

# **Road Transportation of Freight Turnover Measures and Practices at the U.S. Census Bureau**

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**Abstract:** There is a wealth of industry and product data available for analysis in the trucking industries in the United States. Information on relative distance (i.e. local and long-distance) as well as type of operation (e.g., truckload vs. less-than-truckload) is also available. New inquiries for 2007 to separate the household goods moving and storage final demand component from the office moving and storage intermediate demand component, as well as inquiries for general freight commodity groups and transportation of intermodal containers will provide additional analytical tools in the future.

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## **1. Definition of the Service Being Collected**

ISIC Rev 3.1 includes a single class, 6023 Freight transport by road, for all road freight. The transportation of freight by road is classified in six different national level industries in NAICS United States 2007. Those NAICS industries are:

- 484110 – General Freight Trucking, Local
- 484121 – General Freight Trucking, Long-Distance, Truckload
- 484122 – General Freight Trucking, Long-Distance, Less Than Truckload
- 484210 – Used Household and Office Goods Moving
- 484220 – Specialized Freight (except Used Goods) Trucking, Local
- 484230 – Specialized Freight (except Used Goods) Trucking, Long-Distance

When aggregated, industry data from NAICS are relatively comparable to the international standard in scope. The six NAICS industries cover units that are primarily engaged in the provision of transportation services to others as well as separate units providing support to other related units (e.g., a trucking operation associated with a regional retail trade chain). Separate survey forms are used for the for-hire and contract trucking establishments and the ancillary units of larger enterprises (e.g., private fleets, captive delivery, etc.).

For each of these industries, census data collection instruments request the revenue received for the transportation of freight by road. Ancillary units are also requested to provide sales outside of their enterprise, a number of expense items, and a special inquiry to determine the classification of the enterprise that they are serving. The Economic Census only includes data from employers in the industry presentations. A separate program provides industry level data for non-employers.

The Commodity Flow Survey (CFS) is a joint effort between the Census Bureau and the Bureau of Transportation Statistics that forms the basis for information beyond transportation service revenue. The CFS contacts shippers to collect information about domestic destination or port of exit, commodity, value, weight, mode(s) of transportation, the date on which the shipment was made, and an indication of whether the shipment was an export, hazardous material, or containerized. For shipments that include more than one commodity, respondents are instructed to report the commodity that makes up the greatest percentage of the shipment's weight. While there are a number of measures of activity in the trucking industries, the Census and this paper will focus on the measurement of revenues received for transportation services provided.

## **2. Unit of Measure to be Collected**

The services being collected and measured in the road freight transportation industries are based on the value of the service, transportation, being provided rather than the value of goods being shipped, or other measure. Revenues for transportation are directly collected from respondents. Ancillary units are surveyed to collect data on their transportation

service sales outside of their parent enterprise and to collect expense data for captive transportation services.

### **3. Market conditions and constraints**

2002 Economic Census reported 112,698 establishments, with revenues of \$165 billion and 1,437,259 employees.<sup>1</sup> In addition, there were 413,100 nonemployer establishments with \$28.7 billion in receipts<sup>2</sup> for an industry total of 525,798 establishments with revenues of over \$193 billion.

The trucking industry was deregulated in the United States with the passage of the Motor Carrier Act of 1980. At the time, there were fewer than 20,000 motor carriers. Since deregulation, that number has increased to over 500,000 carriers registered with the Department of Transportation.<sup>3</sup>

The road freight industry in the United States is highly competitive with relatively few barriers to entry and exit. Commonly used distinctions in the industry for types of carriers include truckload (TL) and less than truckload (LTL). Additionally types of carriers include for-hire carriers, private fleets, owner-operators, courier companies, and specialized carriers. This review excludes couriers.

The trucking industry is facing a number of challenges. While there continues to be growing demand for road freight, fuel prices, highway congestion, driver shortages, safety and security issues, and additional regulations for hours of service are all placing upward cost pressure on carriers. Driver shortages are impacting long distance truck transportation firms more than local trucking firms. The combination of wages and adverse quality of life issues (e.g., long unpredictable trips away from home) are more specific to long distance trucking. The competitive nature of the industry traditionally limits the ability to pass these costs on to customers. However, driver shortages are allowing for-hire carriers to pass cost increases on to shippers in the form of higher rates and/or fuel surcharges because of capacity constraints.<sup>4</sup>

A shift to just-in time-inventory and production management practices is also placing pressure on companies to operate efficiently.

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<sup>1</sup> 2002 Economic Census, EC02-48I-09, page 2.

<sup>2</sup> <http://www.census.gov/epcd/nonemployer/2002/us/US000.HTM> - Nonemployer data are based on administrative records and collected and processed separately from the Economic Census.

<sup>3</sup> [http://www.bts.gov/publications/national\\_transportation\\_statistics/2003/html/table\\_01\\_02.html](http://www.bts.gov/publications/national_transportation_statistics/2003/html/table_01_02.html) - figures are for the fiscal year and cannot be directly compared to Census data.

<sup>4</sup> Rethinking the Private Fleet, David Cullen, Fleet Owner Magazine, November 1, 2005 ([www.fleetowner.com/management/feature/fleet\\_rethinking\\_private/index.html](http://www.fleetowner.com/management/feature/fleet_rethinking_private/index.html))

To respond to the increasing demand for expedited freight service, trucking companies are increasingly providing additional logistics services and similar value added services. Trucking companies are setting up port distribution centers, providing drayage services, and providing consolidation/deconsolidation services in addition to the basic transportation services.

According to the 2002 Economic Census, the provision of warehousing and storage services, packaging services, and other services related to transportation of freight are an area of important secondary production. These non-transportation services accounted for about 3% of truck transportation establishment revenues. While relatively minor for some industries, they accounted for almost 20% of the revenues received from establishments in Used Household and Office Goods Moving (this activity is called removal services in NACE – new industry 49.42 for revision 2).

In order to provide some perspective of the importance of these non-transportation services in the United States, revenue for contract warehousing and storage from trucking establishments is about 17% of the total contract warehousing receipts reported in the Transportation and Warehousing sector of NAICS. Public warehousing and storage receipts from trucking establishments are about 13% of the total for the sector.<sup>5</sup>

#### **4. Standard Classification Structure and Product Details**

In the 2002 Economic Census, the following revenue lines were collected from respondents in the truck transportation industries:

42000	Local motor carrier revenue
42010	Long-distance motor carrier revenue
42020	Courier and messenger services, including parcel delivery
42030	Contract warehousing and storage
42040	Public warehousing and storage
42050	Process, physical distribution, and logistics consulting
42060	Packing related to motor carrier and storage activities
42070	Order assembly services related to motor carrier and storage activities
42080	Physical processing/transforming of goods related to motor carrier activities
42090	Other related motor carrier and storage activities
43200	Collection of garbage and trash, excluding hazardous waste
43250	Hazardous waste collection
43650	Repair and maintenance, including parts installed
43750	Sales of other merchandise
49810	All other operating revenue

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<sup>5</sup> Total receipts for contract warehousing from all types of transportation and warehousing establishments were \$7.9 billion in 2002 and trucking firms provided \$1.35 billion of the total. Public warehousing and storage totaled \$5.5 billion with \$.76 billion provided by trucking establishments.

Response coverage was 75.8% for this area of the 2002 Economic Census. The United States does not currently have a standard product classification system although the North American Product Classification (NAPCS) is under development. NAPCS products for truck transportation were under development and the work resulted in product inquiries used for data collections in the 2007 Economic Census. The table below is a proposed list of product inquiries related to road transportation of freight in the 2007 Economic Census.

## **Product Lines**

Sources of revenue

1. Moving services
  - a. Residential moving services
  - b. Commercial moving services
  - c. Moving of other good requiring special handling
  - d. Sum of lines 1a through 1c.....**
2. Transportation of documents and parcels
3. Local transportation and delivery of small purchased or serviced items
4. Transportation of bulk liquids and gases in intermodal tank containers by road
5. Transportation of bulk liquids and gases, except in intermodal tank containers, by road
6. Transportation of dry bulks, except in intermodal tank containers, by road
7. Transportation of climate-controlled boxed and palletized goods, except in intermodal tank containers, by road
8. Transportation of boxed and palletized goods, not climate-controlled, except in intermodal tank containers, by road, truckload service
9. Transportation of boxed and palletized goods, not climate-controlled, except in intermodal tank containers, by road, less-than-truckload service
10. Transportation of climate-controlled intermodal containers by road
11. Transportation of other intermodal containers, nec., by road
12. Transportation of automobiles by road
13. Transportation of livestock by road
14. Transportation of waste by road
  - a. Transportation of hazardous waste by road
  - b. Transportation of non-hazardous waste by road
  - c. Sum of lines 14a through 14b.....**
15. Transportation of other goods by road
16. Repositioning services
17. Drayage
18. Domestic freight transportation arrangement services
19. International freight forwarding and customs brokerage services
20. Warehousing services
21. Rental of goods transportation equipment, without operators
22. Van line coordination services
23. Operations and supply chain management consulting services

24. Other products - Specify

25. **TOTAL**

The proposed changes to product collections for the 2007 Economic Census will result in data that is much more easily compared to the CPC Ver. 1.1 product details than was the case in 2002. In general, the proposed Census breakouts and CPC product details are similar in that they address separately refrigerated or climate controlled services, bulk liquid or tanker services, containerized freight transportation services, moving and storage services, and other transportation of freight. In general, the NAPCS product data should align well with the existing international standards. The Census collections will not address the transportation of freight using man- or animal-drawn vehicles (CPC Ver. 1.1 - 64334). While revision 2.0 of the CPC does rearrange the structure of the products into aggregates for passenger and freight, the detailed products in the CPC will remain essentially unchanged.

## **5. Evaluation of Standard Definition and Market Conditions**

The NAPCS products used in the Economic Census are intended to match the apparent market conditions in the area of freight transportation by road. The 2007 proposal essentially expands requested data for basic types of cargo and expands the list of “related” services that may be of interest. 2007 product inquiries will also attempt to collect information on the transportation of various intermodal containers by road.

The NAICS United States industry distinctions will be collected through kind of business inquiries rather than through specific products as had been the case previously. In practice, data will be available for local and long distance freight transportation, general freight and specialized freight, normal trailer and intermodal container, and basic types of commodities being transported. Application of the proposed NAPCS based products will act to complement the existing industry structure in NAICS.

## **6. National Accounts Concepts**

The 1993 System of National Accounts provides guidance on the definition and measurement issues for transportation.

*“(6.103) The output of transportation is measured by the value of the amounts receivable for transporting goods or persons. In economics a good in one location is recognized as being a different quality from the same good in another location, so that transporting from one location to another is a process of production in which an economically significant transformation takes place even if the good remains otherwise unchanged. The volume of transport services may be measured by indicators such as ton-kilometres or passenger-kilometres, which combine both the quantities of goods, or numbers of persons, and the distances over which they are transported. Factors such as speed, frequency or comfort also affect the quality of services provided. Transportation is a typical service activity in that the output produced consists of transformations of persons or*

*goods that do not themselves form part of the output of the service producers. While the services performed are easily identified and quantified, they are not separate entities from the goods or persons in which they are incorporated. The production of transportation for own use within enterprises is an ancillary activity that is not separately identified and recorded.”<sup>6</sup>*

Census industry data for road freight transportation does include data for the production of transportation for own use within enterprises. NAICS classifies establishments based on the activities that they perform rather than who the unit is serving. However, the additional inquiry regarding the classification of the enterprise being served as well as indicators on the file allow the separation of this data if so desired by national accounts.

*“(15.40) As explained in chapter VI paragraph 6.110 and 6.111, the output of wholesale and retail trade is measured by the value of the trade and transport margins realized on the goods they sell. Goods resold are not included either in the output or the inputs of wholesale and retail trade. The trade and transport margins include trade margins plus any transport charges paid separately by the purchaser in taking delivery at the required time and place.”<sup>7</sup>*

*“(15.42) The full cost of transporting a good from the place where it is manufactured to the place where the purchaser takes delivery of it may be included in a number of items. If the producer transports the good, or arranges for it to be transported without extra cost to the purchaser, these transportation costs will be included in the basic price. If the producer transports the goods himself this represents an ancillary activity and the individual costs will be included but not identifiable as transportation costs. If the producer pays a third party to transport the goods then transportation will appear as one of the intermediate costs to the producer. Similarly, wholesale and retail traders may arrange for goods to be moved from where they take delivery of them to where another purchaser takes delivery. As in the case of producers, these costs will be included in the trade margin if no separate charge is made for transportation to the purchaser. Again, as with producers, these costs may represent ancillary activity of wholesale and retail traders or the purchase of an intermediate service, thus entering trade margins. Finally, when transport is arranged in such a way that the purchaser has to pay for the transport costs even when done by the producer or the wholesale or retail trader, these are separately identified as transport margins. The full component of transport services in the trade and transport margins - composed of the transport margins themselves and the transport services included in the trade margins - may be analysed separately in a more analytical version of the supply and use table.”<sup>8</sup>*

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<sup>6</sup> System of National Accounts, 1993 – United Nations publication ST/ESA/STAT/SER.F/2/Rev. 4, page 136.

<sup>7</sup> Ibid, page 347

<sup>8</sup> Ibid, page 347

## 7. Turnover data method

While there were no standard turnover data methods presented for consideration, as part of this paper I am suggesting several choices that might be useful in future efforts. I am presenting two major categories with breakdowns under each.

- A. Direct collection of data from producing establishments
  - 1. One time or ad hoc sample survey of producing establishments
  - 2. Annual or other periodic sample survey of producing establishments
  - 3. Census of producing establishments
- B. Secondary source of data for producing establishments
  - 1. Tax or other administrative revenue records
  - 2. Trade association data
  - 3. Other secondary source data for revenues

These categories are by no means exhaustive although they might provide a useful starting point for discussions of sources of turnover data. Each of the methods listed above has certain strengths and weaknesses. Cost must be balanced with quality and choices made when developing turnover data. The extra quality available from a comprehensive census of producing establishments may not outweigh the costs involved with a project of that type. Alternatively, quality problems in the identification of product data from tax or other administrative records might argue for additional expenditures for ad hoc or more periodic sample surveys of producing units. In the end, the best choice must be made within the resource constraints of the statistical agency.

In the United States, the primary source of product data is the Economic Census performed in years ending with 2 and 7. Interim data is often available from annual sample surveys of producing units but in less detail than the Economic Census.

## 8. Evaluation of Turnover and Prices

The proposed 2007 Economic Census product collections for freight transportation by road can be easily aggregated to supply weighting information to the Producer Price Index program at the Bureau of Labor Statistics. It is possible to develop closely comparable deflators for the output data.

### PPI Structure for Road Transportation<sup>9</sup>

484	Truck transportation
4841	General freight trucking
48411	General freight trucking, local
484110	General freight trucking, local
484110-P	Primary services
484110-1	General freight trucking, local

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<sup>9</sup> PPI Detailed Report, Data for February 2006, Table 5, pages 90-91, U.S. Department of Labor, Bureau of Labor Statistics

484110-SM	Other receipts
48412	General freight trucking, long-distance
484121	General freight trucking, long-distance, truckload
484121-P	Primary services
484121-2	General freight trucking, long-distance, truckload
484121-SM	Other receipts
484122	General freight trucking, long-distance, less than truckload
484122-P	Primary services
484122-1	General freight trucking, long-distance, less than truckload
484122-SM	Other receipts
4842	Specialized freight trucking
48421	Used household and office goods moving
484210	Used household and office goods moving
484210-P	Primary services
484210-2	Used household and office goods moving, except local
484210-4	Used household and office goods moving, local
484210-SM	Other receipts
48422	Specialized freight (except used goods) trucking, local
484220	Specialized freight (except used goods) trucking, local
484220-P	Primary services
484220-3	Specialized freight (except used goods) trucking, local
484220-SM	Other receipts
48423	Specialized freight (except used goods) trucking, long-distance
484230	Specialized freight (except used goods) trucking, long-distance
484230-P	Primary Services
484230-6	Specialized freight (except used goods) trucking, long-distance
484230-SM	Other receipts

A detailed analysis of the comparability of output data and producer price indexes requires a more in depth analysis of sampling frames and coverage issues for each program. Economic Census data does not include non-employers in the industry data totals. The PPI program also generally uses a sampling frame that only includes employers. However, the business register developed by the Census Bureau and the business register developed by the Bureau of Labor Statistics can include differences.

Sampling frame issues for private carriers (included in Census data), non-employers or owner-operators that do not report paying wages (not included in Census data), and similar technical differences will impact the usability and comparability of output data and price index deflators. While there will always be differences, an exposition of the differences at least can provide the basis for a more thorough evaluation of potential problems.

While most of the services included in road transportation of freight are part of intermediate demand, there is one separate final demand component for household goods

moving and storage. The 2007 Economic Census is attempting to collect separate product revenue for that area. If the pricing trends are different for the intermediate demand component and the final demand component, national accounts might wish to have separate deflators available.

A further analysis of the price trends for warehousing and storage services provided by road freight transportation providers might also be useful. As noted previously, the activity is significant for some of the road freight transportation industries and is also important to the wherever produced total of warehousing and storage products. If there is an expectation that the price trends are the same or substantially the same, separate secondary service detailed price indices would not be necessary. Within the cost constraints of a PPI program and the burdensome sample size requirements for lower level price indexes, it might be interesting to evaluate the potential for additional details within the broad other receipts category in the PPI.

Producer Price Index data do indicate that there are some differences in price movements and level across the current industries. The data below, as of February 2006, show the relative price index levels:

Index Series	Base	Feb. 2006 Preliminary <sup>10</sup>
484110	12/03	111.4
484110-SM	12/03	110.1
484121	12/03	110.1
484121-SM	12/03	117.0
484122	12/03	114.8
484122-SM	12/03	111.2
484210	12/03	107.9
484210-SM	12/03	110.7
484220	12/03	111.0
484220-SM	12/03	N/A
484230	12/03	111.1
484320-SM	12/03	115.2

The price indices for warehousing and storage services have increased much less quickly since 12/03.<sup>11</sup>

<sup>10</sup> Ibid, pages 90-91. The industry total and SM levels were chosen in order to avoid rebasing. A more accurate comparison would be for the primary products and other receipts indexes. However, for purposes of illustration, the listed figures are probably acceptable.

<sup>11</sup> Ibid, page 93. The industry level figures for warehousing and storage range from 101.6 to 103.3 using February preliminary numbers for industry indexes based in 12/03.

Census product data for broad types of freight might also prove to be fertile ground for additional price index details. It is not clear if the price movements for intermodal, specialized, and general freight are homogeneous. The availability of detailed product and price data would allow for confirmation or rejection of the differences. Even if there are not price differentials by major product groupings, the additional data may assist national accountants in the distribution of road freight data during input/output analysis.

## **9. Summary**

Recent NAPCS development efforts and their implementation in the 2007 Economic Census will result in turnover data that are more comparable to the international standards. The United States standard industry classification includes substantially more detail than the international standard but can be aggregated to produce comparable scope. New details for types of freight (general commodity groupings in NAPCS) as well as separate identification of intermediate and final demand components for moving and storage might provide useful information to national accounts and others.

There are many issues for consideration when using turnover and price data in the national accounts. While this paper focuses on the comparability of the data produced in the United States, there does not need to necessarily be a one to one match for turnover and price data. Turnover details may sufficiently assist national accountants even if there are not substantially different price trends or available price indices at the lowest level. Alternatively, price indices might indicate different price trends for characteristics that are not readily available in turnover data.

The availability of product turnover by process (e.g., truckload vs. less-than-truckload, general vs. specialized equipment, climate controlled vs. other, etc.) along with data on major commodity groupings and separate identification of intermediate and final demand components, provides a wide range of data for use in all types of analysis, including national accounts uses.