Introduction to the Economic Census

PURPOSES AND USES OF THE ECONOMIC CENSUS

The economic census is the major source of facts about the structure and functioning of the nation's economy. It provides essential information for government, business, industry, and the general public. Title 13 of the U.S. Code (Sections 131, 191, and 224) directs the U.S. Census Bureau to take the economic census every 5 years, ending in "2" and "7."

The economic census furnishes an important part of the framework for such composite measures as the gross domestic product estimates, input/output measures, production and price indexes, and other statistical series that measure short-term changes in economic conditions. Specific uses of economic census data include the following:

- Policymaking agencies of the federal government use the data to monitor economic activity and assess the effectiveness of policies.

- State and local governments use the data to assess business activities and tax bases within their jurisdictions and to develop programs to attract business.

- Trade associations study trends in their own and competing industries, which allows them to keep their members informed of market changes.

- Individual businesses use the data to locate potential markets and to analyze their own production and sales performance relative to industry or area averages.

BASIS OF REPORTING

The economic census is conducted on an establishment basis. A company operating at more than one location is required to file a separate report for each store, factory, ship, or other location. Each establishment is assigned a separate industry classification based on its primary activity and not that of its parent company.

AVAILABILITY OF ADDITIONAL DATA

All results of the 2007 Economic Census are available on the American FactFinder Internet site <www.factfinder.census.gov>. The American FactFinder system at the Web site allows selective retrieval and downloading of the data. For more information, including a description of reports being issued, see the Web site; write to the U.S. Census Bureau, Washington, DC 20233-8300; or call the Customer Services center at 1-800-923-8282 or 301-763-4636.

HISTORICAL INFORMATION

The economic census has been taken as an integrated program at 5-year intervals since 1967 and before that for 1954, 1958, and 1963. Prior to that time, individual components of the economic census were taken separately at varying intervals.

The economic census traces its beginnings to the 1810 Decennial Census, when questions on manufacturing were included with those for population. Coverage of economic activities was expanded for the 1840 Decennial Census and subsequent censuses to include mining and some commercial activities. The 1905 Census of Manufactures was the first time a census was taken apart from the regular decennial population census. Censuses covering retail and wholesale trade and construction industries were added in 1930, as were some service trades in 1933.

Censuses of construction, manufacturing, and the other business service censuses were suspended during World War II.

The 1954 Economic Census was the first census to be fully integrated, providing comparable census data across economic sectors and 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 agencies. Since 1963, administrative records have also been used to provide basic statistics for very small firms, reducing or eliminating the need to send them census report forms.

The range of industries covered in the economic censuses expanded between 1967 and 2007. The census of construction industries began on a regular basis in 1967; and the scope of service industries, introduced in 1933, was broadened in 1967, 1977, and 1987. While a few transportation industries were covered as early as 1963, it was not until 1992 that the census broadened to include all of transportation, communications, and utilities. Also, new for 1992 was coverage of financial, insurance, and real estate industries. With these additions, the economic census and the separate census of governments and census of agriculture collectively covered roughly 98 percent of all economic

activity. In 2002, there was new coverage in the following four industries classified in the Agriculture, Forestry, and Fishing sector under the Standard Industry Classification (SIC) system: landscape agricultural services, landscaping services, veterinary services, and pet care services.

Printed statistical reports from the 1997 and earlier economic censuses provide historical figures for the study of long-term time series and are available in some large libraries. CD-ROMs issued from the 1987, 1992, and 1997 Economic Censuses contain databases including all or nearly all data published in print, plus additional statistics, such as Zip Code statistics, published only on CD-ROM.

SOURCES FOR MORE INFORMATION

More information about scope, coverage, and classification system for each economic census and related surveys is published in the "What's New for 2007" section of the 2007 Economic Census Web site at <www.census.gov/econ /census07/www/whats_new_for_2007/>. Data items and publications for each economic census and related surveys are published as part of the 2007 Economic Census on American FactFinder at <www.factfinder.census.gov>. More information on the methodology, procedures, and history of each economic census is published in the "Methodology" section of the 2007 Economic Census Web site at <www .census.gov/econ/census07/www/methodology/>.

2007 Commodity Flow Survey

GENERAL

The 2007 Commodity Flow Survey (CFS) is undertaken through a partnership between the U.S. Census Bureau, U.S. Department of Commerce and the Research and Innovative Technology Administration (RITA), Bureau of Transportation Statistics (BTS), U.S. Department of Transportation. This survey produces data on the movement of goods in the United States. It provides information on commodities shipped, their value, weight, and mode of transportation, as well as the origin and destination of shipments of commodities from manufacturing, mining, wholesale, and select retail and services establishments. The CFS data are used by policy makers and transportation planners in various federal, state, and local agencies for assessing the demand for transportation facilities and services, energy use, and safety risk and environmental concerns. Additionally, business owners, private researchers, and analysts use the CFS data for analyzing trends in the movement of goods, mapping spatial patterns of commodity and vehicle flows, forecasting demands for the movement of goods, and determining needs for associated infrastructure and equipment. The CFS was conducted previously in 2002, 1997, and 1993.

SCOPE

Industry Coverage

The 2007 CFS covers business establishments with paid employees that are located in the United States and are classified by the 2002 North American Industry Classification System (NAICS) in mining, manufacturing, wholesale trade, and selected retail and services trade industries—namely, electronic shopping and mail-order

houses, fuel dealers, and publishers. Additionally, the survey covers auxiliary establishments (i.e., warehouses and managing offices) of multiestablishment companies. For the 2007 CFS, an advance survey (precanvass) of approximately 40,000 auxiliary establishments was conducted to identify those with shipping activity. Surveyed establishments that indicated undertaking shipping activities and the nonrespondents to the precanvass were included in the CFS sample universe.

The survey does not cover establishments classified in transportation, construction, and most retail and services industries. Farms, fisheries, foreign establishments, and most government-owned establishments are also excluded.

In-scope industries for the 2007 CFS were selected based on the 2002 version of the NAICS, while the industries included in the 2002 CFS were selected based on the 1997 version of the NAICS. For the 1993 CFS and the 1997 CFS, the industries were selected based on the 1987 Standard Industrial Classification (SIC) system. Although attempts were made to maintain similar coverage among the SIC-based surveys (1993 and 1997) and the NAICS-based surveys (2002 and 2007), there have been some changes in industry coverage due to the conversion from SIC to NAICS. Most notably, the logging industry changed from an in-scope Manufacturing SIC code (SIC 2411) to an out-of-scope sector of Agriculture, Forestry, Fishing, and Hunting under NAICS 1133. Also, publishers were reclassified from Manufacturing Division (SIC 2711, 2721, 2731, 2741, and part of 2771) to information sector (NAICS 5111 and 51223) and were excluded from the 2002 CFS. The 2007 CFS, however, includes publishers and retail fuel dealers. Therefore, data users are urged to use caution when comparing 2007 CFS estimates with estimates from prior years.

The NAICS industries covered in the 2007 CFS are listed in the following table:

NAICS code	Description
212	Mining (except oil and gas)
311	Food manufacturing
312	Beverage and tobacco product manufacturing
313	Textile mills
314	Textile product mills
315	Apparel manufacturing
316	Leather and allied product manufacturing
321	Wood product manufacturing
322	Paper manufacturing
323[1]	Printing and related support activities
324	Petroleum and coal products manufacturing
325	Chemical manufacturing
326	Plastics and rubber products manufacturing
327	Nonmetallic mineral product manufacturing
331	Primary metal manufacturing
332	Fabricated metal product manufacturing
333	Machinery manufacturing
334	Computer and electronic product manufacturing
335	Electrical equipment, appliance, and component manufacturing
336	Transportation equipment manufacturing
337	Furniture and related product manufacturing
339	Miscellaneous manufacturing
423[2]	Wholesale trade, durable goods
424[2]	Wholesale trade, nondurable goods
4541	Electronic shopping and mail-order houses
45431	Fuel dealers
4931[3]	Warehousing and storage
5111	Newspaper, periodical, book, and directory publishers
51223[4]	Music publishers
551114[5]	Corporate, subsidiary, and regional managing offices

[1] Excludes Pre-Press Services (NAICS 323122).
[2] Excludes manufacturers sale offices, agents and brokers, and own brand importers.
[3] Includes only captive warehouses that provide storage and shipping support to a single company. Warehouses offering their services to the general public and other businesses are excluded.
[4] For tabulation and publication purposes, NAICS 51223 is grouped with NAICS 5111.
[5] Includes only those establishments in NAICS 551114 with shipping activity.

Note: Other industry areas that are not covered, but may have significant shipping activity, include agriculture and government. For agriculture, specifically, this means that the CFS does not cover shipments of agricultural products from the farm site to the processing centers or terminal elevators (most likely short-distance local movements) but does cover the shipments of these products from the initial processing centers or terminal elevators onward.

Shipment Coverage

The CFS captures data on shipments originating from select types of business establishments located in the 50 states and the District of Columbia. The survey does not cover shipments originating from business establishments located in Puerto Rico and other U.S. possessions and territories. Shipments traversing the United States from a foreign location to another foreign location (e.g., from Canada to Mexico) are not included, nor are shipments from a foreign location to a U.S. location. However, imported products are included in the CFS at the point that they leave the importer's initial domestic location for shipment to another location. Shipments that are shipped through a foreign territory with both the origin and destination in the United States are included in the CFS data. The mileages calculated for these shipments exclude the international segments (e.g., shipments from New York to Michigan through Canada do not include any mileage for Canada). Export shipments are included in the 2007 CFS. See the "Mileage Calculation" section for additional detail on how mileage estimates were developed.

Information Collected

Establishments in the 2007 CFS were asked to provide the following information for a sample of their outbound shipments:

- Shipment ID number
- Shipment date (mm/dd)
- Shipment value
- Shipment weight in pounds
- Commodity code from Standard Classification of Transported Goods (SCTG) list
- Commodity description
- Hazmat flag (United Nations [UN] or North American [NA] number)
- U.S. destination (city, state, Zip Code)—gateway for export shipment
- Modes of transportation
- Foreign destination (exports only—city, country)
- Export mode

By CFS definition, a shipment is a single movement of goods, commodities, or products from an establishment to a single customer or to another establishment owned or operated by the same company as the originating

establishment (e.g., a warehouse, distribution center, or retail or wholesale outlet). Full or partial truckloads were counted as a single shipment only if all commodities on the truck were destined for the same location. For multiple deliveries on a route, the goods delivered at each stop were counted as one shipment. Interoffice memos, payroll checks, or business correspondence were not included in the CFS. Likewise, the CFS does not include shipments of refuse, scrap paper, waste, or recyclable materials unless the establishment was in the business of selling or providing these materials.

Data Collection Method

The CFS survey was conducted through a mailout/mailback with an electronic reporting option. Each establishment selected into the 2007 CFS sample was mailed four questionnaires—one during each calendar quarter of year 2007. The four questionnaires were the same, except for the addition of Item H—"Third-Party Logistics" to the fourth quarter questionnaire (see Appendix E for a copy of the questionnaire). The establishments were asked to provide shipment information about a sample of their individual outbound shipments during a prespecified 1-week period in each calendar quarter. Each of the 4 weeks was in the same relative position of the calendar quarter. Respondents who were interested in electronic reporting could request and use a secure electronic reporting option.

Mileage Calculations

General

The distance traveled by each freight shipment sampled for the 2007 CFS was estimated using routing algorithms and an integrated, intermodal transportation network that has been developed and updated expressly for this purpose. Each shipment record contained the ZIP Codes of shipment origin and destination (O-D pair) and the mode or modal sequence required by the routing algorithm for distance estimation. Each record also contained information on type of commodity moved, its weight, dollar value, and hazardous materials (hazmat) status. For each export shipment, the U.S. port of exit (POE) was also identified, along with foreign destination city and country.

Valid and accurate O-D pair ZIP Codes were essential elements needed for estimating the travel distance of any shipment. For shipments with missing or invalid geographic data elements, such data elements were imputed if there was a high probability of accurate correction (e.g., a specific destination city/state was provided to allow a ZIP Code to be imputed for the shipment). Follow-up contact with respondents was required when the missing information could not be reasonably imputed.

GeoMiler—software to measure the distance traveled by commodity shipments

Mileages were computed using GeoMiler, a routing tool developed in partnership with MacroSys Research and Technology (MacroSys) specifically for CFS mileage calculations. This software tool used current Geographic Information System (GIS) technology and spatial multimodal network databases. It integrated map-visualization features with route solvers to handle many alternative multimodal combinations. This tool used algorithms that found the "best path" over spatial representations of the U.S. highway, railway, waterway, and airway networks. For waterborne export shipments, GeoMiler used a waterborne commerce database from the U.S. Army Corps of Engineers to route freight originating in the United States via the deep sea (ocean). For airborne export shipments, GeoMiler used a newly developed air export network from the RITA /BTS Office of Airline Information (OAI).

For a domestic shipment, the mileage was calculated between the centroid (center of the geographic area) of the U.S. origin ZIP Code and the centroid of the destination ZIP Code. The route between an O-D pair was composed of a series of links and an impedance factor was assigned to each link (impedance is defined as a function of distance and travel time). Given a mode or modal sequence, the role of GeoMiler was to find that "best path" route which minimized the summed total impedance of the links between the specified O-D pair.

The mileage for shipments within a ZIP Code (matching O-D pair) was calculated by means of a formula that approximated the longest distance within the boundaries of that ZIP Code.

For multimodal shipments (those shipments involving more than one mode, such as truck-rail shipments), spatial joins (intermodal transfer links) were added to the network database to connect the individual modal networks together for routing purposes. An intermodal terminals database and a number of terminal transfer models were developed at RITA/BTS to identify likely transfer points for freight. An algorithm was used to find the minimum impedance path between a shipment's origin ZIP Code to the transfer point and then from the transfer point to the destination ZIP Code. The cumulative length of the spatial joins plus links on this path provided the estimated distances used in CFS mileage computations.

The mileage for an export shipment was calculated between the centroid of the U.S. origin ZIP Code and the border crossing on the path of minimum impedance to the foreign destination country (foreign city in the case of Canada and Mexico). For all exports, a POE was found (seaport, airport, or border crossing) if not already provided

by the respondent. However, only the portion of mileage measured within U.S. borders was included as domestic mileage in the CFS estimates.

Methodological Changes From Past Commodity Flow Surveys

Improvements in routing logic—particularly for highway, railway, and airway—were built into the GeoMiler software. Through the use of GeoMiler, distance calculations for freight transportation were refined to better estimate the actual shipment mileage. In particular, GeoMiler introduced an overall concept change in algorithm for:

- Highway routing

- Railway routing

- Waterway routing on export shipments

- Airway routing on both domestic and export shipments

- Routing in Alaska

Highway routing

To estimate highway mileage, GeoMiler considered the functional class of highway so that the "best path" was the quickest path based on the likely use of interstate and other major roadways and not necessarily the shortest path. The "quickest path" algorithms in terms of travel time incorporated the following hierarchical functional class of highway:

1. Interstate route

2. U.S. route

3. State route

4. County or other local route

Hence, the 2007 highway model favored the selection of the higher-order routes (interstate) rather than lower-order routes (state and county), which provided a more realistic path for freight movement via highway.

The use of these selection criteria, coupled with a more extensive highway network, produced higher mileages (an average of about 3 percent) on highway shipments of distances less than 300 miles.

Railway routing

To estimate railway mileage, GeoMiler selected a "single best path" from those calibrated with route density information obtained from sampled 2005 rail waybills, assigned a specific railroad company at shipment origin, and considered ownership, trackage rights, and interlining (the transfer from one railroad company's trackage network to that of another). This procedure resulted in an average of about

3 percent higher mileages on railway shipments than the procedure used to estimate the mileage for the 2002 CFS.

Waterway routing on export shipments

The mileage estimates for export shipments in the 2007 CFS include the total distance from the shipment origin up to the exit port on the U.S. territorial borders.

For waterway exports via inland waterways (e.g., the Mississippi River), the mileage calculation included the distance from an inland water POE (such as St. Louis) to a coastal POE (such as New Orleans), and this extra inland waterway mileage was included in the total domestic mileage for this shipment.

The use of these selection criteria on waterway exports via inland waterways resulted in negligible changes to mileages on inland waterways.

For waterway exports via the Great Lakes (Lakes Erie, Huron, Michigan, Ontario, Superior), the mileage calculation was continued from a Great Lakes POE (such as Chicago, Cleveland, Duluth) to the line of demarcation between the United States and Canada (drawn within each of the Great Lakes except Michigan), and this extra Great Lakes mileage was included in the total domestic mileage for this shipment.

The use of these selection criteria on waterway exports via the Great Lakes produced much higher (an average of about 15 percent) mileages on Great Lakes waterways.

Airway routing on both domestic and export shipments

To estimate domestic airway mileage, GeoMiler selected the "single best path" from the three airports closest to the origin ZIP Code to the three airports closest to the destination ZIP Code. Criteria for route selection were calibrated with 2005 air route information provided by the OAI at RITA/BTS. As in the past, to be acceptable, an airway routing must generate at least twice as many airway miles as highway miles (the ratio of air/truck miles should be at least 2 to 1) in order to reach the destination.

Consequently, the GeoMiler chose the most likely air route from those routes that were nonstop (direct) from airport facilities with higher cargo lifts (weight transported between two airports) based on the OAI air cargo data.

For airway exports, the total domestic mileage included the mileage from the inland POE to a coastal point on the U.S. landmass (where the air flight path to a foreign country intersected with the U.S. territorial border).

The use of these selection criteria on both domestic airway and airway exports via inland airports, coupled with a more extensive airway network, produced much higher (an average of about 12 percent) mileages on airways.

Routing in Alaska

Much of Alaska was inaccessible by any mode of transportation except "bush" airplanes. A "bush" airplane is a small aircraft that usually carries no more than four people, including the "bush" pilot. For the 2007 CFS, a network of mini airports, more extensive than that used previously in the 2002 CFS, was incorporated into intrastate travel within Alaska to accommodate "short-hop" flights where no established roads existed, especially in cases where the respondent reported a mode of highway.

Mileage Data for Pipeline Shipments

For pipeline shipments, ton-miles and average miles per shipment are not shown in the data files. For most of these shipments, the respondents reported the shipment destination as a pipeline facility on the main pipeline network. Therefore, for the majority of these shipments, the resulting mileage represented only the access distance through feeder pipelines to the main pipeline network and not the actual distance through the main pipeline network. Pipeline shipments are included in the U.S. totals for ton-miles and average miles per shipment. For security purposes, there is no pipeline network available in the public domain with which to route petroleum-based products. Hence, any modal distance, either single or multi, involving pipeline was considered as solely pipeline mileage from origin ZIP Code to destination ZIP Code and calculated to equal great circle distance (GCD). GCD is defined as the shortest distance between two points on the earth's surface, taking into account the earth's curvature.

Availability of Additional Transportation Data

Users of transportation data may be especially interested in the reports from the Service Annual Survey, which can be found on the Census Bureau's Web site at <www.census.gov/services>. This survey covers firms with paid employees that provide commercial motor freight transportation and public warehousing services. Data collected include operating revenue and operating revenue by source, percentage of motor carrier freight revenue by commodity type, size of shipments handled, length of haul, and vehicle fleet inventory.