

The Use of Economic Census Data in the U.S. National Accounts

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Data Sources for the U.S. Benchmark Input-Output Accounts¹

The preparation of the input-output (I-O) tables begins with identifying and obtaining the vast amount of source data that are required to effectively measure and relate the industry inputs and outputs.

The most important source for data is the U.S. Bureau of the Census, the largest statistical agency in the Federal Government. Although the Census Bureau is best known for collecting and publishing the demographic statistics for the United States, much of the agency's work involves collecting and publishing economic data. The primary data source for the benchmark I-O tables is the comprehensive Economic Census, which the Census Bureau conducts about every 5 years.

The Economic Census is the preferred data source for the I-O tables because it provides the most comprehensive data available in terms of both industry coverage and measurement of the economic units in those industries. The Economic Census collects most of the essential data required for the tables—such as receipts, inventories, and payrolls—and the data are collected at the level of the smallest operating unit, the “establishment.” In addition, the Census Bureau's collection procedures tend to ensure that no individual establishment is counted more than once. Thus, by relying on the Economic Census data wherever possible, BEA is able to limit duplications that could occur when the Economic Census is used in conjunction with other sources.

The Economic Census is not a complete count of all of the economic units in the economy. Small businesses covered in the Census are measured by sampling or by administrative records rather than by direct reports from each individual business. In addition, some economic units and some industries are not included in the Economic Census. These gaps lead to the need for additional data from other sources and for adjustments in transiting from the Census data to the I-O estimates.

Much of the additional data required to prepare the I-O tables comes from other Census Bureau programs—including annual surveys that cover selected industries, such as manufacturing or services.² The I-O tables also incorporate data collected and tabulated by other Federal agencies—including the U.S. Departments of Agriculture, Education, and Energy—and data from a number of private organizations.

Keeping the source data relevant

In order to improve the quality of the source data available for preparing the I-O tables, BEA regularly consults with the Census Bureau staff about issues relating to the Economic Census and other statistical programs. In some cases, these discussions result in the collection of data previously not included in the

¹ This material is an excerpt from BEA's unpublished Input-Output Manual.

² Information on industry expenses and sales taxes are generally collected using annual surveys. The Census Bureau also conducts quarterly and monthly surveys; data from some of these surveys are incorporated into other economic accounts, including the national income and product accounts.

Census Bureau programs. In others, the definitions of economic flows or of accounting specifications used in the surveys may be refined so that they more closely reflect I-O concepts.

A number of formal procedures are in place to facilitate these consultations—including interagency committees, the Office of Management and Budget forms review process, and Census Bureau advisory committees. Additionally, informal contacts between BEA and Census Bureau staff frequently lead to discussions on such topics as what types of data are important, definitions of statistics collected, wording of report forms, and procedures for drawing statistical samples.

The importance of these information exchanges is heightened by the challenges posed by the vibrant, ever-changing nature of the U.S. economy. Products and even whole industries may come and go, and industrial structure and processes may change dramatically. Examples of these types of changes include the following: Technological innovations, such as computers and software, Internet transactions, cellular phones, and genetic drugs; introductions of new financial instruments, such as “derivatives”; regulation or deregulation in specific markets, such as the recent restructuring in the communication and broadcasting industries; and shifts in consumer tastes, such as demand for fingernail-care services.

Specifically, BEA staff must collaborate with Census Bureau data collection staff to identify changes that affect the industry data. Together, they must be able to adapt data collection procedures, to develop new adjustments to the data, and to make any other changes necessary to keep the I-O tables in conformance with the concepts of I-O accounting.

The Economic Census

The Economic Census can be dated back to 1810, when a few questions on manufacturing were added to the Census of Population. These questions were added shortly after James Madison became president; earlier, in meetings of the Constitutional Convention, he had urged that the Census be used for more than just a head count. Gradually the scope of the Economic Census expanded, and data collection and processing were systematized. The 1905 Manufacturers Census marked the first time a census was taken separately from the decennial population census. Censuses for retail and wholesale trade and for construction were added for 1930, and some service trades were added for 1933.

The 1954 Economic Censuses were the first to be fully integrated: They provided comparable census data across economic sectors, using consistent time periods, concepts, definitions, classifications, and reporting units. It was the first census to be taken by mail, using lists of firms provided by the administrative records of other Federal Government agencies. Since 1963, administrative records have also been used to provide basic statistics for very small firms, thereby reducing or eliminating the need to send them questionnaires. Also since 1963, the reference years for the Economic Census have been years ending in “2” and “7.” These years seem to be optimal in spacing out the work required for these Censuses and that required for the decennial Census of Population and Housing.

The Economic Census has grown from a few questions on manufacturing in the 1810 Census of Population to nearly 500 questionnaire variations that collected data from 3.7 million companies representing over 5 million business establishments in 1,056 industry classifications in the 1997 Economic Census. In addition, through the use of administrative records, the Census Bureau compiled data on 14 million businesses without paid employees and on 1.5 million small business employers.

The 1997 Economic Census was conducted largely using the North American Industry Classification System (NAICS); earlier censuses had used the U.S. Standard Industrial Classification (SIC) system. Compared with the SIC, NAICS greatly expanded the coverage of services and information-oriented industries. Under NAICS, economic activity is classified into 20 major sectors (two-digit level); most of the detailed commodity/industry I-O data correspond to the NAICS classifications at the six-digit level.

The Census universe

In order to understand the most important coverage adjustments required to transit from the Census data to the I-O tables, it is helpful to understand the procedures used in the Economic Census to develop a comprehensive “universe” (mailing list or directory) of businesses to canvas. The Economic Census uses a centralized, multipurpose, computerized data file of U.S. business establishments and companies that includes both those with employees and payrolls and those without employees and payrolls (non-employers). This list, now called the Business Register, first became operational as the Standard Statistical Establishment List (SSEL) for data year 1974. “Businesses” are legal or administrative entities that are assigned an employer identification number (EIN) by the Internal Revenue Service (IRS). For the 1997 Economic Census, the Business Register included over 19 million businesses—180,000 multi-establishment companies with about 1 1/2 million affiliate establishments, 5 million single-establishment companies, and nearly 14 million non-employer businesses.

The Business Register database consists of two cross-classified databases, one for single-establishment companies and one for multi-establishment companies. In addition to the EIN and the Business Register identification number, the records contain the company name and address, the industry classification, the geographic code, the legal form of organization, and some operating data (receipts, payroll, etc.). By matching the EINs assigned to each establishment with employees to the Business Register identification numbers, the Census Bureau links and identifies affiliations for parent companies, subsidiary firms, and their establishments. The operating data are from the Census Bureau’s Company Organization Survey (COS) and from IRS records for employment and payroll. The COS consists of a “Report of Organization” questionnaire that is sent annually to all multi-establishment companies with 50 or more employees and to a sample of smaller multi-establishment companies. The Business Register also uses information from the Social Security Administration (SSA) and the Bureau of Labor Statistics to develop the mailing list for the Economic Census.

Report forms and sampling

The 1997 Economic Census covered over 14 million establishments. In order to reduce respondent burden, whenever possible, Census forms were not sent to the smallest establishments; rather, their classification was determined and their data were compiled from administrative records provided by IRS and SSA. If the Census Bureau lacked sufficient information to classify an establishment into a six-digit NAICS category, that establishment was sent a “Classification Form.” This form asked for only a limited number of identification and data items for classification purposes, and the rest of the data was compiled from administrative records. The remainder of the respondents to the Census received either the short or the long survey form.

The long form was sent to the establishments of all multi-establishment companies and to the largest single-establishment companies. These establishments were subject to an intense follow-up collection effort in order to ensure as complete coverage as possible.

In order to minimize respondent burden, the smaller single-establishment firms were sampled. The universe of these establishments was stratified and sampled using formulas designed to enable the Census Bureau to compile reliable estimates for industries at specified geographic levels. Cutoffs were established so that the sampled establishments would account for only about 3 percent of the total receipts for each industry.

As an example, the Economic Census report on Non-employer Statistics shows about 10.8 million establishments (employer and non-employer) in the services industries. The mail out for these industries broke down as follows: 662,000 companies received the classification form, 330,000 multi-establishment companies and 651,000 large single-establishment companies received long forms, and about 49,000 establishments (about 3.1 percent) were sampled to represent the remaining 1.55 million smaller single-establishment companies.

The Census Bureau published Economic Census data reports for all the major two-digit NAICS categories except for agriculture, forestry, fishing, and hunting and for public administration. For mining, construction, and manufacturing, reports on industry statistics, product statistics, and materials consumed were issued at the six-digit NAICS industry level. For the other major sectors, reports by revenue lines or product lines were published. For more detail on the Census data used for each industry, see the appendix table at the end of this handbook.

Because payroll tax records are at the heart of the Census Bureau's system for keeping track of businesses between censuses, non-employers do not receive Economic Census forms, and their statistics are not reflected in any of the core business statistics reports. However, statistics for the number of non-employer establishments and the value of their receipts have been tabulated and separately published in Economic Census years beginning with 1972. These statistics are derived primarily from administrative records of the IRS. Most of the non-employer establishments are sole proprietorship businesses (that is, the "self-employed") that file Form 1040, Schedule C, "Profit or Loss from Business." The rest are partnerships and corporations that file tax returns but report no paid employees. These partnerships and corporations are covered in the Census Bureau's annual *County Business Patterns* report, which is discussed later.

Transportation surveys

The Census Bureau conducts two transportation surveys as adjuncts to the Economic Census: The Vehicle Inventory and Use Survey (VIUS) and the Commodity Flow Survey (CFS). Unlike the Economic Census itself, these surveys are based solely on samples, and the results of these surveys are not published as part of the industry-specific series of releases in the Economic Census. In addition, the sampling for the VIUS is not based on a list of establishments or firms, and the sampling for the CFS is only partly based on a list of establishments.

The VIUS began as the "Truck Inventory and Use Survey," which was part of the 1963 Census of Transportation. For 1997, the survey was renamed and the scope was expanded to include pickups, minivans, and sport-utility vehicles, which many states permit to be registered as either trucks or cars. Using an estimated 75 million motor vehicle registrations supplied by the states, R.L. Polk and Company selected and provided to the Census Bureau a stratified probability sample of 130,500 trucks and trailers in five body-type categories—pickup, van, single-unit light truck (26,000 pounds gross vehicle weight or less), single-unit heavy truck, and truck tractor. The Census Bureau then sent survey forms to the truck owners (including fleet owners); the questions covered physical characteristics (vehicle type, average weight, type and size of body, etc.) and

operational characteristics (number of trucks operated, vehicle miles during 1997, use of vehicle, types of commodities carried, etc.).

In 1990, the Census Bureau began a joint effort with the Department of Transportation that resulted in the CFS, which was first conducted for 1993. This program improved upon an earlier Census Bureau program called the Commodity Transportation Survey, which produced measures of the flow of goods and materials by mode of transportation from 1963 to 1977.

The 1997 CFS involved a sample of approximately 100,000 domestic manufacturing, mining, wholesale, and selected retail establishments. The sample was selected from a universe of about 800,000 establishments in these industries, which included auxiliary units of multi-establishment companies. Shipments were classified using the Standard Classification of Transported Goods system (SCTG). This system is partly based on the Harmonized Commodity Description and Code System, the system used in the United States for exports, imports, and customs. The survey respondents provided information on the value and classification of the shipment, the shipment weight, and the destination of the shipment (including whether for domestic use or for export).

Cautions about the Economic Census data

The Economic Census data are the best data available for the construction of I-O tables, but, as with all statistics, they are not perfect. Like all statistics, they are subject to measurement error, and additionally, they do not cover all the aspects of economic activity that we want to include in the I-O tables.

As indicated earlier, the Economic Census uses sampling for small businesses, and sampling itself involves errors. Moreover, as the Census Bureau statement below spells out, there are some prevalent measurement problems other than sampling:

“All surveys and censuses are subject to non-sampling errors. Non-sampling errors can be attributed to many sources: inability to obtain information about all of the companies in the sample; inability or unwillingness on the part of respondents to provide correct information; response errors; definition difficulties; differences in the interpretation of questions; mistakes in recording or coding the data; and other errors of collection, response, coverage, and estimation for non-response.”³

In particular, there are three non-sampling problems that affect the Economic Census, all of which result in shortfalls of the statistics from true counts. Two of these problems are “adjusted for” by BEA in constructing the I-O tables. First, as mentioned earlier, the Census Bureau does not include the values for non-employers in the published tables. Second, the Business Register, which provides the universe of establishments used by the Economic Census, is based on administrative records from the IRS and SSA. The accuracy of these records depends upon the compliance of businesses with the tax and social insurance laws, and not all businesses comply. The shortfalls that result are termed “tax misreporting” errors, which relate to economic flows that stem from legal activities but are missed because of noncompliance.

The third non-sampling issue, for which BEA does not make an adjustment, is illegal activities. Activities that are against the law, such as gambling in some states, are not covered in the Economic Census or in the I-O tables (or in most other economic data). By their nature, there are no source data for illegal activities, and they

³ U.S. Census Bureau, *Annual Capital Expenditures, 1999*, page C-4.

are excluded from the national accounts of the United States, although SNA 1993 recommends that illegal activities should be covered in national accounts.

Most of the major sectors of the economy are covered by the 1997 Economic Census. However, for the farm sector, a separate Census of Agriculture is conducted by the U.S. Department of Agriculture; it covers farming but excludes most agricultural services, forestry, fishing, and hunting. Public administration is partly covered by a separate Census of Governments, conducted by the Census Bureau.

In addition, the 1997 Economic Census does not cover a number of economic activities within the other major sectors. In transportation and warehousing, the U.S. Postal Service, large certificated passenger air transportation, and all rail transportation are excluded. In finance and insurance, funds and trusts are excluded. In professional, scientific, and technical services, landscape architecture and veterinary services are excluded. In educational services, elementary and secondary schools, colleges, and professional schools are excluded. In other services (except public administration), pet care, labor, political, and religious organizations, and private households are excluded.

As has been noted, the Economic Census does not cover all the economic activities and all the economic flows needed for the I-O tables. For this reason, BEA supplements the Economic Census with other sources of data, many of which are also from the Census Bureau.

Other Census Bureau programs

BEA draws upon various annual surveys of selected industries that are conducted by the Census Bureau— principally surveys covering manufacturing, wholesale trade, retail trade, and services. In addition, BEA uses data from *County Business Patterns*, the Business Expenditure Survey, the construction statistics program, and two programs covering government activities.

Annual industry surveys

In preparing the annual surveys, the Census Bureau selects samples of companies based on the Business Register. As was done in selecting the sample of the smaller single-establishment companies for the Economic Census, the Bureau uses stratified probability sampling to select the recipients for the annual surveys in manufacturing (Annual Survey of Manufactures or ASM), wholesale trade (Annual Wholesale Trade Survey or AWTS), retail trade (Annual Retail Trade Survey or ARTS), and selected services (Services Annual Survey or SAS). These surveys collect fewer data items than are collected in the corresponding Economic Census questionnaires, but they do provide some data that are not included in the Census.

New samples for the annual surveys are usually selected after each Economic Census. For example, a new sample for wholesale trade, based on the 1997 Economic Census, was introduced for the 1999 AWTS. In order to maintain the accuracy of the samples, the Census Bureau adds new companies on a regular basis. These “births,” which are identified using new EIN numbers issued by IRS and kind-of-business classifications provided by the SSA, are added to the universe from which the sample is drawn about 9 months after the new business begins operation. For the ASM, the Bureau also uses the annual Company Organization Survey to identify new establishments of multi-establishment companies covered by the Business Register.

The manufacturing and retail surveys cover the same universe as the corresponding Census canvasses, but the wholesale trade and services surveys have covered only part of the corresponding Census universes. In

the future, the Census Bureau is planning to cover more industries and to collect more detailed information in these surveys.

County Business Patterns

County Business Patterns (CBP) is a publication or series rather than a Census Bureau survey. The basic data for the series are extracted from the Business Register, from the Company Organization Survey, from various Census Bureau programs, such as the four annual surveys described above, and from the administrative records of the IRS and the Social Security Administration. CBP contains data only for the number of establishments, for employment, and for payrolls, but, during the Census years, it does include establishments with no payrolls. It covers partnerships and corporations that have no employees, but it does not cover the broad category of “Self employed” activity—filings of IRS Form 1040, Schedule C, “Income and Loss for Business.” CBP also does not cover domestic service workers, railroad employees, agricultural production workers, most government employees, and employees on ocean-borne vessels or in foreign countries.

Business Expenses Survey

The Business Expenses Survey (BES, formerly known as the Business Expenditures Survey) covers companies classified as merchant wholesalers and retailers and companies in selected service industries. This survey is conducted every 5 years as part of AWTS, ARTS, and SAS, but it is on separate forms. Expenses include payroll, employer cost for fringe benefits, cost of contract labor, taxes and license fees, depreciation and amortization charges, lease and rental payments, telephone and other purchased communications, purchased utilities, and various other expenses. For 2002, partly as a result of BEA recommendations, the industry coverage of the BES was expanded and more detailed expense questions were included. In 2007, the SAS will begin to cover expenses for services and will replace the BES as the source for these data. Additionally, the SAS will collect a limited set of expenses for services annually.

Value of construction put in place

The value of construction put-in-place program (VPIP) encompasses the monthly and annual surveys that measure construction activity. “Construction” as covered by this program differs from the construction industry of the Economic Census in a fundamental way—the Census of Construction measures the industry on the basis of reports by establishments primarily *engaged* in the construction business, whereas much of the VPIP program measures activity by collecting reports from the *owners* of the construction projects. Thus, the VPIP captures a number of important parts of construction activity that are not included in the Census—such as non-employer construction, architectural and engineering costs, own-account construction, homeowner construction, and construction done as a secondary source of revenue by non-construction establishments.

The Census Bureau’s estimates of the value of construction put in place are prepared using several different methods. The estimates for private nonresidential buildings, for state and local government structures, and for multi-unit residential buildings are derived from data collected using stratified samples of construction projects, while the estimates for single-unit residential buildings are derived indirectly.

For private nonresidential buildings and for state and local government structures, the projects that are sampled are selected from a list of contract awards for construction projects valued at \$75,000 or more that is compiled by the F.W. Dodge Division of the McGraw-Hill Information Systems Company; for geographic areas not covered by the Dodge list, the Census Bureau’s sampling is partly based on building permit

notifications. Each month, about 8,500 projects are included in the private nonresidential buildings sample, and about the same number are included in the state and local government sample. The results of these samples are adjusted upward by 27 percent and 5 percent, respectively, to account for the under-coverage that results from the \$75,000 cutoff for the samples. These adjustment percentages are based on periodic, in-depth surveys of construction activity by the Census Bureau. The results for the industrial buildings category are further adjusted by benchmarking the tabulated estimates to the Census Bureau's Annual Capital Expenditures Survey levels for 1992, 1994, and 1998. The upward adjustment of 27 percent for the under-coverage of private nonresidential projects is considered a potential source of non-sampling error for this survey. Another potential source of error is the need to impute data for non-respondents and for late and inconsistent reports.

For multi-unit residential buildings, the sample projects are selected from the Census Bureau's Housing Starts Survey (see below). Each month about 2,500 projects are sampled.

The estimates for single-family residential value put in place are derived by an indirect method that uses data from a comprehensive Census Bureau program that covers residential housing. This program collects data beginning with a sample survey of building permits issued by permit issuing places and continuing with sample surveys of housing starts, completions, and sales. The Census Bureau prepares the value put in place estimates by first multiplying the total number of housing units started in a month by the average value of these units (excluding the value of undeveloped land) to compute the total value of units started. Then, using "progress patterns" derived from periodic studies, this total value is distributed, month-by-month, across the period that an average house takes to build.

The construction-put-in-place estimates for "other construction" are from a variety of sources covering farms, utilities, communications, and Federal Government structures.

Government activities

The Census Bureau's Census of Governments is the primary source of the data on the financial activities of state and local governments. This Census is not considered to be part of the Economic Census, but it is conducted in the same years. The data collected in the Census of Governments represent direct summations of the individual units canvassed; no sampling and no estimation methodology is employed other than imputations for non-response. The 1997 Census identified more than 87,000 local government units. In addition, the Bureau conducts the annual Survey of Government Finances (GF) that covers all state governments and a sample of local governments. For 2000, the survey sample was drawn from the 1997 Census of Governments and included all county governments with resident populations of 100,000 or more, all municipalities with populations of 75,000 or more, all independent school districts with enrollments of 10,000 or more, and certain other governments that met specific criteria. Other government entities, such as townships, are covered by sample.

Federal Government data are derived by the Census Bureau from the Budget of the United States and related documents.

Other important sources of I-O data

The preparation of the I-O tables also relies on the incorporation of data from sources other than the Census Bureau. These sources include the statistical programs of the Department of Agriculture, the Department of Energy, Department of Education, and the Securities and Exchange Commission, insurance

industry data from the A.M. Best Company, and estimates from BEA's national income and product accounts and international transactions accounts.

Department of Agriculture

The primary source for the I-O estimates of farm output is "cash receipts from farm marketings," which is compiled from various sources by the Economic Research Service (ERS) of the U.S. Department of Agriculture (USDA). The I-O estimates of farm expenses are based on the Farm Costs and Returns Survey, which is an annual survey that collects financial data on farm businesses. This survey is a cooperative project of ERS and the USDA's National Agricultural Statistics Service.

Department of Energy

The Energy Information Administration (EIA) of the U.S. Department of Energy compiles a variety of data on energy markets. An annual census of electric power industry participants collects data on power production and sales from approximately 4,900 respondents. About 3,300 of these respondents are electric utilities; the other respondents include independent power producers, power marketers, and the unregulated subsidiaries of electric utilities. The EIA's annual natural gas survey covers producers that deliver gas directly to customers, pipelines (interstate and intrastate), and investor- and municipally owned gas distributors. About 1,700 entities are included in the survey. Because responses to the electric and natural gas surveys are required by law, the results are considered to be universe counts. The EIA data provide the basis for the I-O allocations of energy consumption to final-use categories.

Securities and Exchange Commission

The FOCUS Report (Financial and Operating Combined Uniform Single Report) is an annual report required by the Securities and Exchange Commission (SEC) of all security and commodity agents and brokers that are subject to certain minimum capital requirements established by the Securities and Exchange Acts of 1933 and 1934. The reports are filed by these companies through the exchanges responsible for regulating and overseeing their activity (such as the New York Stock Exchange). The information collected in the report includes balance sheet, revenue, expense, employment, transactions, and sales data. Aggregated data are not published by the SEC, but tabulations are made available to BEA. *The Annual Report of the Securities and Exchange Commission* also provides a variety of data on the activities of the securities industry in the United States. The SEC data are used in conjunction with the Economic Census data.

A.M. Best Company

The A.M. Best Company rates individual insurance companies, and as part of this work, compiles a variety of financial and operating data from about 6,000 insurance companies in the United States. These companies include property and casualty, life, and health insurance carriers, health maintenance organizations, and other insurance companies. "The primary source of information is each insurance company's annual and (if available) quarterly financial statements as filed with the regulator of the state in which the statements are prepared in accordance with statutory accounting requirements established by the National Association of Insurance Commissioners and administered by each state."

Department of Education

The Department of Education's National Center for Education Statistics (NCES) continues the statistical studies and surveys conducted by the U.S. Office of Education since 1870. The annual *Digest of Education Statistics* provides summary data on pupils, staff, and finances—including government expenditures—at the elementary, secondary, and higher education levels. The NCES data are based on reports from administrators of educational institutions and of state and local agencies having jurisdiction over education. The NCES includes in its surveys specialized vocational, trade, business, and correspondence schools as well as nursery schools and kindergartens that are part of regular elementary schools. These statistics are used for the I-O accounts to supplement the data collected in the Census of Governments.

Other parts of the national economic accounts

Two major programs maintained by BEA, the national income and product accounts (NIPAs) and the international transactions accounts (ITAs) are also principal elements of the national economic accounts of the United States. The NIPAs and the ITAs are closely connected to the I-O accounts, and many of the major aggregates that appear in the three sets of accounts are similar or identical. Thus, the I-O accounts draw directly upon certain flows from the NIPAs and the ITAs. In addition, many of the detailed NIPA components are benchmarked periodically to the I-O accounts. These interdependencies help to keep the three sets of accounts consistent with one another.

The NIPAs are compiled from a wide variety of sources, including many of the sources described in this paper. Although the I-O accounts are used extensively as benchmarks for the corresponding NIPA flows, a number of the NIPA estimates are similarly adopted directly for use in the I-O tables. Examples include the NIPA imputations for non-market activities and some of the NIPA components for motor vehicle production.

The ITAs are a statistical summary of a country's transactions with the rest of the world. The ITA estimates of exports and imports of goods and services, modified to appropriate concepts and coverage, are incorporated into both the NIPAs and the I-O accounts.