U.S. Transportation Satellite Accounts for 1996

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THIS article presents estimates of the transportation satellite accounts (TSA's) for 1996, which update the 1992 TSA's.[1] Like the 1992 TSA's, the 1996 TSA's are based on, and are an extension of, the input-output (I-O) accounts; they are constructed by rearranging the I-O data and by adding information from other sources of transportation data. The TSA's were developed jointly by the Bureau of Transportation Statistics of the U.S. Department of Transportation and the Bureau of Economic Analysis.

The TSA's identify and aggregate detailed estimates on transportation activities and present the estimates by industry and by commodity. This information can provide answers to such questions as "what is the contribution of transportation to gross domestic product?"; "what industries are large users of transportation?"; and "what are the inputs required by transportation from other industries?" Using the TSA estimates is advantageous for transportation analyses because transportation activities in the TSA's include those conducted on a for-hire basis, which are identified as transportation within the published I-O accounts, and those conducted by businesses for their own use (own-account transportation), which—although included—are not separately identified as transportation in the I-O accounts. Own-account transportation covers activities such as transporting goods from a grocery company's warehouses to its retail outlets by the company's truck fleet and local delivery services provided by small retailers.

The TSA's treat own-account transportation as a separate industry with gross output equal to the sum of its intermediate inputs and value-added components. Because own-account transportation activities that are included as part of the production process in the I-O accounts are treated as if they were market transactions in the TSA's, the total gross output for all industries is larger in the TSA's than that in the I-O accounts. However, the TSA estimate of own-account transportation does not change the total estimate of gross domestic product (GDP) from the I-O accounts, because the value added that is created through own-account transportation activities is already counted in the

1. For an overview of the 1992 TSA's, see Bingsong Fang, Xiaoli Han, Ann M. Lawson, and Sherlene K.S. Lum, "U.S. Transportation Satellite Accounts for 1992," *Survey of Current Business* 78 (April 1998): 16–27.

Satellite Accounts

Satellite accounts are frameworks designed to expand the analytical capabilities of the national accounts without overburdening them or interfering with their general-purpose orientation. In this role, satellite accounts organize information in an internally consistent way that suits a particular analytical focus, yet they maintain links to the existing national accounts. Further, because they supplement the existing accounts rather than replace them, they serve as a laboratory for economic accounting in that they provide room for conceptual development and methodological refinement. In their most flexible applications, satellite accounts may use definitions and concepts that differ from the existing accounts. For example, a satellite account may be built around a broader concept of industry, output, and capital formation than the existing accounts.

Two types of satellite accounts are identified by the *System of National Accounts, 1993*.[1] Each type is distiguished by its relationship with the central framework. The first type involves the rearrangement of central classifications and the introduction of complementary elements that differ from the conceptual central framework. An example of this type of satellite accounts is the travel and tourism satellite accounts prepared by BEA.[2]

The second type of satellite accounts is based on concepts that are alternatives to the ones of the central framework. A different production boundary or an enlarged concept of consumption or production may be introduced, or the scope of assets may be extended. An example of this type of satellite accounts is BEA's environmental accounts, which include natural resources in the asset accounts and the use of natural resources as negative investment in the income and product accounts.[3]

1. See Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, and the World Bank, *System of National Accounts, 1993* (Brussels/Luxembourg, New York, Paris, and Washington, DC, 1993).

2. See Sumiye Okubo and Mark A. Planting, "U.S. Travel and Tourism Satellite Accounts for 1992," *Survey* 78 (July 1998): 8–22.

3. See "Integrated Economic and Environmental Satellite Accounts" and "Accounting for Mineral Resources: Issues and BEA's Initial Estimates," *Survey* 74 (April 1994): 33–72.

I-O estimates of industry value added, and the TSA's only reclassify this value added as transportation related.

Using the more comprehensive measures of transportation and the statistical framework developed for the 1992 TSA's, as well as more recent data where available, the 1996 TSA's present an updated snapshot of transportation's changing role in the U.S. economy, particularly in the business sector. From 1992 to 1996, transportation grew more slowly than the overall economy, primarily as a result of relative differences among industries in their intensity of transportation use, in their growth of gross output, and in their changes in intensity of transportation use. Highlights include the following:

- GDP grew more than 25 percent, while the value added that was contributed to GDP by transportation activities—both own-account and for-hire—grew 21 percent. As a result, the share of the value added from all transportation activities in GDP decreased slightly from 5.0 percent in 1992 to 4.8 percent in 1996.
- The five slowest growing industries, which grew at an average rate of 22 percent in 1992–96, required 4.0 cents of transportation per dollar of their output in 1996. In contrast, the five fastest growing industries, which grew at an average rate of 31 percent, required only 2.9 cents of transportation per dollar of their output.

Acknowledgments

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Data Availability

This article presents the aggregate estimates from the 1996 transportation satellite accounts (TSA's). Estimates for 99 industries at the I-O summary level are available on BEA's Web site at <www.bea.doc.gov>; under "National," click on "Industry and wealth data," and look under "Transportation data." On the same site are also available estimates from the 1992 TSA's. Estimates from the 1992 and 1996 annual I-O accounts are available on BEA's Web site at <www.bea.doc.gov>; under "National," click on "Industry and wealth data," and look under "Input-Output data."

The 1996 TSA estimates are also available for $20 on diskette—product number NDN–0252. The 1992 TSA estimates are available for $20 on diskette—product number NDN–0193. To order, call the BEA Order Desk at 1–800–704–0415 (outside the United States, call 202–606–9666).

Table 1.—The TSA Make of Commodities by Industries, 1996

[Millions of dollars at producers' prices]

Industry	Commodity															Total industry output
					Transportation											
	Agriculture, forestry, and fisheries	Mining	Construction	Manufacturing	Railroad and passenger ground	Motor freight and warehousing	Water	Air	Pipelines and freight forwarders	Own-account transportation [1]	Communications and utilities	Wholesale and retail trade	Finance, insurance, and real estate	Services	Other [2]	
Agriculture, forestry, and fisheries	287,694	0	0	1,117	0	0	0	0	0	0	0	0	0	1,510	0	**290,321**
Mining	0	162,445	0	10,834	0	0	0	0	0	0	0	0	0	0	0	**173,279**
Construction	0	0	867,665	0	0	0	0	0	0	0	0	0	0	0	0	**867,665**
Manufacturing	0	0	0	3,580,895	0	0	0	0	0	0	48	0	0	83,357	1,702	**3,666,001**
Railroads and related services; passenger ground transportation, except transit	0	0	0	0	68,494	196	0	0	0	0	0	0	0	0	5	**68,695**
Motor freight transportation and warehousing	0	0	0	0	0	197,995	0	0	0	0	14,493	0	0	0	0	**212,488**
Water transportation	0	0	0	0	0	0	34,825	0	0	0	0	0	0	0	0	**34,825**
Air transportation	0	0	0	0	0	0	0	118,316	0	0	0	0	0	0	0	**118,316**
Pipelines, freight forwarders, and related services	0	0	0	0	688	1,675	246	3,340	35,703	0	0	0	0	0	0	**41,653**
State and local passenger transit	0	0	0	0	6,983	0	0	0	0	0	0	0	0	0	0	**6,983**
Own-account transportation [1]	0	0	0	0	0	0	0	0	0	199,652	0	0	0	0	0	**199,652**
Communications and utilities	0	0	0	0	0	0	0	0	0	0	620,361	0	0	39,328	1,007	**660,696**
Wholesale and retail trade	0	0	0	0	0	0	0	0	0	0	0	1,453,546	0	1	0	**1,453,547**
Finance, insurance, and real estate	0	0	0	0	0	0	0	0	0	0	0	0	2,102,188	46,054	0	**2,148,241**
Services	0	0	0	10	0	22	0	0	58	0	0	2	889	2,960,041	621	**2,961,642**
Other [2]	0	0	0	54	118	0	1,748	2,688	0	0	56,112	3,656	11,943	3,419	1,005,370	**1,085,107**
Total commodity output	**287,694**	**162,445**	**867,665**	**3,592,909**	**76,283**	**199,889**	**36,820**	**124,344**	**35,761**	**199,652**	**691,013**	**1,457,204**	**2,115,020**	**3,133,709**	**1,008,705**	**13,989,110**

1. "Own-account transportation" includes transportation by truck and bus provided by nontransportation industries for their own use.

2. "Other" consists of government enterprises (except State and local government passenger transit) and other input-output (I-O) special industries. For a description of I-O special industries, see Ann M. Lawson, "Benchmark Input-Output Accounts for the U.S. Economy, 1992: Make, Use, and Supplementary Tables," SURVEY OF CURRENT BUSINESS 77 (November 1997): 46–47.

- Own-account transportation grew more slowly than for-hire transportation in 1992–96. Gross output of own-account transportation increased 21 percent, while gross output of for-hire transportation increased 24 percent. Similarly, value added from own-account transportation increased 17 percent, compared with a 23-percent increase in for-hire transportation.

Interpreting the above results requires an understanding of the decision processes used by businesses in choosing between buying for-hire transportation services or providing own-account transportation services internally. For example, a business must consider the rental cost and the purchase cost of transportation equipment, operating costs, frequency of service required, size of geographic area covered, special requirements such as refrigeration, availability of alternative means of transportation, and the compatibility between transportation operations and other business activities. Thus, aggregate estimates from the TSA's should be supplemented by more detailed industry data to achieve a better understanding of business transportation choices.

Although the TSA's provide a more comprehensive classification of transportation activities, the TSA estimates still understate the true economic importance of transportation. First, because of data limitations, own-account transportation by modes other than trucks and buses and by most government enterprises are not included.[2] Second, because the current TSA framework maintains the

2. The TSA's include postal services in government enterprises.

Table 2.—The TSA Use of Commodities by Industries, 1996

[Millions of dollars at producers' prices]

Commodity	Industry												
					Transportation								
	Agriculture, forestry, and fisheries	Mining	Construction	Manufacturing	Railroad and passenger ground	Motor freight and warehousing	Water	Air	Pipelines and freight forwarders	State and local passenger transit	Own-account transportation [1]	Communications and utilities	Wholesale and retail trade
Agriculture, forestry, and fisheries	68,848	59	4,763	145,862	1	4	6	1	0	3	0	97	1,347
Mining	356	30,369	6,437	117,806	0	0	6	0	173	0	0	59,806	33
Construction	3,148	3,505	710	24,533	3,294	1,053	43	241	562	1,932	859	35,124	10,288
Manufacturing	46,332	13,287	259,701	1,313,861	8,910	15,280	3,135	14,894	1,758	3,818	19,537	26,955	62,750
Railroads and related services; passenger ground transportation, except transit	1,811	1,116	1,521	16,860	2,962	446	17	154	38	147	286	5,767	1,401
Motor freight transportation and warehousing	4,084	1,140	13,120	56,977	500	39,356	88	277	244	75	1,136	1,297	4,802
Water transportation	368	87	255	1,494	20	1,139	6,713	52	55	12	113	601	67
Air transportation	695	425	1,227	14,127	269	1,843	61	7,200	259	9	14	1,926	6,092
Pipelines, freight forwarders, and related services	112	19	3	4,819	520	6,608	1,630	10,099	976	28	171	1,016	440
Own-account transportation [1]	15,157	3,670	48,338	22,316	0	0	0	0	0	0	0	1,294	54,878
Communications and utilities	4,427	9,705	5,265	72,855	739	6,696	233	1,673	1,738	547	5,233	77,989	45,787
Wholesale and retail trade	13,247	3,323	71,663	227,648	2,521	7,276	486	1,878	409	535	7,665	5,730	29,263
Finance, insurance, and real estate	20,575	23,573	13,893	62,082	1,947	8,435	1,935	3,556	2,206	133	2,049	17,322	94,413
Services	7,244	5,218	79,292	214,649	5,039	21,370	5,798	10,098	9,522	202	19,921	71,113	176,042
Other [2]	197	1,042	819	31,076	431	1,527	3,460	8,878	522	4	687	10,296	15,332
Total intermediate inputs	186,600	96,537	507,009	2,326,963	27,154	111,032	23,611	59,000	18,461	7,445	57,671	316,334	502,934
Total value added [3]	103,721	76,742	360,656	1,339,038	41,541	101,456	11,215	59,315	23,192	–462	141,981	344,362	950,613
Total industry output	**290,321**	**173,279**	**867,665**	**3,666,001**	**68,695**	**212,488**	**34,825**	**118,316**	**41,653**	**6,983**	**199,652**	**660,696**	**1,453,547**

Commodity	Industry				Final uses							**Total commodity output**
	Finance, insurance, and real estate	Services	Other [2]	Total intermediate inputs	Personal consumption expenditures	Gross private fixed investment	Change in business inventories	Exports of goods and services	Imports of goods and services	Government expenditures	GDP	
Agriculture, forestry, and fisheries	9,342	9,492	456	240,282	33,361	0	5,264	27,066	–20,725	2,446	47,412	**287,694**
Mining	5	30	2,524	217,545	98	1,017	1,023	8,123	–64,794	–568	–55,100	**162,445**
Construction	66,789	24,450	20,776	197,307	0	481,126	0	97	0	189,135	670,357	**867,665**
Manufacturing	18,901	296,303	12,278	2,117,701	975,781	505,582	19,517	465,357	–699,280	208,251	1,475,208	**3,592,909**
Railroads and related services; passenger ground transportation, except transit	1,437	3,841	1,266	39,070	24,222	1,293	–30	5,457	–189	6,459	37,213	**76,283**
Motor freight transportation and warehousing	6,340	11,608	2,416	143,460	31,618	5,834	353	13,195	–1,868	7,297	56,429	**199,889**
Water transportation	10	127	2,303	13,414	6,167	6	11	10,475	4,425	2,321	23,405	**36,820**
Air transportation	4,325	11,665	1,783	51,919	46,198	2,320	51	28,942	–12,723	7,637	72,425	**124,344**
Pipelines, freight forwarders, and related services	60	1,504	33	28,037	4,318	0	27	3,084	0	294	7,723	**35,761**
Own-account transportation [1]	1,259	51,918	823	199,652	0	0	0	0	0	0	0	**199,652**
Communications and utilities	34,976	74,980	10,467	353,311	281,637	6,259	9	5,003	–990	45,785	337,703	**691,013**
Wholesale and retail trade	4,776	60,710	2,040	439,172	809,435	98,774	2,013	66,786	19,221	21,802	1,018,032	**1,457,204**
Finance, insurance, and real estate	325,167	207,782	6,355	791,421	1,186,672	39,368	0	63,886	–4,199	37,871	1,323,598	**2,115,020**
Services	155,613	423,093	9,832	1,214,045	1,795,058	117,681	92	26,179	–6,264	–13,083	1,919,664	**3,133,709**
Other [2]	27,669	24,830	2,827	129,599	42,934	–46,563	1,662	91,118	–116,342	906,297	879,106	**1,008,705**
Total intermediate inputs	656,670	1,202,335	76,179									
Total value added [3]	1,491,571	1,759,307	1,008,928								7,813,175	
Total industry output	**2,148,241**	**2,961,642**	**1,085,107**									**13,989,110**

1. "Own-account transportation" includes transportation by truck and bus provided by nontransportation industries for their own use.

2. "Other" consists of government enterprises (except State and local government passenger transit) and other input-output (I-O) special industries. For a description of I-O special industries, see Ann M. Lawson, "Benchmark Input-Output Accounts for the U.S. Economy, 1992: Make, Use, and Supplementary Tables," SURVEY OF CURRENT BUSINESS 77 (November 1997): 46–47.

3. "Total value added" equals total industry output less total intermediate inputs.

production boundary in the I-O accounts, own-account transportation activities conducted by final users—the use of motor vehicles by households and by general government—are not included. Research on the valuation of motor vehicle services by households and by general government is currently under way, and estimates of these types of own-account transportation are being considered for future inclusion in the TSA's. Third, the estimates of own-account transportation exclude profits because information to make such estimates is not available. Thus, during a period of rising (declining) profit margins, the growth of own-account transportation tends to be understated (overstated).

The 1996 TSA's are presented in four tables: The make table shows the commodities that are produced by each industry (table 1); the use table shows the inputs to industry production and the commodities that are consumed by the final users (table 2); the direct requirements table shows the amount of a commodity that is required by an industry to produce a dollar of the industry's output (table 3); and the total requirements table shows the production that is required, directly and indirectly, from each industry to deliver a dollar of

Table 3.—The TSA Commodity-by-Industry Direct Requirements, 1996

[Direct requirements per dollar of industry output, at producers' prices]

Commodity	Industry															
					Transportation											
	Agriculture, forestry, and fisheries	Mining	Construction	Manufacturing	Railroad and passenger ground	Motor freight and warehousing	Water	Air	Pipelines and freight forwarders	State and local passenger transit	Own-account transportation [1]	Communications and utilities	Wholesale and retail trade	Finance, insurance, and real estate	Services	Other [2]
Agriculture, forestry, and fisheries	0.23714	0.00034	0.00549	0.03979	0.00002	0.00002	0.00018	0.00001	0.00000	0.00043	0.00000	0.00015	0.00093	0.00435	0.00321	0.00042
Mining	0.00123	0.17526	0.00742	0.03213	0.00000	0.00000	0.00016	0.00000	0.00416	0.00000	0.00000	0.09052	0.00002	0.00000	0.00001	0.00233
Construction	0.01084	0.02023	0.00082	0.00669	0.04796	0.00496	0.00122	0.00203	0.01350	0.27667	0.00430	0.05316	0.00708	0.03109	0.00826	0.01915
Manufacturing	0.15959	0.07668	0.29931	0.35839	0.12970	0.07191	0.09003	0.12589	0.04220	0.54676	0.09785	0.04080	0.04317	0.00880	0.10005	0.01132
Railroads and related services; passenger ground transportation, except transit	0.00624	0.00644	0.00175	0.00460	0.04312	0.00210	0.00048	0.00130	0.00091	0.02105	0.00143	0.00873	0.00096	0.00067	0.00130	0.00117
Motor freight transportation and warehousing	0.01407	0.00658	0.01512	0.01554	0.00728	0.18522	0.00251	0.00234	0.00586	0.01074	0.00569	0.00196	0.00330	0.00295	0.00392	0.00223
Water transportation	0.00127	0.00050	0.00029	0.00041	0.00029	0.00536	0.19277	0.00044	0.00131	0.00172	0.00056	0.00091	0.00005	0.00000	0.00004	0.00212
Air transportation	0.00239	0.00245	0.00141	0.00385	0.00391	0.00867	0.00176	0.06085	0.00621	0.00129	0.00007	0.00292	0.00419	0.00201	0.00394	0.00164
Pipelines, freight forwarders, and related services	0.00039	0.00011	0.00000	0.00131	0.00757	0.03110	0.04681	0.08535	0.02344	0.00401	0.00086	0.00154	0.00030	0.00003	0.00051	0.00003
Own-account transportation [1]	0.05221	0.02118	0.05571	0.00609	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00196	0.03775	0.00059	0.01753	0.00076
Communications and utilities	0.01525	0.05601	0.00607	0.01987	0.01076	0.03151	0.00670	0.01414	0.04173	0.07833	0.02621	0.11804	0.03150	0.01628	0.02532	0.00965
Wholesale and retail trade	0.04563	0.01918	0.08259	0.06210	0.03670	0.03424	0.01396	0.01587	0.00981	0.07661	0.03839	0.00867	0.02013	0.00222	0.02050	0.00188
Finance, insurance, and real estate	0.07087	0.13604	0.01601	0.01693	0.02834	0.03970	0.05557	0.03005	0.05296	0.01905	0.01026	0.02622	0.06495	0.15136	0.07016	0.00586
Services	0.02495	0.03011	0.09139	0.05855	0.07336	0.10057	0.16648	0.08535	0.22859	0.02893	0.09978	0.10763	0.12111	0.07244	0.14286	0.00906
Other [2]	0.00068	0.00601	0.00094	0.00848	0.00628	0.00719	0.09936	0.07504	0.01253	0.00057	0.00344	0.01558	0.01055	0.01288	0.00838	0.00261
Total value added	0.35726	0.44288	0.41566	0.36526	0.60472	0.47747	0.32202	0.50133	0.55679	–0.06616	0.71114	0.52121	0.65400	0.69432	0.59403	0.92980
Total output	**1.00000**	**1.00000**	**1.00000**	**1.00000**	**1.00000**	**1.00000**	**1.00000**	**1.00000**	**1.00000**	**1.00000**	**1.00000**	**1.00000**	**1.00000**	**1.00000**	**1.00000**	**1.00000**

1. "Own-account transportation" includes transportation by truck and bus provided by nontransportation industries for their own use.

2. "Other" consists of government enterprises (except State and local government passenger transit) and other input-output (I-O) special industries. For a description of I-O special industries, see Ann M. Lawson, "Benchmark Input-Output Accounts for the U.S. Economy, 1992: Make, Use, and Supplementary Tables," SURVEY OF CURRENT BUSINESS 77 (November 1997): 46–47.

Table 4.—TSA Industry-by-Commodity Total Requirements, 1996

[Total requirements, direct and indirect, per dollar of delivery to final demand, at producers' prices]

Industry	Commodity														
					Transportation										
	Agriculture, forestry, and fisheries	Mining	Construction	Manufacturing	Railroad and passenger ground	Motor freight and warehousing	Water	Air	Pipelines and freight forwarders	Own-account transportation [1]	Communications and utilities	Wholesale and retail trade	Finance, insurance, and real estate	Services	Other [2]
Agriculture, forestry, and fisheries	1.33365	0.01384	0.03765	0.08823	0.02079	0.01263	0.01559	0.01524	0.01054	0.01170	0.01055	0.00960	0.01118	0.02023	0.00281
Mining	0.02417	1.23138	0.03657	0.07647	0.02045	0.01572	0.01548	0.01627	0.01909	0.01321	0.12055	0.01087	0.00632	0.01764	0.00608
Construction	0.02783	0.04057	1.01339	0.02253	0.08139	0.01764	0.01645	0.01431	0.02562	0.01168	0.06566	0.01655	0.04087	0.02016	0.02115
Manufacturing	0.40066	0.21234	0.54968	1.64865	0.35973	0.20718	0.24784	0.26229	0.15674	0.20168	0.16141	0.12900	0.06716	0.26057	0.03660
Railroads and related services; passenger ground transportation, except transit	0.01061	0.00962	0.00536	0.00907	0.93866	0.00568	0.00283	0.00342	0.00284	0.00303	0.01051	0.00241	0.00164	0.00347	0.00151
Motor freight transportation and warehousing	0.03453	0.01931	0.03318	0.03707	0.02101	1.22150	0.01280	0.01200	0.01501	0.01363	0.03891	0.01012	0.00805	0.01352	0.00450
Water transportation	0.00254	0.00116	0.00103	0.00135	0.00102	0.00793	1.15760	0.00126	0.00192	0.00096	0.00182	0.00036	0.00023	0.00045	0.00255
Air transportation	0.00657	0.00554	0.00565	0.00872	0.00694	0.01340	0.00557	1.01325	0.00905	0.00212	0.00563	0.00613	0.00349	0.00650	0.00209
Pipelines, freight forwarders, and related services	0.00379	0.00231	0.00316	0.00522	0.01968	0.05200	0.06555	0.11884	1.02460	0.00222	0.00428	0.00188	0.00101	0.00247	0.00071
State and local passenger transit	0.00108	0.00098	0.00054	0.00092	0.09569	0.00046	0.00029	0.00035	0.00029	0.00031	0.00107	0.00025	0.00017	0.00035	0.00015
Own-account transportation [1]	0.07996	0.03422	0.07075	0.02481	0.01381	0.00919	0.01019	0.00815	0.00991	1.00758	0.01402	0.04463	0.00666	0.02609	0.00310
Communications and utilities	0.04375	0.08526	0.03570	0.05249	0.03830	0.05826	0.03363	0.03676	0.06330	0.04056	1.02707	0.04662	0.02730	0.05782	0.01353
Wholesale and retail trade	0.09814	0.04749	0.13095	0.11843	0.07855	0.06426	0.04281	0.04138	0.03139	0.05805	0.03396	1.03468	0.01431	0.04590	0.00725
Finance, insurance, and real estate	0.14649	0.22065	0.07100	0.08159	0.07097	0.09520	0.12195	0.07455	0.10651	0.04051	0.07860	0.10399	1.18795	0.13150	0.01277
Services	0.11090	0.10059	0.17917	0.15110	0.14091	0.19058	0.26981	0.16299	0.29572	0.14310	0.16237	0.16867	0.11120	1.14147	0.02003
Other [2]	0.01574	0.02497	0.01546	0.02601	0.01972	0.02428	0.18585	0.11060	0.02725	0.01279	0.11586	0.02393	0.02724	0.02193	1.00461
Total industry output multiplier	**2.34043**	**2.05023**	**2.18927**	**2.35265**	**1.92761**	**1.99591**	**2.20424**	**1.89166**	**1.79977**	**1.56310**	**1.85227**	**1.60967**	**1.51480**	**1.77007**	**1.13946**

1. "Own-account transportation" includes transportation by truck and bus provided by nontransportation industries for their own use.

2. "Other" consists of government enterprises (except State and local government passenger transit) and other input-output (I-O) special industries. For a description of I-O special industries, see Ann M. Lawson, "Benchmark Input-Output Accounts for the U.S. Economy, 1992: Make, Use, and Supplementary Tables," SURVEY OF CURRENT BUSINESS 77 (November 1997): 46–47.

a commodity to final users (table 4). Like the 1992 TSA's, the four basic tables in the 1996 TSA's show own-account transportation as a separate industry and a separate commodity.

The rest of this article discusses the changes in the TSA estimates from 1992 to 1996 and describes the estimating method that was used to prepare the 1996 TSA's.

Changes from 1992 to 1996

From 1992 to 1996, transportation's contribution to the economy decreased slightly, primarily reflecting differences in the relative use of transportation and differences in the growth rates among sectors of the economy. This decrease is reflected in both the transportation value-added measure and in the transportation output measure. Within transportation, the contribution of own-account transportation decreased more than that of for-hire transportation, but the general distribution of these two types of transportation among using industries did not change. Table 5 provides summary data on the industry use of transportation, and table 6 shows the industry supply of

Table 5.—Use of Transportation Across Industries, 1992 and 1996

Industry	Commodity											
	Millions of dollars at producers' prices						Percent					
	For-hire transportation		Own-account transportation [1]		Total transportation		Share of total for-hire transportation		Share of total own-account transportation		Share of total transportation	
	1992	1996	1992	1996	1992	1996	1992	1996	1992	1996	1992	1996
Total	**381,300**	**473,096**	**165,461**	**199,652**	**546,761**	**672,748**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Intermediate	217,925	275,903	165,461	199,652	383,386	475,555	57.1	58.3	100.0	100.0	70.1	70.6
Agriculture, forestry, and fisheries	5,720	7,070	13,177	15,157	18,897	22,227	1.5	1.5	8.0	7.6	3.5	3.3
Mining	2,810	2,786	3,870	3,670	6,680	6,456	0.7	0.6	2.3	1.8	1.2	1.0
Construction	13,286	16,127	38,950	48,338	52,236	64,465	3.5	3.4	23.5	24.2	9.6	9.6
Manufacturing	80,248	94,275	21,806	22,316	102,054	116,591	21.0	19.9	13.2	11.2	18.7	17.3
Railroads and related services; passenger ground transportation	3,470	4,271	.....	.....	3,470	4,271	0.9	0.9	.....	.....	0.6	0.6
Motor freight transportation and warehousing	35,049	49,392	.....	.....	35,049	49,392	9.2	10.4	.....	.....	6.4	7.3
Water transportation	5,889	8,509	.....	.....	5,889	8,509	1.5	1.8	.....	.....	1.1	1.3
Air transportation	14,409	17,781	.....	.....	14,409	17,781	3.8	3.8	.....	.....	2.6	2.6
Pipelines, freight forwarders, and related services	1,294	1,572	.....	.....	1,294	1,572	0.3	0.3	.....	.....	0.2	0.2
State and local government passenger transit	173	271	.....	.....	173	271	(*)	0.1	.....	.....	(*)	(*)
Own-account transportation [1]	1,306	1,720	.....	.....	1,306	1,720	0.3	0.4	.....	.....	0.2	0.3
Communications and utilities	8,803	10,607	1,187	1,294	9,990	11,901	2.3	2.2	0.7	0.6	1.8	1.8
Wholesale and retail trade	8,963	12,802	42,819	54,878	51,782	67,680	2.4	2.7	25.9	27.5	9.5	10.1
Finance, insurance, and real estate	10,523	12,174	899	1,259	11,422	13,433	2.8	2.6	0.5	0.6	2.1	2.0
Services	21,482	28,745	42,035	51,918	63,517	80,663	5.6	6.1	25.4	26.0	11.6	12.0
Other [2]	4,500	7,801	718	823	5,218	8,624	1.2	1.6	0.4	0.4	1.0	1.3
Final	163,375	197,193	.....	.....	163,375	197,193	42.9	41.7	.....	.....	29.9	29.4

* Less than 0.1 percent.

1. "Own-account transportation" includes transportation by truck and bus provided by nontransportation industries for their own use.

2. "Other" consists of government enterprises (except State and local government passenger transit) and other input-output (I-O) special industries. For a description of I-O special industries, see Ann M. Lawson, "Benchmark Input-Output Accounts for the U.S. Economy, 1992: Make, Use, and Supplementary Tables," SURVEY OF CURRENT BUSINESS 77 (November 1997): 46–47.

Table 6.—Transportation Value Added by Industry of Origin, 1992 and 1996

Industry	Millions of dollars						Percent					
	For-hire transportation		Own-account transportation [1]		Total transportation		Share of total for-hire transportation		Share of total own-account transportation [1]		Share of total transportation	
	1992	1996	1992	1996	1992	1996	1992	1996	1992	1996	1992	1996
Total	**191,644**	**236,257**	**121,531**	**141,981**	**313,175**	**378,238**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Agriculture, forestry, and fisheries	.....	.....	8,821	9,465	8,821	9,465	.....	.....	7.3	6.7	2.8	2.5
Mining	.....	.....	2,965	2,705	2,965	2,705	.....	.....	2.4	1.9	0.9	0.7
Construction	.....	.....	30,266	37,444	30,266	37,444	.....	.....	24.9	26.4	9.7	9.9
Manufacturing	.....	.....	15,899	15,011	15,899	15,011	.....	.....	13.1	10.6	5.1	4.0
Railroads and related services; passenger ground transportation	34,390	41,541	.....	.....	34,390	41,541	17.9	17.6	.....	.....	11.0	11.0
Motor freight transportation and warehousing	83,371	101,456	.....	.....	83,371	101,456	43.5	42.9	.....	.....	26.6	26.8
Water transportation	12,796	11,215	.....	.....	12,796	11,215	6.7	4.7	.....	.....	4.1	3.0
Air transportation	42,166	59,315	.....	.....	42,166	59,315	22.0	25.1	.....	.....	13.5	15.7
Pipelines, freight forwarders, and related services	19,624	23,192	.....	.....	19,624	23,192	10.2	9.8	.....	.....	6.3	6.1
State and local government passenger transit	–703	–462	.....	.....	–703	–462	–0.4	–0.2	.....	.....	–0.2	–0.1
Communications and utilities	.....	.....	771	799	771	799	.....	.....	0.6	0.6	0.2	0.2
Wholesale and retail trade	.....	.....	30,999	39,186	30,999	39,186	.....	.....	25.5	27.6	9.9	10.4
Finance, insurance, and real estate	.....	.....	607	810	607	810	.....	.....	0.5	0.6	0.2	0.2
Services	.....	.....	30,740	36,072	30,740	36,072	.....	.....	25.3	25.4	9.8	9.5
Other [2]	.....	.....	463	489	463	489	.....	.....	0.4	0.3	0.1	0.1

1. "Own-account transportation" includes transportation by truck and bus provided by nontransportation industries for their own use.

2. "Other" consists of government enterprises (except State and local government passenger transit) and other input-output (I-O) special industries. For a description of I-O special industries, see Ann M. Lawson, "Benchmark Input-Output Accounts for the U.S. Economy, 1992: Make, Use, and Supplementary Tables," SURVEY OF CURRENT BUSINESS 77 (November 1997): 46–47.

transportation; these tables are the sources of information for the comparative analyses.

Slower growth in transportation.—From 1992 to 1996, value added and gross output by transportation industries grew at a slower rate than the economy as a whole. GDP grew more than 25 percent, while the value added that was contributed to GDP by transportation industries grew 21 percent. Total gross output grew more than 27 percent, while transportation gross output grew 23 percent. The slower growth in transportation reduced transportation's share of the total economy. For example, total transportation used by business to produce each dollar of gross output declined from 3.5 percent to 3.4 percent in 1992–96, and transportation's share of total final use declined from 2.6 percent to 2.5 percent.

The slower growth in transportation can largely be attributed to relative differences among industries in their intensity of transportation use and in their growth of gross output.[3] In 1992–96, the industries that were more intensive users of transportation—agriculture, mining, construction, and manufacturing—grew more slowly than the industries that were less intensive users of transportation—wholesale and retail trade; finance, insurance, and real estate (FIRE); and services (chart 1). The five slowest growing industries grew at an average rate of 22 percent in 1992–96 and required 4.0 cents of transportation per dollar of their output in 1996. Over the same period, the five fastest growing industries grew at an average rate of 31 percent and required 2.9 cents of transportation per dollar of their output in 1996.

In addition, transportation's relatively slower growth was attributable to changes in the intensity of transportation use by industries. The transportation requirement for the five fastest growing industries decreased from 3.1 cents per dollar of gross output in 1992 to 2.9 cents in 1996, while that for the five slowest growing industries remained at 4.0 cents. The reduction in transportation intensity for these industries can be attributed to changes in industry practices, changes in transportation efficiencies, and changes in the relative prices of inputs. TSA estimates and additional industry information are required for detailed analysis of the relative contribution of these factors to observed changes in transportation use.

Slower growth in own-account transportation.—Within transportation, own-account transportation grew more slowly than for-hire transportation in 1992–96. Gross output of own-account transportation increased 21 percent, while gross output of for-hire transportation increased 24 percent. Similarly, value added from own-account transportation increased 17 percent, compared with a 23-percent increase in for-hire transportation.[4]

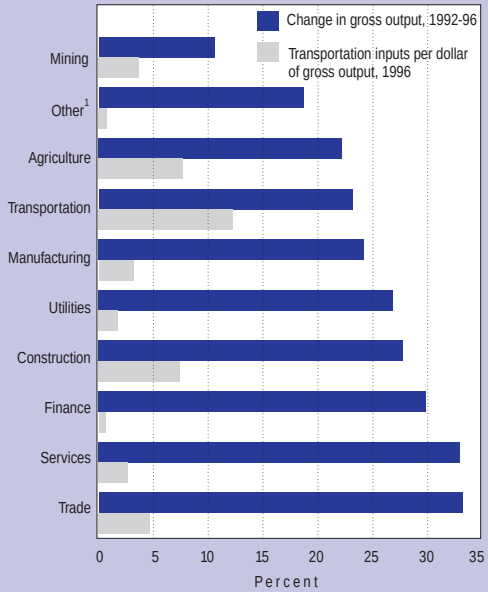
Several factors contributed to the slower growth of own-account transportation. Two key factors are the relative differences in input structures and in the growth of gross output among using industries. For example, the rapidly growing FIRE industry required about half a cent of for-hire transportation for each dollar of industry gross output in 1996, but it required only one tenth as much of own-account transportation. In contrast, the more slowly growing agriculture, mining, and

3. The transportation intensity for an industry is measured by the industry's direct requirement of transportation as a share of its total output. The higher the share, the more intensive a user the industry is.

4. The level of value added from own-account transportation is not comparable with that from for-hire transportation, because the value added from own-account transportation does not include a profit component while that from for-hire transportation does. This treatment of profits for own-account transportation is both conceptual and technical. Profits of own-account transportation activities contribute to overall profits, but a reliable indicator for estimating this contribution is not available.

CHART 1

Transportation Requirements and Output Growth by Industries



1. "Other" consists of government enterprises (except State and local government passenger transit) and other I-O special industries. For a description of I-O special industries, see "Benchmark Input-Output Accounts for the U.S. Economy, 1992: Make, Use, and Supplementary Tables," *Survey* 77 (November 1997): 46–47.

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construction industries all required more own-account transportation per dollar of gross output. In addition, the growth of own-account transportation relative to that of for-hire transportation is probably understated, because own-account transportation of transportation industries may be growing more rapidly than that of other industries, but it is classified as for-hire in the TSA's.[5] Indeed, for the industries in which own-account transportation is estimated in the TSA's, the use of own-account transportation in 1992–96 grew as fast as, or faster than, the use of for-hire transportation. However, the for-hire transportation industry's intensive use of its own services caused its growth to exceed the own-account transportation's growth. In addition, other factors such as outsourcing may have shifted some of the own-account transportation operations from nontransportation industries to for-hire transportation industries.[6]

Small changes in industry use of transportation services.—Although industries grew at different rates from 1992 to 1996, their ranking by use of for-hire transportation services changed only slightly. The three largest users remained manufacturing ($94 billion), for-hire transportation ($82 billion), and services ($29 billion). These three industries accounted for 74 percent of all for-hire transportation used by business (chart 2).

The ranking of industries by their use of own-account transportation from the TSA's also remained relatively stable in 1992–96. The three largest users remained trade ($55 billion), services ($52 billion), and construction ($48 billion). These three industries accounted for 78 percent of all own-account transportation used by business (chart 3).

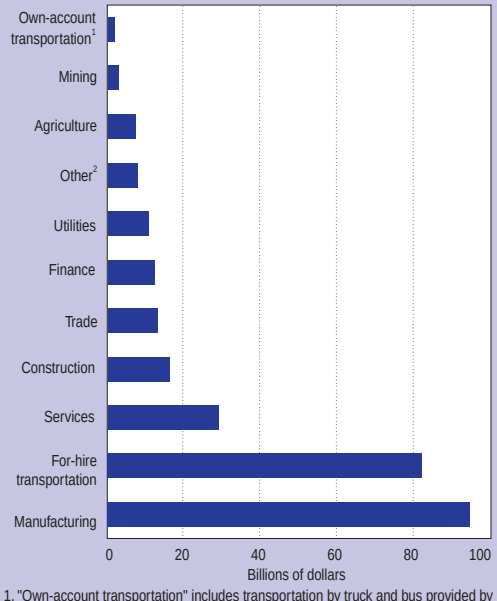
In both 1992 and 1996, the pattern of industry use of for-hire transportation differed markedly from that of own-account transportation. Manufacturing was the largest user of for-hire transpor-

5. In the TSA's, transportation services provided by for-hire transportation industries for the industries' own use are classified as for-hire transportation. Although some of these services may be provided on an own-account basis, the data for own-account cannot be separated from those for for-hire transportation. As a result, the comparison of for-hire transportation with own-account transportation may be slightly distorted. However, the estimates of the size and growth of total transportation are not affected, because own-account transportation activities conducted by for-hire transportation industries are included in the measures of for-hire transportation industries.

6. The profit margin for for-hire transportation increased in 1992–96. If the profit margin increased similarly for own-account transportation, then a bias is introduced into the TSA estimates when comparing growth in value added for for-hire transportation, which includes profits, with that for value added for own-transportation, which does not include profits.

CHART 2

For-Hire Transportation Used by Industries, 1996



1. "Own-account transportation" includes transportation by truck and bus provided by nontransportation industries for their own use.
2. "Other" consists of government enterprises (except State and local government passenger transit) and other I-O special industries. For a description of I-O special industries, see "Benchmark Input-Output Accounts for the U.S. Economy, 1992: Make, Use, and Supplementary Tables," *Survey* 77 (November 1997): 46–47.

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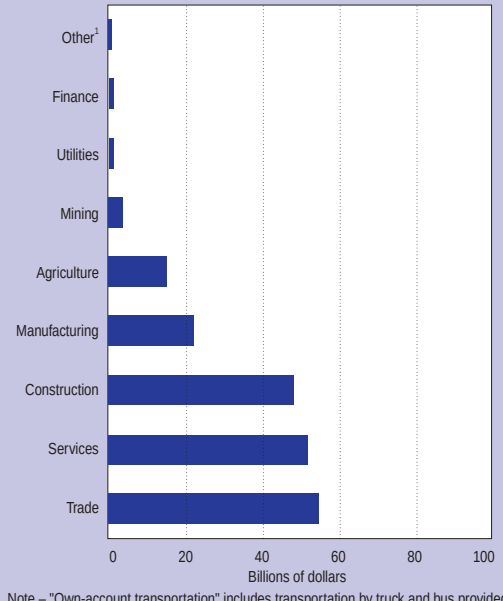
CHART 3

Own-Account Transportation Used by Industries, 1996



Note.– "Own-account transportation" includes transportation by truck and bus provided by nontransportation industries for their own use.
1. "Other" consists of government enterprises (except State and local government passenger transit) and other I-O special industries. For a description of I-O special industries, see "Benchmark Input-Output Accounts for the U.S. Economy, 1992: Make, Use, and Supplementary Tables," *Survey* 77 (November 1997): 46–47.

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tation, but it ranked fourth as a user of own-account transportation. The trade industry was the largest user of own-account transportation, but it ranked only fifth as a user of for-hire transportation.

The differences in industry usage of for-hire transportation or of own-account transportation may reflect differences in business practices across industries. For example, firms in many services industries regularly send service technicians to client sites, and own-account transportation may provide flexibility in scheduling that for-hire transportation can not provide. Similarly, in many retail trade industries, deliveries tend to be irregular in time and location, and for-hire transportation services may be too limited or too expensive. In addition, the omission of own-account transportation by other modes, such as water and air, may have some impact on the differences in industry usage if different industries rely on own-account transportation by these modes to a different extent.

Estimating methods

The 1996 TSA's are based on information from the 1996 annual I-O accounts and the 1992 TSA's and on additional transportation-related data for 1996.[7] The gross output measure of own-account transportation is a cost-based estimate derived from these data. It includes major cost items for the measured transportation operations for an industry—such as fuel, tires, drivers' compensation—but it does not include the contribution of the own-account transportation operations to profits.

The method used to estimate own-account transportation for the 1996 TSA's generally follows steps that were used for the 1992 TSA's. First, all the commodities in the I-O accounts were separated into the commodities that were related to transportation and those that were not on the basis of whether or not the commodity was used predominantly for transportation purposes. For example, motor gasoline, tires, and automotive repair services were primarily used for the maintenance and operation of motor vehicles.

Second, the total use of each commodity that was identified as transportation-related was separated into two parts—that used for transportation and that used for other purposes. For example, gasoline is used for transportation and for operating farm equipment.

Third, the transportation portions of the transportation-related commodities were distributed to different modes, such as transportation by truck, by bus, by air, and by water.

Fourth, for transportation by truck and bus, the transportation portions of the transportation-related commodities were distributed to using industries. The distributions were based on data related to motor vehicles, such as motor vehicle miles by industry and motor fuel use by industry. A set of distribution weights was derived from these data in order to approximate the relative size of transportation operations in nontransportation industries.[8]

Fifth, estimates of other inputs were prepared to form a complete input structure for own-account transportation. These estimates were based on the input structures of the corresponding for-hire transportation industries and exclude transportation costs and trade margins.

Finally, estimates of transportation costs and trade margins were derived from the data on total transportation costs and trade margins expressed as ratios of the commodity output for each and every I-O commodity.

The major difference between the estimating method used for the 1996 TSA's and that used for the 1992 TSA's is the data that were used to distribute the transportation portion of the transportation-related commodities in step four. For the 1992 TSA's, the distribution weights were based on data from the Census Bureau's 1992 Truck Inventory and Use Survey, which is only conducted every 5 years as a part of the economic census. For the 1996 TSA's, the distribution weights were extrapolated from those used for the 1992 TSA's by detailed industry output data from the 1996 annual I-O accounts (see table A).

The TSA extrapolators are based on nominal values of industry output, so they include relative price effects. These output-based extrapolators are used to calculate the distribution weights of transportation-related commodities, which are then used to derive TSA estimates of own-account transportation for industries. For the 1996 TSA's, the relative price effects are assumed to have only a small impact. In future updates, real values will be used.

The new source data used to prepare the 1996 TSA's include the following: The output of transportation-related commodities are from the 1996

7. For an overview of the 1996 annual I-O accounts, see Sumiye O. Okubo, Ann M. Lawson, and Mark A. Planting, "Annual Input-Output Accounts of the U.S. Economy, 1996," *Survey* 80 (January 2000): 37–86.

8. The transportation-related commodities for other modes were not distributed to using industries, because sufficient information to create these distributions was not available. This is the major reason why own-account estimates for these modes are not included in the current TSA's.

annual I-O accounts; 1996 data on energy use by transportation modes, which are used to distribute transportation-related commodities by modes, are from the Department of Energy's transportation energy data book; and the input structure of the for-hire transportation industries from the 1996 annual I-O accounts are used to estimate the inputs for own-account transportation. Table A provides a summary comparison of the source data used for the 1992 and 1996 TSA's.

Table A.–Source Data for the 1992 TSA's and for the 1996 TSA's

Data	1992 TSA's	1996 TSA's
Primary source and accounting framework	1992 benchmark input-output (I-O) accounts from BEA	1996 annual I-O accounts from BEA
Transportation and nontransportation use of energy [1]	Transportation energy data from Department of Energy (DOE)	Transportation energy data from DOE
Distribution weights [2]	1992 Truck Inventory and Use Survey from the Census Bureau	Unpublished work files for 1992 benchmark I-O accounts and 1996 annual I-O accounts from BEA
Other commodity inputs [3]	1992 benchmark I-O accounts from BEA	1996 annual I-O accounts from BEA

TSA's Transportation satellite accounts
1. The shares of total fuel and other transportation-related commodity outputs used for transportation purposes and across different transportation modes.
2. The distribution weights used to allocate the total consumption of fuel and transportation-related commodities for transportation purposes across industries.
3. Commodities that are not transportation-specific, but that are used in the production of transportation services.