earlier articles in the *Government Information Quarterly*, to help the public understand the benefits and uses of census data.

Publication Policies and Information for Authors

Government Information Quarterly is a cross-disciplinary, peer-reviewed journal that provides a forum for theoretical and philosophical analyses, the presentation of research findings and their practical applications, and a discussion of current policies and practices, as well as new developments at all levels of government. The journal presents valuable resource material to government officials and policy makers, journalists, lawyers, researchers, teachers and scholars, students, librarians, or anyone interested in the role of government information in society.

EDITORIAL POLICY

1. The Editors will be pleased to receive invited and unsolicited manuscripts, in English, from all parts of the world, that emphasize government information policies, resources, services, or practices.
2. Manuscripts for publication should be sent to: the Editor, Associate Editor, or a member of the Editorial Board (see addresses in front of journal).
3. Invited papers, as well as unsolicited articles, are subject to the **(double-blind) refereeing process**. All papers are sent out anonymously to members of the Editorial Board and perhaps to other readers as well.
4. The criterion for acceptance will be appropriateness to the field, taking into account the merit of content and presentation.
5. Submission of a manuscript clearly implies commitment to publish in this journal. Previously published papers and papers under review by another journal are unacceptable.
6. Letters to the Editor should not exceed 400 words in length and may be: (a) comments or criticisms of articles recently published in the journal; and (b) announcements of developments and issues warranting the attention of readers.
7. Since the number of titles published each year of potential value to our readers is quite large, only a few can be formally reviewed. Persons wishing to write reviews or to suggest titles are invited to contact: John A. Shuler, Reviews Editor. Publishers, likewise, are requested to forward announcements of new and forthcoming titles that may interest our readers. Books submitted to the publisher will not be accepted.

MANUSCRIPT REQUIREMENTS

1. Submit four (4) copies (the original plus three other copies). All papers must include an abstract, not exceeding 150 words, and a biographical statement not exceeding 100 words.
2. To ensure anonymity in the review of manuscripts, keep identifying material out of the manuscript. Attach a cover page giving authorship, institutional affiliation, and a biographical statement, and provide only the title as identification on the manuscript and abstract.
3. The manuscript must be typed, double-spaced (including indented material, notes, and references) on 8 x by 11 inch white opaque paper using one side only. Lines must not exceed 6 inches. Margins must be a minimum of 1 inch.
4. Type each table on a separate page. Insert location note at the proper place in text, e.g., "Table 2 about here."
5. Cited notes and references must be sequentially numbered in the manuscript and gathered at the end under the heading "Notes and References." These should be typed double-spaced and conform to the University of Chicago Manual of Style, 14th edition.
6. Upon acceptance of the paper, authors should supply the Editor with a hardcopy of the manuscript and an IBM compatible computer disk with all text files spell-checked and stripped of any embedded graphics (equations, graphs, charts, line drawings, or illustrations). This text file must be marked as to the placement of all graphics. All text files must be saved as WordPerfect, MS Word, or ASCII.
7. Figures (graphs, charts, line drawings, or illustrations) must be camera ready, preferably drawn in India ink. Original or glossy print of each figure will be required if the manuscript is accepted. If this is not possible, please send the Editor a separate graphics file as either an encapsulated postscript (eps) or tagged image file format (tiff).