

Profile of the Commodity Flow Survey

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Predecessor to CFS: CTS

1963, 67, 72 - CTS covered only shipments of more than 25 miles made by manufacturing establishments (excluded AK and HI)

1977 – covered entire U.S.; included shipments of 25 miles or less; requested value of shipments to adjust CTS to COM

1983 – did not publish results because estimates had substantial bias

1987 – conducted research, but no survey

Survey History: From CTS to CFS

- Expand industry coverage
- Collect data during reference year
- Estimate shipment distances using modeled transportation network
- Conduct by mail as part of the Economic Census (mandatory)

Survey Objectives

- Measure the contents, modal usage, distance-shipped, and geography of outbound shipments made by employer establishments located in the United States
- Cover as much of the U.S. freight transportation activity as possible
- Publish value, tons, ton-miles by 1-, 2-, and 3-dimensional summaries

CFS Industry Coverage

Employer establishments located in the U.S. and classified in the following industries:

- Manufacturing
- Mining
- Wholesale
- Retail mail-order houses
- Auxiliary warehouses and administrative offices

Industries Not Covered in the CFS

- Most retail
- Services
- Transportation
- Agriculture, forestry, fishing
- Government
- Construction
- Oil and gas extraction

CFS Shipment Coverage

- A shipment is an individual movement of commodities from an originating establishment to one customer or to another location of the same multiple establishment firm
- Imports not included until they reach the first domestic shipper covered by CFS
- Shipments “in-transit” through the U.S. are not captured (e.g., Canada to Mexico)

Sample Design Basics

3 Stages – Establishments, weeks, shipments

- (1) Establishments selected from a frame constructed from the Census Bureau's Business Register
- (2) Each establishment systematically assigned to report for 1 week in each calendar quarter of the year
- (3) Respondents construct frame and select sample of shipments for the week

Sampling Establishments

- Stratified simple random sample
- Strata defined by geography, industry, and size of establishment
- Industry serves as a proxy for commodity
- Estimated annual value of shipments used as the sampling MOS

Sampling Weeks

- Establishments sorted by geography, industry, and size variables
- Each establishment is systematically assigned to report for 1 of 13 weeks within each quarter of the reference year
- Each establishment reported for the same relative week in each quarter

Sampling Shipments

Respondent asked to:

- Create a complete and unduplicated sampling frame of shipments made in reporting week
- Count and report the total number of shipments made in the week
- Pick the appropriate selection rate from a table (no sampling if ≤ 40 shipments)
- Systematically select shipments and report data on selected shipments

Reporting Total Number of Shipments

Item D Please enter the **total number** of outbound shipments (or deliveries), including customer pick-up, for the one-week reporting period shown above. If book figures are not available, please provide your best estimate.

This number should reflect all shipments and deliveries leaving this location during the one-week reporting period. *Please see Instruction Guide for a definition of "shipment."*



DO NOT PROCEED UNTIL YOU HAVE COMPLETED ITEM D.



Sampling Instructions

Item E SAMPLING INSTRUCTIONS

Our goal in this section is to identify a sample of your shipments that you will provide data on. Through the use of a sample, we can avoid asking you for information on all of your shipments, while still obtaining statistically accurate information.

FINDING YOUR SELECTION RATE

If you reported 40 or fewer shipments in item D, please enter "1" as your selection rate in the box below, then go directly to item F and enter the information for each of your shipments.

If you reported 41 or more shipments in item D, we will now ask you to select and report on a sample of your shipments. Following the steps below will result in a sample of 20 to 40 shipments to report on in item F.

In the table at right, identify the selection rate that corresponds to the number you entered in item D, and enter it in the box below.

Please enter your selection rate. →

Number of shipments entered in item D	Selection rate
1— 40	1
41— 80	2
81— 100	3
101— 200	5
201— 400	10
401— 800	20
801— 1600	40
1601— 3200	80
3201— 6400	160
6401—12800	320
More than 12800	Call Census at 1-800-772-7851

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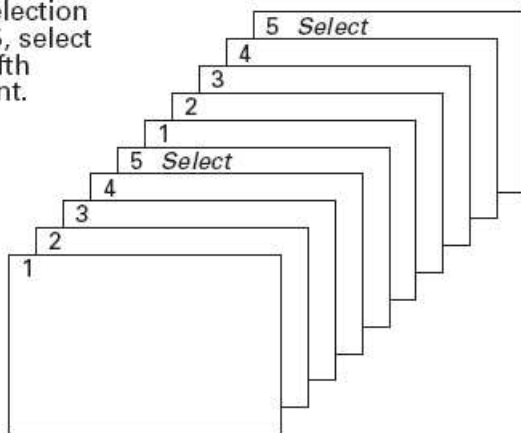
Sampling Instructions

SELECTING YOUR SAMPLE OF SHIPMENTS

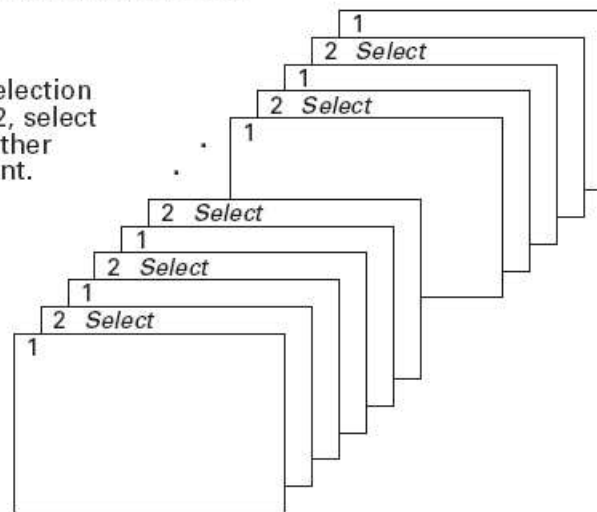
1. Use the file or combination of files that best reflects your full range of outbound shipping activities.
2. Begin with the first shipment. Count the shipments until you reach your selection rate. Select this shipment to report on in item F.
3. Continue counting with the next shipment. Count this shipment as 1 and continue until you reach the selection rate again. Select this shipment to report on in item F.
4. Repeat step 3 until you reach the last shipment for the one-week period. If the last shipment is counted as the selection rate, select this shipment to report on in item F. If the last shipment is not counted as the selection rate, do not report this shipment.

In the following examples, each rectangle represents one shipment.

If the selection rate is 5, select every fifth shipment.



If the selection rate is 2, select every other shipment.



Once you have selected your sample of shipments, please proceed to item F and enter the requested information for each selected shipment. Examples of completed lines for two shipments are provided on lines "0" and "00" below.

If you have difficulties constructing a file of shipments or have questions about how to select the sample of your shipments, please call our toll-free number for assistance: 1-800-772-7851.

Data Items Collected

For each shipment:

- Value, weight, primary commodity
- Domestic mode(s) of transportation
- Destination city, state, and ZIP
- For exports
 - mode of export
 - U.S. port, airport, or border crossing of exit
 - Foreign destination (city and country)

Editing Respondent Data

- Shipment sampling
- Missing critical shipment data
- Item consistency edits
- Weighted tabulations
- Quarter-to-quarter consistency edits

Imputation of Shipment Value or Weight

A given shipment's value or weight that is missing or failed edit may be imputed if:

- The other item is reported greater than 0 and passed edit
- The shipment's commodity is valid

Imputation Methodology

- Donor shipment must have reported value and weight greater than 0 and passed edit
- Imputation cells based on shipment commodity, origin, and size of reported item
- Ratio from the donor applied to recipient's reported item
- Median ratio for commodity used if no donor found

Weighting

- Final tabulation weight computed for each shipment
- Product of seven factors
 - 3 sampling weights
 - 2 nonresponse adjustments (quarter, shipment)
 - 2 Census ratio adjustments (establishment, industry)

Establishment-Level Census Adjustment Ratio (CAR)

- Most establishments reporting in the 1997 CFS also reported in the 1997 Economic Census
- Ratio of census “value of shipments” to CFS estimated value of shipments
- Correct for sampling and nonsampling error in the selection of shipments
- Establishments outside acceptable limits were excluded from tabulation (5% in 1997)

Industry-Level Census Adjustment Ratio

- Ratio of Census “value of shipments” to CFS estimated value of shipments computed at the national level for each industry
- Accounts for changes in the CFS universe between the time the sample was selected and when the survey was conducted
- Accounts for establishment nonresponse

Variance Estimates

- Computed using the method of random groups
- Don't account for variance due to imputation or for the routing of shipments through the modeled transportation network to estimate mileages
- Tend to be larger for estimates of tons and ton-miles

Summary of Sampling Weights in the 1997 CFS

- 1st stage sampling weights ≤ 100
- 2nd stage sampling weight = 13
- 99% of shipments had 3rd stage sampling weights less than 290
- 95% of shipments had final tabulation weights of about 400 or less

Summary of Establishment Response to the 1997 CFS

- 85% of establishments responded in at least 1 quarter
- 80% of responding establishments had data that contributed to tabulations
- 93% of reported shipments contributed to tabulations

Summary of Establishment Response (cont.)

- Some differences by trade area
 - Rates varied from 83% to 89%
- Slightly higher response for large establishments
 - Rates varied from 80% to 90%
- Response fairly consistent by state
 - Rates varied between 74% and 92% (avg. = 86%)

Item Missing Rates: 1997 CFS

Item	Number of Shipments Missing (Percent)
Value	2.7
Weight	4.0
Mode	1.3
Commodity	0.3
Destination ZIP	4.3

Analysis of Respondent Sampling in the 1997 CFS

- 91% of responses contributed to analysis
- Of the 40% of the responses that required no sampling, the reported # of shipments was within 2 of the expected number 95% of the time
- Of the 60% of the responses that required sampling, the comparable percentage dropped to 72%

Comparing CFS Value of Shipments to Economic Census

- For establishments matching to the Census, the median Census-to-CFS ratio was 1.05
- Median ratio decreased as the number of reported quarters increased

CFS Industry Coverage over Time

- Based on the 1987 Standard Industrial Classification (SIC) System for 1993 and 1997 CFS
- Based on the North American Industry Classification System (NAICS) for 2002 CFS
 - Logging and publishers out of scope
 - Auxiliary establishments coded in 2 industries under NAICS, but coded based on establishments served under SIC system

CFS Sample Size over Time

- Decrease in sample size from 200K in 1993 to 100K in 1997
 - Allowed for earlier and more intense follow-up of problem reporters, so better quality data
 - Improvements made to increase the efficiency of the sample design
 - Estimates published earlier and more of them

CFS Sample Size over Time (cont.)

- Decrease in sample size from 100K in 1997 to 50K in 2002
 - Primarily due to budget constraints
 - Less detailed geographic estimates
 - Improvements to capture less frequent types of shipments (e.g., hazardous materials, air, water, rail)

Other Changes to the CFS

- Commodity codes
 - STCC (1993); SCTG (1997)
- Sub-national geography
 - National Transportation Analysis Regions (NTAR, 1993); State/Metropolitan Area (1997)
 - New MA definitions introduced subsequent to Decennial Population Census

CFS Data Collection Improvements

- Reduced the number of commodity codes from 1,200 to 500 (1997)
- Added a diagram of shipment sampling procedure to help respondents (1997)
- Improved automated editing (1997)
- Quick and easy access to questionnaires via imaging (2002)

CFS Sample Design Improvements

- MOS based on estimated value of shipments instead of payroll (1997)
- Implemented a procedure to reduce the effect of large and infrequent shipments (1997)
- Maximum 1st stage sampling weight (1997)

CFS Sample Design Improvements

- Used prior survey data to identify establishments making less frequent types of shipments (air, water, rail, and hazardous materials; 2002)
- Reduced time between frame year and the year in which the survey was conducted (2002)

Export Estimates Published in 1997

- 8 tables published from 1997 CFS
 - Export mode, domestic mode, country of destination, commodity group (9 categories), 2-digit commodity, selected states of origin
 - Export mode and country of destination, commodity group and export mode

Review of 1997 CFS Export Estimates

- CFS estimates were lower when compared to summary export data from Foreign Trade Division and to data from BTS' Transborder Database
- CFS obtained information on about 1% of all export shipments
- Exports accounted for about 8% of estimated total value (V) in 1997 (4.7% for tons (T), 8.2% for ton-miles(TM))

Review of 1997 CFS Export Estimates

Domestic part of exports shipped by truck accounted for:

- ~7% of total value shipped by truck in 1997 (2.0% for tons, 5.0% for ton-miles)
- ~60% of the estimated total value exported in 1997 (30% T, 23% TM)
- Rail (6.5% V; 26% T; 42% TM)
- Water (3% V; 18% T; 17% TM)

1997 CFS: Measures of Reliability

CVs of Shipments by Truck

	Exports	All	State (Med)
Value	5.5	1.1	5.9
Tons	15.4	2.1	12.4
Ton-miles	12.4	1.1	9.1

- We expect increased variability for 2002 CFS

Possibilities for Improving Coverage of Exports in the CFS

- Add yes/no question to Census Bureau's annual survey of multiple-establishment firms
- Make use of prior sample data to identify likely exporters
- Collect identification information to help match CFS data to Foreign Trade Division's export data (e.g., unique shipment identifier known by the shipper and filed in AES)

Contact Information

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