Transportation Statistics Annual Report

U.S. Department of Transportation
Bureau of Transportation Statistics

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Bureau of
Transportation
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U.S. Department of Transportation

Bureau of Transportation Statistics

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400 Seventh Street, SW, K-15
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Acknowledgments

U.S. Department of Transportation

Norman Y. Mineta
Secretary

Bureau of Transportation Statistics

Rick Kowalewski
Deputy Director

William J. Chang
Associate Director for Information Systems

John V. Wells
Chief Economist

Jeremy Wu
Acting Chief Statistician

Produced under the direction of:
Wendell Fletcher
Assistant Director for Transportation Analysis

Project Manager
Kirsten Oldenburg

Editor
Marsha Fenn

Major Contributors
Kathryn Tsibulsky
Felix Ammah-Tagoe
Anthony Apostolides
Jonaki Bose
David Chesser
David Chien
Martha Courtney
Scott Dennis
Kay Drucker
Ron Duych
Bingsong Fang
Mary Field
Chester Ford
Lee Giesbrecht
Bruce Goldberg
Jason Goodfriend
Xiaoli Han
Elijah Henley
Deborah Johnson
Maha Khan
Janice Lent
William Mallett
Getachew Mekonnen
Jeffery Memmott
Craig Morris
Nagaraj Neerchal
Long Nguyen
Ken Notis
Lisa Randall
Elizabeth Roberto
Joy Sharp
Matthew Sheppard
Brian Sloboda
Deepak Virmani
Jie Zhang

Other Contributors
Bill Bannister
Don Bright
Michael Cohen
Dorinda Edmondson
Pat Flanagan
Alpha Glass
Chip Moore
Peg Young

Report Layout, Production, and Cover Design
Lorisa Smith
Ashton Alvis

Preface

Congress requires the Bureau of Transportation Statistics (BTS) to report on transportation statistics to the President and Congress. This *Transportation Statistics Annual Report (TSAR)* is the ninth such report prepared in response to this congressional mandate, laid out in 49 U.S.C. 111 (j). In addition to presenting the state of transportation statistics, the report focuses on transportation indicators related to 15 topics. Most of these topics are specified in the Transportation Equity Act for the 21st Century.

The BTS publication, *National Transportation Statistics (NTS)*, a companion to this annual report, has more comprehensive and longer time series data than could be accommodated here. *NTS* is available both in print and online at www.bts.gov.

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Chapter 1

Summary

Summary

In this edition of the Transportation Statistics Annual Report, the Bureau of Transportation Statistics (BTS) has focused on transportation indicators related to 15 specific topics (chapter 2) and on the overall state of transportation statistics (chapter 3).

SUMMARY OF TRANSPORTATION INDICATORS (CHAPTER 2)

Chapter 2 contains transportation data and information on the following topics:[1]

1. productivity in the transportation sector,
2. traffic flows,
3. travel times,
4. vehicle weights,
5. variables influencing traveling behavior,
6. travel costs of intracity commuting and intercity trips,
7. availability of mass transit and number of passengers served,
8. frequency of vehicle and transportation facility repairs,
9. accidents,
10. collateral damage to the human and natural environment,
11. condition of the transportation system,
12. transportation-related variables that influence global competitiveness,
13. transportation and economic growth,
14. government transportation finance, and
15. transportation energy

Each of these topics is represented by a series of key indicators in chapter 2. The indicators are presented graphically; supporting data tables are in appendix B (see box 1).

[1] Topics 1 through 12 appear in the Transportation Equity Act for the 21st Century, under 49 USC 111(c)(1). Some of the topic names, however, have been shortened in this report.

BOX 1
About the Data in this Report

The data in this report come from a variety of sources—principally, from the Bureau of Transportation Statistics and other operating administrations of the Department of Transportation. However, other sources are federal government agencies, such as the U.S. Census Bureau, Bureau of Economic Analysis, U.S. Environmental Protection Agency, U.S. Coast Guard, and Energy Information Administration. To supplement government sources, the report occasionally uses data and information from trade associations, such as the Association of American Railroads and American Public Transportation Association. Data from any of these sources may be subject to omissions and errors in reporting, recording, and processing. Sample data are subject to sampling variability. Documents cited as sources in this report often provide detailed information about definitions, methodologies, and statistical reliability.

To be consistent, when trend data are used in this report they are shown, if possible, for at least a 10-year period. Because of the differing availability of data among all the indicators included, it has not been possible to use the same span of 10 years for each indicator without sacrificing timeliness. Instead, the data span a decade up to the year of most recent data available when this report was prepared. (More information about data in the report can be found in the introduction to chapter 2.)

In this summary chapter, full data sources are not provided. However, the data here are from chapter 2, where full citations are given in the text and graphs. Corresponding tables in appendix B also contain source information. The data here are presented in the same order—by topic section—as they appear in chapter 2 enabling easy access to data sources. Also not present in this chapter are complete definitions, which can vary across data sources.

1. Productivity in the Transportation Sector

Labor productivity in the for-hire transportation services and petroleum pipeline industries increased 20 percent between 1990 and 2000 compared with all business, which increased 23 percent. Among the modes, railroad and local trucking increased the most, by 65 percent each from 1990 to 2000. The labor productivity of Class I bus carriers, which fluctuated over the period, increased the least (16 percent).

The multifactor productivity of all private business sectors combined increased 8 percent between 1990 and 1999, while the multifactor productivity of the rail transportation subsector increased 30 percent.

These two indicators of economic productivity—multifactor and labor productivity—differ. Labor productivity relates output to labor input, while multifactor productivity relates changes in output to changes in a set of inputs, such as capital, labor, energy, materials, and services. Economists generally consider multifactor productivity to be a more comprehensive indicator since it takes into account changes in several different inputs, not just labor. Rail is the only transportation sector for which multifactor productivity estimates are currently available. BTS has a project underway, in consultation with the Bureau of Labor Statistics to develop multifactor productivity indicators for all modal sectors.

2. Traffic Flows

Tracking the volume and geographic flow of traffic on America's roads, rails, airports, and waterways helps to ensure that transportation infrastructure is properly maintained and has adequate capacity to meet the demand. The volume of passenger travel is measured by estimating the number of miles traveled per person for each mode (see box 2). This method takes into account the distance traveled by a vehicle and the number of people in the vehicle. Freight is measured in ton-miles, the movement of one ton of cargo the distance of one statute mile. Each of these volume measurements allows for comparisons across modes, although these comparisons are affected by data-collection methods and definitions.

BOX 2
Data on Passenger-Miles of Travel

Two national estimates of passenger-miles of travel (pmt) are available; they differ in coverage, methodology, and other factors. The 2000 pmt data presented in this section come from the Bureau of Transportation Statistics (BTS) publication, *National Transportation Statistics 2002* (NTS). BTS compiles these data for NTS annually, primarily using mode-by-mode data derived in various ways by BTS and others. For instance, pmt for large air carriers and intercity trains are estimated from ticket sales and trip lengths; for transit, the data are reported by transit authorities. Each method used to estimate these pmt has differing strengths and weaknesses, as discussed in NTS in the Accuracy Profiles for table 1–34 (available at http://www.bts.gov/).

Later, in the section on *Variables Influencing Travel Behavior*, is a presentation of 2001 pmt data from the 2001 National Household Travel Survey, jointly conducted by BTS and the Federal Highway Administration. As survey data, they are collected using a single methodology. This provides a coherence and comparability not available with the NTS data. However, these data are not collected annually, limiting their use for trend analyses. Another difference between the NTS and NHTS data is the extent of their coverage among modes. It is to be expected, then, that because of methodological and coverage issues the NTS and NHTS data will differ.

Passenger miles of travel (pmt) in the United States totaled an estimated 4.7 trillion in 2000, or about 17,000 miles for every man, woman, and child. Over the decade, 1990 to 2000, pmt increased 24 percent. Excluding gas pipelines, all modes of freight transportation combined generated nearly 4.0 trillion domestic ton-miles in 2000, 20 percent more than in 1990.

In addition to studying freight and passenger volumes, it is also important to track changes in the geographic and modal distribution of freight and passenger travel in order to anticipate and alleviate areas of high congestion. Truck, rail, and waterborne freight flow maps help planners to pinpoint potential problem areas in the transportation system.

3. Travel Times

Most Americans experience some type of travel delay while driving their personal vehicle or traveling on a bus, train, or airplane. These delays can be costly for individuals, businesses, and the transportation industry. A multitude of factors can affect travel times.

In a 2003 study, BTS found that between 1995 and 2002, scheduled trip time (including connection time, where necessary) had increased in 63 percent of 246 rail city-pairs, in 68 percent of 261 air city-pairs, and in 46 percent of 250 intercity bus city-pairs.

For those using personal vehicles, highway travel times increased in 70 of 75 urban areas (93 percent) between 1990 and 2000. In 2000, it took 39 percent longer, on average, to make a peak period trip in urban areas compared with the time it would take if traffic were flowing freely.

Just over 82 percent of domestic air flights arrived on time in 2002, compared with 75 percent in 1996. Late flights amounted to 16 percent of flights in 2002, down from 23 percent in 1996. Over this period, late, canceled, or diverted flights peaked at 1.6 million in 2000, declining to just below 942,000 in 2002.

Seventy-seven percent of Amtrak trains arrived at their final destination on time in 2002, compared with 72 percent in 1993. Over these years, short-distance trains—those with runs of less than 400 miles—have consistently registered better on-time performance than long-distance trains—those of 400 miles or more.

4. Vehicle Weights

Vehicle traffic affects the longevity of infrastructure. Traffic, on a given highway segment, can be measured by average weights and numbers of vehicles. Another approach to assessing highway pavement stress is by estimating vehicle loadings on the nation's highways. Aircraft landing weights can affect airport pavement, as can the weight of rail equipment on rail tracks. For maritime infrastructure, especially ports, vessel size (often expressed in deadweight tons (dwt)—a measure of cargo capacity), rather than weight, can be of concern. As larger waterborne vessels are added to the worldwide merchant marine fleet, U.S. ports may have to expand to accommodate larger ships or decide to specialize in handling cargoes that are not affected by changes in vessel size.

The number of trucks in the U.S. truck fleet grew 23 percent between 1992 and 1997.[2] In the Heavy category (over 26,000 pounds), the number of trucks grew 37 percent during the period, while medium trucks (between 6,001 and 19,500 pounds) increased 14 percent. Light trucks, which include sport utility vehicles (SUVs), minivans, vans, and pickup trucks, represented 86 percent of the truck fleet in 1997. The number of light trucks increased by 24 percent between 1992 and 1997, however, the strongest growth occurred among SUVs (93 percent) and minivans (61 percent).

Large combination trucks[3] made up only 6 percent of traffic volume in urban areas in 2001 but accounted for 77 percent of urban Interstate highway loadings. In rural areas, they represented 17 percent of traffic and 89 percent of rural Interstate loadings in 2001. Between 1991 and 2001, large combination truck traffic volume grew from 14 percent to 17 percent on rural roads, while remaining the same on urban Interstate highways.

The average capacity of containerships calling at U.S. ports increased 9 percent to nearly 40,000 dwt between 1998 and 2001.[4] Meanwhile, the average capacity of all types of vessels calling at U.S. ports grew 4 percent.

The average weight of each freight railcar remained fairly constant—ranging from 63 to 67 tons—between 1991 and 2001. However, this relatively steady average weight of a loaded railcar masks countervailing trends among selected freight commodities. Between 1991 and 2001, for instance, the average weight of a carload of coal was 110 tons in 2001, up from 99 tons in 1991. Coal represented 46 percent of rail freight tonnage in 2001.

5. Variables Influencing Traveling Behavior

Results from the 2001 National Household Travel Survey,[5] sponsored by BTS and the Federal Highway Administration, show that the daily non-occupational travel of all people in the United States totaled about 4 trillion miles, an average of 14,500 miles per person per year. On a daily basis, the average person traveled 40 miles, 88 percent of it in a personal vehicle.[6] Overall, people took 411 billion daily trips in 2001, an average of 1,500 trips per person annually or about 4 trips per day. The largest number of daily trips (45 percent) were to shop, to visit doctors and dentists, and for other family and personal business. Commuting—trips made to and from work—accounted for 15 percent of all personal trips in 2001. The average length of these trips was 12 miles.

One key factor affecting travel behavior is household vehicle availability. Slightly less than one-third of households had one personal vehicle available for use in 2001. A little more than one-third of households (40 million out of 107 million households) had two vehicles and

[2] These data, from the Vehicle Inventory and Use Survey conducted every five years, were the most recent available when this report was prepared.

[3] Large combination trucks weigh more than 12 tons and have 5 or more axles.

[4] 1998 is the first year for which data are available.

[5] See box 2 on page 5 for a discussion about pmt data. Full details of the 2001 National Household Travel Survey are in chapter 2, section 5.

[6] Comprises cars, vans, SUVs, pickup trucks, other trucks, recreational vehicles, and motorcycles.

slightly less than one-quarter had three or more vehicles available. Almost 8 percent of households (8.5 million) had no vehicle available for use. People in these households tend to take fewer trips and travel shorter distances each year than people in households with at least one vehicle available.

6. Travel Costs of Intracity Commuting and Intercity Trips

On average, U.S. households spent $7,406 (in chained 1996 dollars) on transportation in 2001. This represented 21 percent of all household expenditures. Only housing cost more (31 percent). On average (median), half of the working poor spent almost 10 percent of their income (based on current 1999 dollars) on commuting expenses in 1999. This is over twice the percentage of income that the median of the total population spent on commuting (4 percent).

Driving an automobile 15,000 miles per year cost 50¢ per mile in 2001, or 16 percent more than it did in 1991, when total costs were 43¢ (in chained 1996 dollars). For those using transit, the average fare remained about the same between 1990 and 2000 (in chained 1996 dollars). Increases in fares per passenger-mile for some modes of transit were offset by lower fares per passenger-mile for other modes.

On average, intercity trips via Amtrak cost 20¢ per revenue passenger-mile in fiscal year 2000, up 33 percent from 15¢ per revenue passenger-mile in fiscal year 1993 (in chained 1996 dollars). Meanwhile, average intercity Class I bus fares rose 27 percent, from $21 to $26, between 1990 and 2000 (in chained 1996 dollars).

As these data show, it is not always possible to compare the travel costs of intracity and intercity trips because not all mode travel costs can currently be measured in the same way. However, BTS statisticians, in collaboration with the Bureau of Labor Statistics, are investigating a new method of computing price indices for air travel. Preliminary data from this research are presented in chapter 2. This research might one day serve as a model for producing price indices for other modes, enabling better cross-modal comparisons.

7. Availability of Mass Transit and Number of Passengers Served

There were approximately 7,500 transit agencies in the United States in 2001. However, about 70 percent of the U.S. population is served by just 580 of these agencies. Transit use continues to be concentrated in specific markets, such as communities where households do not own cars, in certain large cities, and in lower income households. Approximately 40 percent of all daily transit trips are work related.[7]

There were 46.5 billion urban transit pmt in 2001 compared with 37.5 billion in 1991, an increase of 24 percent. As they have historically, buses had the largest pmt share in 2001, generating 19.6 billion pmt or 42 percent of all transit pmt.

While transit ridership was somewhat stagnant between 1991 and 1996, it grew steadily between 1996 and 2001 to 9 billion unlinked trips,[8] an increase of 19 percent. Bus ridership comprised the majority of unlinked trips (5.2 billion) in 2001. However, rail transit ridership, with almost 3.5 billion trips in 2001, posted the strongest growth (39 percent). Since at least 1996, approximately 77 percent of all unlinked transit passenger trips (6.9 billion trips in 2001) have been made within the service area of only

[7] The datum in this sentence is from the *2001 National Household Travel Survey* (see section 5 in chapter 2 for more information). The balance of the data in this summary of section 7 are from the Federal Transit Administration's National Transit Database and *National Transit Summaries and Trends*, 2002 draft. Full citations are available in chapter 2.

[8] For a discussion of linked vs. unlinked trips, see section 7 in chapter 2.

30 such authorities. New York City transit alone accounted for 30 percent of all trips in 2001.

The nationwide fleet of ADA[9] lift- or ramp-equipped transit buses increased to 87 percent (to 58,785 buses) in 2001 from 52 percent of the bus fleet in 1993. In 2001, 50 percent or 1,374 rail transit stations were ADA accessible. These stations serve passengers traveling via automated guideway transit, cable cars, commuter rail, heavy rail, inclined plane, light rail, monorail, and the Alaska Railroad.

8. Frequency of Vehicle and Transportation Facility Repairs

Data are not readily available to properly characterize the frequency of repairs for vehicles and infrastructure of all modes. Partly, this is because vehicle operations for many modes are in the private sector; and, as it affects profitability, this operational information can be confidential. For passenger cars, actual repair frequency data and resultant disruptions are dispersed among car owners. However, some private organizations do collect and analyze car repair data on a model/year basis.

In some cases where repair data are available, making the link to service interruptions can be problematic. In other cases, maintenance cost data are available (e.g., airlines and highways). But, again, the connection between costs and frequency and, thus, interruptions of service are not clear. Annual data are available on U.S. domestic vessel fleet capacity, but capacity results from market and other factors as well as repair downtime.

Most of the vehicle repair data for the trucks and buses operated by the nation's nearly 600,000 motor carriers are not public information. A surrogate measure is data on highway truck inspections. Over 2.0 million roadside truck inspections were completed in 2001, up 25 percent since 1990. The percentage of inspected trucks taken out of service declined from 34 percent in 1990 to 23 percent in 2001.

Work zones on freeways cause an estimated 24 percent of the nonrecurring delays on freeways and principal arterials. The level of funding applied to highway maintenance is an indirect measure of the amount of maintenance activity and, thus, presence of work zones on highways. Funding for highway maintenance increased by 15 percent (in constant 1987 dollars)[10] between 1990 and 2001. Pavement resurfacing represented just over half (51 percent) of the miles of federal-aid roads undergoing federally supported construction or maintenance in 2001, up from about 42 percent in 1997.[11]

Class I railroad companies maintained nearly 170,000 miles of track in 2001, down from nearly 200,000 miles of track in 1991. Throughout the 1990s, rail companies replaced an average of 743,000 tons of rail and an average of 12.2 million crossties each year. Railroads also periodically replace or rebuild locomotives and freight cars. On average, new and rebuilt locomotives made up 4 percent of Class I railroad fleets between 1990 and 2001.

Transit service[12] interruptions due to mechanical failures remained relatively level from 1995 through 2000,[13] averaging between 18 and 19 mechanical problems per 100,000 revenue vehicle-miles.

[9] ADA refers to the Americans with Disabilities Act (ADA) of 1990.

[10] Instead of chained 1996 dollars, constant 1987 dollars are used here because the Federal Highway Administration publishes its data accordingly.

[11] 1997 is the earliest year for which these data are available.

[12] See detailed definitions of the type of transit equipment included in this section in chapter 2.

[13] Data prior to 1995 and later than 2000 were collected using different definitions of what constitutes an interruption of service and are not comparable.

Natural disasters, accidents, labor disputes, terrorism, security breaches, and other unforeseeable incidents can result in major disruptions to the transportation system. Although a comprehensive account of these unpredictable interruptions has not been undertaken nor data compiled on them, numerous studies and other analyses have sought to evaluate the effects of individual events on the transportation system.

Terrorist attacks and security alerts have affected transportation services for decades. After the terrorist attacks of September 11, 2001, all commercial flights scheduled for September 12 were canceled. Many flights were canceled during the remainder of the month and the months that followed. Two years later, air passenger traffic has not fully recovered; however, other factors, such as an economic downturn, may have contributed to the decrease in traffic.

9. Accidents

Crashes involving motor vehicles and other transportation accidents in the United States result in tens of thousands of fatalities and millions of injuries each year. The number of fatalities and injuries per year represent a common means for evaluating the safety of each transportation mode. Dividing the number of fatalities by population and injuries by passenger-miles traveled can enable useful comparisons across time and modes. However, care must be taken in doing so, because definitions of fatalities and injuries vary by mode.

There were 45,130 fatalities related to transportation in 2001, almost 16 fatalities per 100,000 U.S. residents. This is a decline of 11 percent from 18 fatalities per capita in 1991, when there were 44,320 fatalities. Nearly 93 percent of all transportation fatalities in 2001 were highway-related.

An estimated 3.1 million people suffered some kind of injury involving passenger and freight transportation in 2001. Most of these injuries, about 98 percent, resulted from highway crashes. However, injury rates for most highway vehicle types declined between 1991 and 2001. One exception was the rate for light truck occupants, which rose 15 percent, from 50 per 100 million pmt in 1991 to 58 per 100 million pmt in 2001.

A BTS analysis of motor vehicle-related injury data for 2001[14] shows that there were sharp peaks in injuries associated with youth. For motor vehicle occupants and motorcyclists, the peak spanned ages 15 to 24 years; for pedalcyclists and pedestrians, the peak spanned ages 10 to 14 years. Young males exhibited a substantially greater peak in serious injuries than young females. In addition, the percentage of injuries classified as serious was greater for motorcyclists (20 percent of all motorcyclist injuries were serious), pedestrians (19 percent), and pedalcyclists (10 percent) than it was for motor vehicle occupants (7 percent).

Motor vehicle crashes in the United States cost an estimated $231 billion in 2000 (in current dollars), about $820 per person or 2 percent of the Gross Domestic Product (GDP). The largest components of the total cost (26 percent each) are market productivity—the cost of foregone paid labor due to death and disability—and property damage.

While transportation accidents amounted to approximately 6 percent of the deaths of those under age 65 between 1991 and 2000, these fatalities represented 10 percent of the total

[14] This analysis was based on data from the U.S. Consumer Product Safety Commission's National Electronic Injury Surveillance System. Due to methodological differences, these data are not necessarily consistent with other injury data in this report that come from the U.S. Department of Transportation, National Highway Traffic Safety Administration's National Automotive Sampling System General Estimates System.

years of potential life lost (YPLL)[15] during this period. People who die from transportation accidents tend to be younger on average than victims of other causes of death.

10. Collateral Damage to the Human and Natural Environment

As people travel and freight is transported, damage can occur to the human and natural environment. Although most available environmental data is limited to these movements, transportation's impact on the environment is not. It can also occur when transportation equipment and fuels are produced and infrastructure is built, during repair and maintenance of equipment and infrastructure, and when equipment and infrastructure are no longer usable and are discarded and dismantled. The extent of damage throughout these life cycles of transportation fuel, equipment, and infrastructure can vary by mode. In all cases, actual impacts on the human and natural environment are dependent on ambient levels or concentrations of pollutants and rates of exposure.

Transportation vehicles and vessels in 2001 emitted 66 percent of the nation's pollution from carbon monoxide (CO), 47 percent of nitrogen oxides (NO_x), 35 percent of volatile organic compounds (VOC), 5 percent of particulates, 6 percent of ammonia, and 4 percent of sulfur dioxide. Highway vehicles emitted almost all of transportation's share of CO emissions in 2001, 80 percent of the NO_x, and 75 percent of all VOC. With the exception of ammonia, transportation air emissions have declined since 1991.

Transportation emissions of greenhouse gases (GHGs) grew 22 percent between 1990 and 2001, while total U.S. emissions rose 13 percent to 6,936 teragrams of carbon dioxide (CO_2) equivalent ($TgCO_2Eq$).[16] Of this, 27 percent were emitted by transportation. Nearly all (97 percent) of CO_2 emissions—the predominant GHG—are generated by the combustion of fossil fuels. Transportation was responsible for 31 percent of all U.S. CO_2 emissions in 2001. Transportation CO_2 emissions grew 24 percent between 1991 and 2001.

Transportation-related sources typically account for most oil spills into U.S. waters reported each year to the U.S. Coast Guard. For instance, transportation's share of the total volume of oil spilled between 1991 and 2000 varied from a high of 97 percent (in 1996) to a low of 77 percent (in 1992). The volume of each spill varies significantly from incident to incident. One catastrophic incident can, however, spill millions of gallons into the environment.

Transportation firms reported more than 17,700 hazardous materials incidents in 2001.[17] These incidents resulted in 7 deaths and 143 injuries, compared with annual averages of 21 deaths and 445 injuries between 1991 and 2001. During that decade, the number of reported hazardous material incidents increased. However, much of the increase may be attributed to improved reporting and an expansion of reporting requirements.

11. Condition of the Transportation System

Two major components of the transportation system—vehicles and infrastructure—are prone to deterioration due to wear, aging, and damage. Another component, capacity, is important to understand to aid planners in meeting the demands for travel and shipping affected by, say, congestion. Measures of the net capital stock of

[15] YPLL, which is computed by adding up the remaining life expectancies of all victims at their deaths, is a measurement that accounts for the age distribution among different causes of injury mortality and other common causes of death.

[16] Including sinks, net U.S. emissions totaled 6,098 $TgCO_2Eq$ in 2001. See section 10 in chapter 2 for more information on sinks.

[17] See this section in chapter 2 for a definition of a reported incident.

the transportation system—the value in dollars of vehicles, infrastructure, and other components—provide comprehensive indicators that combine system condition (quality) with capacity (quantity). This measure gives a sense of the amount of money invested in the system over time and allows for comparisons across modes.

Highway-related capital stock (highway infrastructure, consumer motor vehicles, and trucking and warehousing) represented the majority of the nation's transportation capital stock in 2000 (at $2,166 billion, in 1996 chained dollars). Rail also represented a substantial portion of transportation capital stock; although, it was still less than one-sixth of highway-related capital stock. The combined value of privately owned capital stock for other modes of the transportation system, including rail, water, air, pipeline, and transit, is less than the value of consumer motor vehicles alone. All highway-related capital stocks increased between 1990 and 2000. In-house transportation grew 81 percent, while transportation services (a component of all modes) rose 83 percent.

Individual data on vehicle and infrastructure condition are collected by several operating administrations of the U.S. Department of Transportation, such as the Federal Highway Administration and the Federal Aviation Administration. These data reflect qualitative evaluations of the pavement and associated structures.

The condition of highways, bridges, and airport runways have all improved in recent years. The percentage of rural Interstate mileage in poor or mediocre condition declined from 35 percent in 1993 to 14 percent in 2001. Moreover, poor or mediocre urban Interstate mileage decreased from 42 to 28 percent during this same period. Of the nearly 600,000 roadway bridges in 2001, 14 percent were deemed structurally deficient and 14 percent functionally obsolete. Ten years earlier, about 40 percent of bridges were either structurally deficient or functionally obsolete. At the nation's commercial service airports, pavement in poor condition declined from 5 percent of runways in 1990 to 2 percent in 2001. For the larger group of several thousand National Plan of Integrated Airport Systems airports, poor conditions existed at 5 percent of runways in 2001, down from 10 percent in 1990.

The age of various transportation fleets is another measure of condition, although not a very precise one. The equipment in air, rail, highway, water, and transit transportation fleets varies widely in terms of scheduled maintenance, reliability, and expected life span. Additional information, such as fleet maintenance standards, actual hours of vehicle use, and durability, would provide a more thorough means for analyzing the condition of a vehicle fleet and comparing fleets across modes.

Because of improvements in the longevity of passenger cars, the median age of the automobile fleet in the United States has increased significantly since 1992. The median age of the truck fleet,[18] by contrast, began to increase in the early 1990s but has been declining since 1997 as new purchases of light trucks have increased substantially.

The age of transit vehicles varies by transit and vehicle type. For instance, ferryboat fleets have aged, while the average age of full-size transit buses has decreased between 1990 and 2000. Similarly, the age of the U.S. maritime flag vessel fleet varies by vessel type. While 28 percent of the overall U.S. flag vessel fleet was 25 years old or more in 2000, 50 percent of towboats and 43 percent of tank and liquid barges were 25 years old or older in 2000.

The average age of Amtrak locomotives and railcars has declined by a year between 1990

[18] This includes all truck categories: light, heavy, and heavy-heavy.

and 2000. Of the 20,028 Class I freight locomotives in service in 2000, 37 percent were built in 1990 or later. While these data on rail equipment are publicly available, data on the condition of infrastructure are not released by the nation's private railroads.

Finally, the average age of all U.S. commercial aircraft was 13 years in 2000, up from 11 years in 1991. While the average age of aircraft belonging to the major airlines was also 11 years in 1991, it was a year younger than the fleet average in 2000.

12. Transportation-Related Variables That Influence Global Competitiveness

Transportation contributes to economic activity and to a nation's global competitiveness as a service, an industry, and an infrastructure. It affects the price competitiveness of domestic goods and services because final market prices reflect transportation costs.

The United States had relatively lower prices for transportation goods and services in 1999[19] than 15 out of 25 Organization for Economic Cooperation and Development countries. However, the nation's top two overall merchandise trade partners, Canada and Mexico, had lower relative prices in 1999 than the United States.

The United States traded $300 billion worth (in current dollars)[20] of transportation-related goods (e.g., cars, trains, boats, and airplanes and their related parts) in 2002 with its partners, more than twice the nominal value of these commodities in 1990. As is the case with overall international trade, the United States had a merchandise trade deficit in transportation-related goods exports and imports, totaling $82 billion in 2002.

U.S. trade in transportation services in 2002 totaled $105.4 billion (in current dollars). The United States had a surplus in transportation services from 1990 through 1997. Then, between 1997 and 1998, imports increased 7 percent while exports decreased 5 percent, resulting in a $4.6 billion deficit. This deficit continued to grow, reaching $13.9 billion in 2002.

Since competitiveness implies advantages in exporting certain products, these measures indicate the relative U.S. position in transportation-related goods and services. While these measures are good indicators of export performance, they only *indirectly* measure the relative competitive position of the United States, because several other factors besides trade influence competitiveness. A central concept that underpins trade among nations, sectors, industries, and firms is *comparative advantage*. Comparative advantage in trade occurs when trading partners seek to benefit from the ability to produce goods or services more efficiently or cost-effectively than other countries. The implication of this concept is that no country has a comparative advantage in the production of *every* good and service. In this sense, competitiveness refers to the advantage one country may have over other nations in exporting certain products, with the ultimate goal being the improvement of the country's prosperity and standard of living.

13. Transportation and Economic Growth

Transportation comprises a sizable segment of the U.S. economy. Total transportation-related final demand rose by 37 percent between 1990 and 2001 (in 1996 chained dollars), from $719.8 billion to $984.1 billion. This meas-

[19] 1999 is the most recent year for which comparable international data were available at the time this report was prepared.

[20] All dollar amounts in this section are in current dollars. While it is important to compare trends in economic activity using constant or chained dollars to eliminate the effects of price inflation, it is not possible to do so in this instance (see notes on chapter 2 figures and corresponding tables in appendix B).

ure—the value of transportation-related goods and services sold to the final users—is a component of GDP and a broad measure of the importance of transportation to the economy. In 2001, the share of transportation-related final demand in GDP was 11 percent, the same as in 1990.

The contribution of for-hire transportation industries to the U.S. economy, as measured by their value-added (or net output), increased (in 1996 chained dollars) from $181 billion in 1990 to $270 billion in 2001. In the same time period, this segment's share in GDP fluctuated slightly, increasing from 2.7 percent in 1990 to 3.0 percent in 1999 before declining to 2.9 percent in 2001. This is also a component of GDP but cannot be added to transportation final demand because the two measures reflect different approaches (supply-side and demand-side) to assessing the relationship between transportation and the economy.

14. Government Transportation Finance

Governments collect revenues and spend money on transportation-related infrastructure and equipment. Federal, state, and local government transportation revenues targeted to finance transportation programs[21] increased 38 percent from $82.2 billion in 1990 (in 1996 chained dollars)[22] to $113.6 billion in 2000.

Spending on building, maintaining, operating, and administering the nation's transportation system by all levels of government totaled $149.0 billion in 2000 (in 1996 chained dollars). Among all modes of transportation, highways receive the largest amount of total government transportation expenditures. In 2000, this amounted to $93.6 billion and accounted for nearly 63 percent of the total.

Gross government transportation investment,[23] including infrastructure and vehicles, is a measure of the building of new public transportation capital. As a major component of the nation's total transportation capital stocks, gross investment has risen steadily over the last decade from $59.0 billion in 1990 to $76.0 billion in 2000, an increase of 29 percent (in 1996 chained dollars).

15. Transportation Energy

Transportation energy use rose 22 percent between 1991 and 2001, to 28 percent of the nation's total energy consumption in 2001. Still, transportation energy use has grown more slowly than GDP over the decade, indicating that the U.S. economy is gradually becoming less energy intensive and, thus, less vulnerable to changes in energy prices. Highway vehicles consumed an estimated 81 percent of transportation sector energy in 2001.

Transportation fuel prices experienced short-term fluctuations (in 1996 chained dollars) between 1992 and 2002. However, per capita vehicle-miles traveled (vmt) for all modes of transportation increased in almost every year. For instance, between 1991 and 2001, per capita highway vmt rose about 1 percent annually, while that of large air carriers grew 3 percent.

Passenger travel overall was 5 percent more energy efficient in 2000 than in 1990, mainly due to gains by domestic commercial aviation. (Improved aircraft fuel economy and increased passenger loads resulted in a 32 percent gain in commercial air passenger energy efficiency between 1990 and 2000.) Freight energy efficiency (ton-miles/BTU) declined 7 percent from

[21] See this section in chapter 2 for detailed descriptions of the government revenues included.

[22] All dollar values in the summary of this section are expressed in 1996 chained dollars.

[23] See this section in chapter 2 for detailed descriptions of transportation investments.

1990 to 2000. The decline in freight energy efficiency occurred as a result of a 2 percent average annual growth rate in ton-miles paired with a relatively rapid average annual growth rate of 3 percent in freight energy consumption.

SUMMARY OF THE STATE OF TRANSPORTATION STATISTICS (CHAPTER 3)

Chapter 3 presents an overview of the state of transportation statistics. It focuses on five core areas: freight, passenger travel, air transportation, economic, and geospatial data. Each section provides an analysis of why these data are important, a review of existing data, and possible options for filling crucial data gaps.

1. Freight Data

Changes in freight transportation reflect the dynamic nature of the national and global economies and continuing improvements and innovations in technology. Alterations in the mix of manufactured products, shifts in global production and trade patterns, and growing domestic demands from industry and consumers all affect freight transportation and related data needs.

The consensus among the transportation community on collected freight data is that they are often too out of date to capture current developments and despite progress, there are many missing pieces to the freight picture. Furthermore, data are often not comparable across modes. Current data collections include the Commodity Flow Survey and the Carload Waybill Sample; data on waterborne commerce, air freight, and motor carriers; and data covering international shipments. Despite the wealth of these data, important gaps remain in data on freight flows, origins and destinations of shipments, commodities shipped, transit times, shipment costs, the nodal connections through which freight passes, and infrastructure and equipment used to sustain freight flows.

Options to improve freight data center around enhancing the Commodity Flow Survey. They include changing from the current five-year cycle to more frequent data collection and expanding coverage. Other approaches focus on standardizing the universal bill of lading and using information technologies to aid in collecting data.

2. Passenger Travel Statistics

A much-valued feature of American life is the ability to travel from place to place with relative ease, at a reasonable expense, and in a minimal amount of time, whether it is across town, cross country, or to a foreign destination. Americans average 1,500 trips annually, covering an average of 14,500 miles per person.[24]

Many kinds of data are needed to evaluate (and forecast) this demand for passenger travel and how well the supply meets the demand. Data are needed for the different modes of transportation and at various levels of detail, including geographic scale. Questions that help evaluate the needs of current and future travelers include why people travel, how and when they travel, what their origins and destinations are, how long travel takes, and how much it costs. Travel data, in combination with other types of data, can also be used to assess the costs and benefits of travel, including transportation safety and its environmental effects.

There are three main types of passenger travel data: survey, regulatory/administrative, and operations/industry data. Each type provides different levels of detail in terms of coverage, periodicity, and geography; and each possesses

[24] These data are from the *2001 National Household Travel Survey*. See chapter 2, section 5.

different strengths and weaknesses. The principal survey—the National Household Travel Survey (NHTS) and its precursors—has been conducted periodically. The 2001 NHTS, conducted by BTS and the Federal Highway Administration (FHWA), asked 26,000 households nationwide about their daily non-occupational travel, as well as about long-distance trips (trips of 50 miles or more one way) taken during a 4-week period.

Other surveys that provide travel data include the long form of the decennial census (U.S. Census Bureau), Survey of International Air Travelers (Department of Commerce), General Aviation and Air Taxi Activity Survey (Federal Aviation Administration), airline passenger Origin and Destination Survey (BTS), and Vehicle Inventory and Use Survey (FHWA). Regulatory and administrative sources of passenger data include the National Transit Database (Federal Transit Administration) and the Highway Performance Monitoring System (FHWA). The Federal Transit Administration collects data from transit authorities; FHWA, from state departments of transportation. Industry sources that release operations data include the American Public Transportation Association (transit), Amtrak, and airline associations.

Options to improve passenger travel data include: expanding coverage of key existing datasets to additional modes, improving the specificity of intercity bus and rail data, enhancing data on rural transportation, collecting data on populations with special needs, and working on the detail and completeness of existing travel datasets.

3. Air Transportation Statistics

Airline traffic and financial statistics were first collected by the federal government in the 1930s for use in monitoring and promoting the fledgling air transport industry. Today, the U.S. Department of Transportation (DOT) collects a variety of air passenger and freight statistics from more than 240 domestic and foreign airlines serving the United States.

The federal government's use of air transport data supports policy initiatives and international air service negotiations, monitoring of air carrier fitness, allocating airport improvement funds, ensuring the provision of essential air services, setting international and intra-Alaska mail rates, and safety and security analysis. Other agencies' uses of the data vary. For instance, the Department of Labor uses aviation data in their computation of productivity and consumer price indices. The Department of Justice uses data to monitor the collection of customs service fees and for anti-trust cases. Other uses range from airport planning, traffic forecasting, and development of tourism initiatives by state and local governments; travel planning by the general public; planning and marketing by the travel and tourism industry; and forecasting and analysis by airlines.

The four main categories of airline statistics that now exist, financial, operational and traffic, pricing and fees, and safety, provide different levels of detail in terms of coverage, periodicity, and focus. The federal government collects the majority of publicly available aggregated airline statistics directly from air carriers. The Air Transport Association reports member data on a quarterly and monthly basis on airfares, a cost index, and passenger and cargo traffic. The International Civil Aviation Organization collects international air data covering 188 countries.

Options to improve air transportation data include implementation of current BTS research on computing price indices for air travel, combining traffic data on air taxis and corporate jets with information from the National Transportation Safety Board for conducting exposure/risk analysis, expanding the collection of on-time statistics to smaller carriers and international flights, and allowing collection of flight-specific air transportation data.

4. Transportation Economic Data

Transportation economics refers to industry performance on key economic measures such as prices, quantities, productivity, and externalities. It looks at not only how the industry performs directly in meeting the needs of its customers, but also how it affects the economy as a whole, based on, for example, measures of employment, output, and international competitiveness.

Currently available economic data fall into several categories: prices, quantities, investment, productivity, externalities and regulation, and impacts of the economy. Price may be the measure on which customers most often focus. Good passenger travel price data exist for some modes but not for others. Some data are available for freight movement but are limited in a number of ways. Quantity data measure the level of mobility that transportation enables. Again, the availability of these data vary between passenger travel and freight and among modes.

Investment data relate to both the capacity and condition of the system. Capital stock data are available for the private transportation sectors but not for publicly owned sectors. Productivity measures how effectively economic inputs are converted into output. Two forms are used: labor and multifactor productivity. While data for the former are widely available, only railroad industry multifactor productivity data are available.

Measures of the costs of external effects of transportation (e.g., on safety, congestion, and the environment) are important in determining whether various kinds of regulation of transportation are appropriate. Data on the physical quantity of most of these externalities are available. Exact locations, costs, actual impacts, and other data are less available.

Options for improving transportation economic data include: further development of the BTS airfare price index, expansion of the Transportation Satellite Accounts data to additional modes and services, augmentation of capital stock data, and development of multifactor productivity measures for modes other than railroads.

5. Geospatial Data

Geospatial information technologies have become increasingly useful decisionmaking tools for the transportation industry and agencies responsible for transportation planning and asset management. Previously used only by expert operators on specialized mainframe systems, they are now available for desktop systems and distributed computing services that give nontechnical users access to spatial analytical tools.

BTS creates, maintains, and distributes geospatial data (on rail and highway networks, airports and runways, ports, and Amtrak stations) by state, county, congressional district, and metropolitan statistical area boundaries. The National Bridge Inventory maintained by FHWA contains information describing locations and conditions that can be displayed cartographically and analyzed. In partnership with the DOT Office of Intermodalism and FHWA, BTS developed GeoFreight,[25] a tool enabling analyses of the intensity of infrastructure use for intermodal facilities (e.g., airports, seaports, and truck-rail interchanges).

Key areas for future geospatial data and standards development critical for transportation analysis include land-use planning, employee-based travel pattern analysis, and fine-grained data on infrastructure and operations critical to transportation safety and security analysis.

[25] In earlier versions, this tool was called the Intermodal Bottleneck Evaluation Tool (IBET).

Specific areas include: integration of bridge, tunnel, and transit data in the National Transportation Atlas Database; development of a North American Transportation Atlas Database; and expansion of a current web-based mapping center to enable customers to generate interactive maps and spatial analysis.

CONCLUSIONS

While a wealth of data exist to inform stakeholders about the state of transportation, much work remains to be done. Data need to be collected or collected differently, relevant linkages among datasets need to be established, and data need to be analyzed and offered in ways useful for stakeholders at all levels of government and the private sector.

Chapter 2

Transportation Indicators

Introduction

The Transportation Equity Act for the 21st Century[1] charged the Bureau of Transportation Statistics (BTS) with compiling, analyzing, and publishing a comprehensive set of transportation statistics, including information on:

- productivity in various parts of the transportation sector;
- traffic flows;
- travel times;
- vehicle weights;
- variables influencing traveling behavior, including choice of transportation mode;
- travel costs of intracity commuting and intercity trips;
- availability of mass transit and the number of passengers served by each mass transit authority;
- frequency of vehicle and transportation facility repairs and other interruptions of transportation service;
- accidents;
- collateral damage to the human and natural environment;
- the condition of the transportation system; and
- transportation-related variables that influence global competitiveness.

For this report, BTS has added three additional topics: transportation and economic growth, government transportation finance, and transportation energy. Each of these topics is represented by a series of key indicators. Data tables supporting all the indicators are in appendix B at the end of the report. Appendix table numbers correspond to the figures numbers in this chapter.

[1] 49 U.S. Code 111(c)(1).

About the Data in the Report

For consistency, most trend indicator data are shown over at least a 10-year period. Because of the differing availability of data among all the indicators included, it has not been possible to use the same span of 10 years for each indicator without sacrificing timeliness. Instead, the data span a decade up to the year of most recent data available when this report was prepared. There are some instances where less than 10 years of data are presented—either because the data are not comparable over the period or are not available.

With a few exceptions, trend data involving costs have been converted to 1996 chained ("real") dollars to eliminate the effect of inflation over time. Appendix B provides both 1996 chained dollar and current dollar value tables. Throughout the report, results of percent calculations have been rounded up or down, as appropriate, to a whole number. Average annual percentage change calculations have been made using a logarithmic formula to account for compounding over time.[1]

Data in this report come from a variety of sources: principally, from the Bureau of Transportation Statistics and other operating administrations of the Department of Transportation. However, other sources are federal government agencies, such as the U.S. Census Bureau, Bureau of Economic Analysis, U.S. Environmental Protection Agency, U.S. Coast Guard, and Energy Information Administration. To supplement government sources, the report occasionally uses data and information from trade associations, such as the Association of American Railroads and American Public Transportation Association. Data from any of these sources may be subject to omissions and errors in reporting, recording, and processing. Sampling data are subject to sampling variability. Documents cited as sources in this report often provide detailed information about definitions, methodologies, and statistical reliability.

[1] The formula is: Average annual rate = Exp $[(\text{Ln}\,Y - \text{Ln}\,X)/(n-m)] - 1$, where Y is the end year value; X is the initial year value, n is the end year, and m is the initial year.

Labor Productivity in Transportation

Labor productivity (output per hour) in the for-hire transportation services and petroleum pipeline industries increased by 20 percent from 1990 to 2000. This compares with an increase of 45 percent for all manufacturing and 23 percent for the overall business sector (figure 1). Labor productivity, a common and basic productivity measure, is calculated as the ratio of output to hours worked or to the number of full-time employees.

The growth of individual transportation subsector labor productivity between 1990 and 2000 varied (figure 2). Compared with the overall business sector, several transportation modes had considerably higher rates of increases in labor productivity, and some lower, over the same period. Railroad labor productivity increased 65 percent, as did local trucking, while pipeline productivity grew 38 percent. On the other hand, labor productivity in air transportation increased 19 percent, "trucking except local" increased 18 percent, and Class I bus carriers rose 16 percent.

Comparing annual growth rates is another way to interpret changes of labor productivity over time. For overall business, labor productivity grew at an average annual rate of 2 percent between 1990 and 2000. Labor productivity in rail transportation—where productivity has been affected by consolidation of companies, more efficient use of equipment and lines, increased ton-miles (output), and labor force reductions—increased by 5 percent annually. Labor productivity of local trucking also grew at 5 percent annually.

The lowest annual labor productivity growth rates were for pipelines (3 percent), trucking except local subsector (1.7 percent), and air transportation (1.8 percent). Bus carriers' productivity grew 1.5 percent but with considerable fluctuation over the period of analysis.

FIGURE 1 Labor Productivity of Major Sectors: 1990–2000
Output per hour

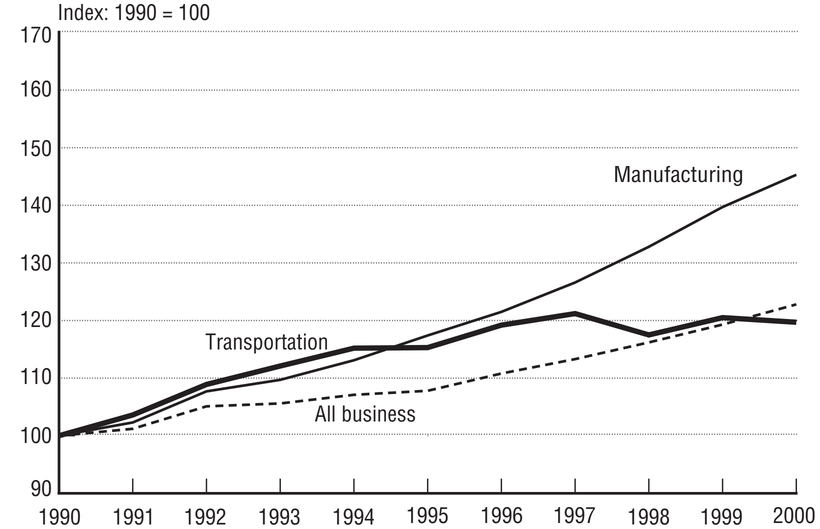
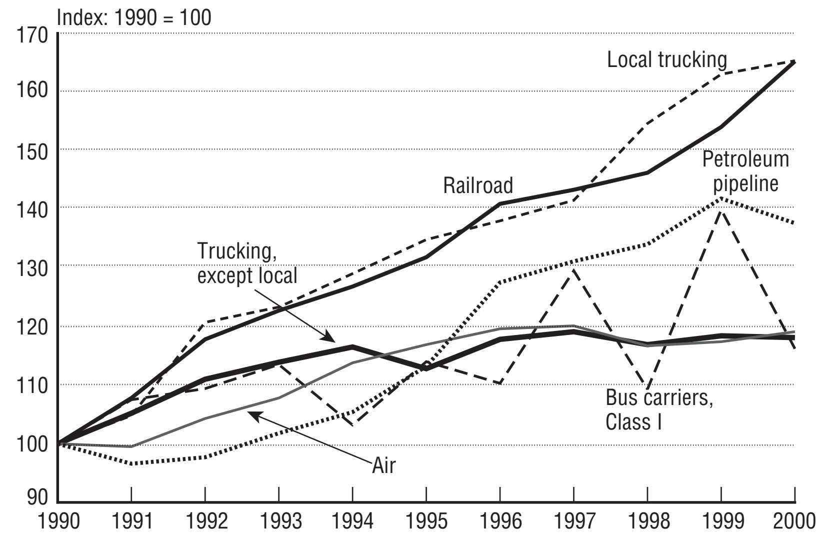


FIGURE 2 Labor Productivity of For-Hire Transportation Industries:1990–2000



NOTES: Labor productivity for transportation measures quality-adjusted ton- and passenger-miles per hour. Quality adjustment corrects for differences in services and handling, e.g., the difference between flying first class and coach or differences in the handling requirements of high- and low-value commodities. Pipeline labor productivity is measured by output per employee. No data are available for water transportation.

Local trucking includes establishments that generally provide trucking services within a single municipality, contiguous municipalities, or a municipality and its suburban areas. Trucking, except local, includes common or contract carriers that generally provide trucking service beyond a single municipality, contiguous municipalities, or a municipality and its suburban areas

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, calculation based on data from U.S. Department of Labor (USDOL), Bureau of Labor Statistics (BLS), Office of Productivity and Technology, "Industry Productivity Database," available at http://www.bls.gov, as of February 2003. U.S. Department of Commerce, Bureau of Economic Analysis, "Gross Domestic Product by Industry," February 2003. **Manufacturing and business**—USDOL, BLS, Office of Productivity and Technology, "Industry Productivity Database," available at http://www.bls.gov, as of February 2003.

Multifactor Productivity

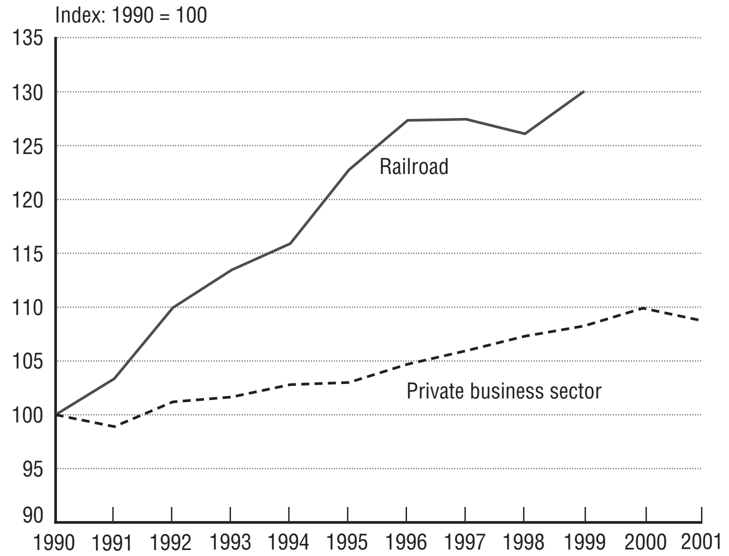
Multifactor productivity (MFP) in rail transportation increased by 30 percent between 1990 and 1999 (an average annual rate of 3 percent), while in the overall private business sector, MFP increased by 8 percent (less than 1 percent annually) (figure 3). Thus, the rail industry has contributed positively to increases in MFP in the business sector and to the U.S. economy over this period.

While MFP measures are difficult to construct, they provide a much more comprehensive view of productivity than labor productivity measures. The conventional methodology for calculating multifactor productivity, which is used here, employs growth rates of inputs weighted by their income shares. This methodology has been developed and used by various academic researchers and government agencies, such as the Bureau of Labor Statistics.[1]

Transportation MFP data are currently available from the Bureau of Labor Statistics for the rail sector only. The Bureau of Transportation Statistics is developing MFP measures for other transportation industries, such as air, pipelines, and so on. The objective is to provide information on the relative importance of changes in the inputs and on the productivity of the inputs relative to changes in transportation output. This research should also provide information on the relative importance of transportation in increasing the productivity of the U.S. economy and, hence, transportation's contribution to the economic growth of the country.

1 See, for instance, discussion on MFP by the Bureau of Labor Statistics in the *BLS Handbook of Methods*, available at http://www.bls.gov/opub/hom/homch11_a.htm.

FIGURE 3 Multifactor Productivity: 1990–2001



NOTE: Rail productivity data are only available through 1999.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, available at http://www.bls.gov/mfp, as of February 2003. **Business sector**—"Multifactor Productivity Trends," table 1. **Rail**—"Industry Multifactor Productivity Data Table by Industry, 1987–1999."

Passenger-Miles of Travel

Estimated passenger-miles of travel (pmt) in the United States increased 24 percent between 1990 and 2000 (see box). Pmt totaled an estimated 4.7 trillion in 2000,[1] about 17,000 miles for every man, woman, and child [2, 3].

Just over 85 percent of passenger travel in 2000 was made in personal vehicles (passenger cars and light trucks, including sport utility vehicles, pickups, and minivans) (figure 4). Most of the balance (11 percent) occurred by air. Passenger travel in light trucks accounted for a little under one-third of all pmt. Transit, excluding bus transit, made up less than 1 percent of pmt in 2000; with transit bus included, it accounts for 4 percent.

Travel increased every year between 1990 and 2000 at an annual average rate of 2 percent [3]. Pmt by air and by light truck grew the fastest over this period, at 4 percent per year on average (figure 5). Pmt by intercity train (Amtrak) declined, although there has been modest growth since 1996. Likewise, transit pmt has grown since the mid-1990s.

Passenger travel has increased during the 1990s for a variety of reasons. The resident population of the United States grew by nearly 33 million people over this period [2]. Moreover, the economy also grew significantly. Gross Domestic Product (GDP) increased by 37 percent[2] and GDP per capita grew 21 percent between 1990 and 2000 (figure 6) [1].

[1] This calculation excludes travel in heavy trucks, by bicycle, by walking, and by boat (including recreational boat). Pmt in heavy trucks is excluded because such travel is assumed to be incidental to the hauling of freight, the main purpose of such travel. Bicycle, pedestrian, and boat travel are excluded because there are no national estimates available on an annual basis.

[2] Calculation is based on chained 1996 dollars.

Sources

1. U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Accounts, summary GDP table, available at http://www.bea.doc/bea/dn1.htm, as of May 2003.
2. U.S. Department of Commerce, U.S. Census Bureau, *Statistical Abstract of the United States: 2002* (Washington, DC: 2003), for population data.
3. U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2003), table 1-34, also available at http://www.bts.gov/.

Data on Passenger-Miles of Travel

Two national estimates of passenger-miles of travel (pmt) are available; they differ in coverage, methodology, and other factors. The 2000 pmt data presented in Section 2 come from the Bureau of Transportation Statistics (BTS) publication, *National Transportation Statistics 2002* (NTS). BTS compiles these data for NTS annually, primarily using mode-by-mode data derived in various ways by BTS and others. For instance, pmt for large air carriers and intercity trains are estimated from ticket sales and trip lengths; for transit, the data are reported by transit authorities. Each method used to estimate these pmt has differing strengths and weaknesses, as discussed in the Accuracy Profiles for table 1-34 in NTS 2002, available at http://www.bts.gov/.

Section 5, Variables Influencing Traveling Behavior, presents 2001 pmt data from the *2001 National Household Travel Survey*, jointly conducted by BTS and the Federal Highway Administration. As survey data, they are collected using a single methodology. This provides a coherence and comparability not available with the NTS data. However, these data are not collected annually, making them unsuitable for year-to-year trend analyses. Another difference between the NTS and NHTS data is the extent of their coverage among modes. It can be expected, then, that because of methodological and coverage issues the NTS and NHTS data will differ.

FIGURE 4 Share of Passenger-Miles by Mode: 2000

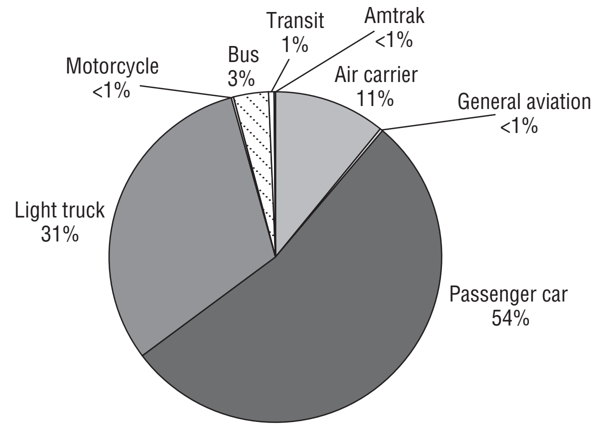


FIGURE 5 Change in Passenger-Miles by Selected Mode: 1990–2000

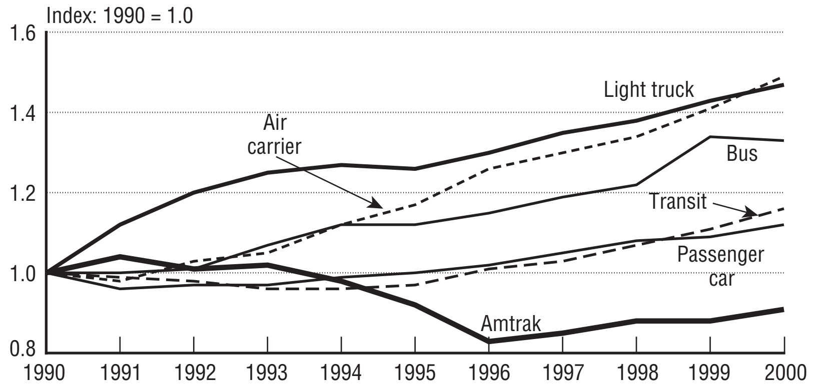
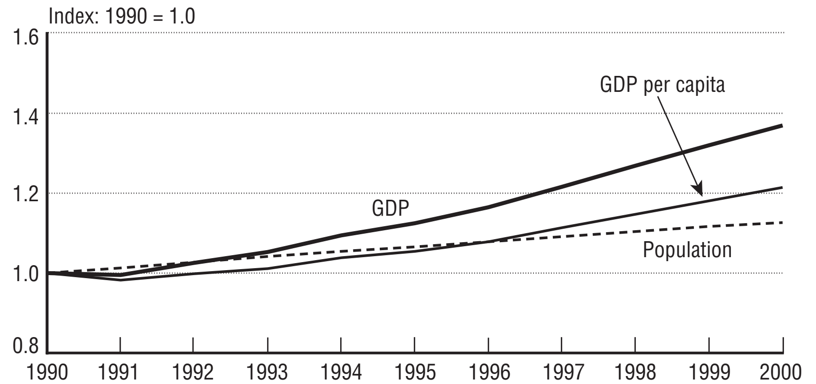


FIGURE 6 Total U.S. Population and Gross Domestic Product (GDP): 1990–2000



NOTES: Transit includes motor bus, heavy rail, commuter rail, light rail, ferryboat, trolley bus, demand responsive, and others. Motor bus and demand responsive figures are also included in the bus figure for highway.

SOURCES: Passenger-miles—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-34, also available at http://www.bts.gov/, as of April 2003.

Gross Domestic Product—Based on chained 1996 dollar data from U.S. Department of Commerce (USDOC), Bureau of Economic Analysis, National Income and Product Accounts, summary GDP table, available at http://www.bea.doc.gov/bea/, as of May 2003. **Population**—USDOC, U.S. Census Bureau, National Intercensal Estimates 1990-2000, available at http://census.gov/popest/data/national/tables/intercensal/US-EST90INT-01.php, as of May 2003.

Domestic Freight Ton-Miles

Excluding gas pipelines, all modes of freight transportation, combined, generated nearly 4 trillion domestic ton-miles in 2000, 20 percent more than in 1990. This represents an average growth rate of almost 2 percent per year during the decade [1].

Domestic ton-miles for all modes, except water, grew during this decade (figure 7). On an average annual basis, air grew the fastest (5 percent per year), followed by rail and truck (4 percent each). Rail and truck accounted for the majority of domestic traffic, representing 39 percent and 30 percent of domestic ton-miles, respectively, in 2000 (figure 8). Truck data, however, do not include retail and government shipments and some imports and, therefore, understate total truck traffic.

Water transportation and oil pipelines[1] accounted for 16 and 15 percent of domestic ton-miles, respectively, in 2000. Although domestic waterborne ton-miles decreased 23 percent between 1990 and 2000, waterborne vessels continued to play a prominent role in international trade [1, 2]. Ships transported 78 percent (by ton) of U.S. imports and exports in 2000.

Air freight tends to transport high value, relatively low weight goods. Thus, on a ton-miles basis, air freight accounted for less than 1 percent of domestic freight in 1998, whereas on a value basis, this mode accounted for 12 percent of domestic freight[2] [3].

Ton-miles is the primary physical measure of freight transportation output. A ton-mile is defined as one ton of freight shipped one mile and, therefore, reflects both the volume shipped (tons) and the distance shipped (miles). Ton-miles provides the best single measure of the physical volume of freight transportation services. This, in turn, reflects the overall level of activity in the economy.

Sources

1. U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington DC: 2002), table 1-44, also available at http://www.bts.gov/.
2. _____, *U.S. International Trade and Freight Transportation Trends* (Washington, DC: 2003).
3. U.S. Department of Transportation, Federal Highway Administration, *The Freight Story* (Washington, DC: 2002).

[1] The Bureau of Transportation Statistics developed data for gas pipelines in 2003 but not in time to include in this report.

[2] The most recent year for which freight value basis data are available is 1998.

FIGURE 7 Change in Domestic Freight Ton-Miles by Mode: 1990–2000

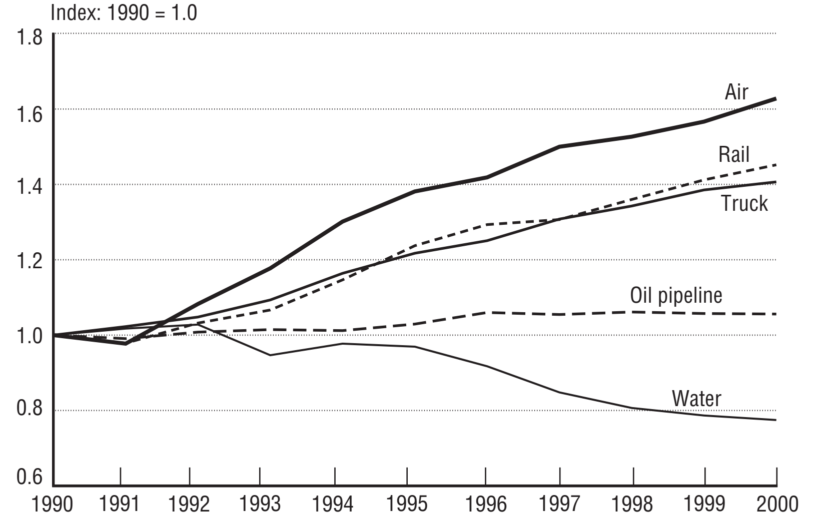
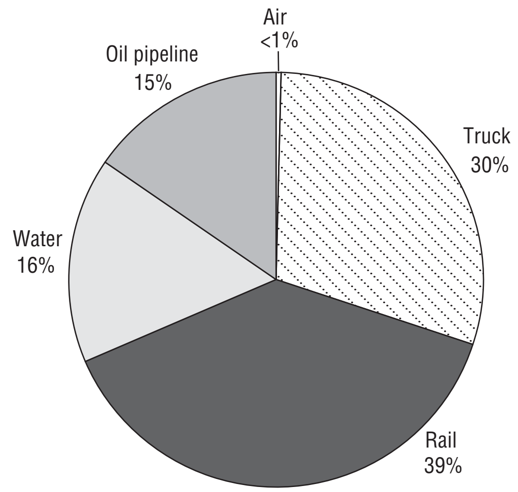


FIGURE 8 Modal Shares of Domestic Freight Ton-Miles: 2000



SOURCES: Air, pipeline, and water—U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics (BTS), *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-44. **Truck**—BTS calculation based on USDOT, BTS, *Transportation Statistics Annual Report 2000* (Washington, DC: 2001), p. 124; and USDOT, Federal Highway Administration, *Highway Statistics 2001* (Washington, DC: 2002), table VM-1. **Rail**—BTS calculation based on Surface Transportation Board, Carload Waybill Sample; Transport Canada, *Transportation in Canada* (Ottawa, Ontario: Annual issues), table 12-1; American Association of Railroads, *Railroad Facts* (Washington, DC: 1991–2001 issues), p. 36.

Geography of Domestic Freight Flows

The U.S. transportation system carried 20 percent more ton-miles of domestic freight in 2000 than in 1990 [1]. This growth was unevenly distributed in terms of geography and mode. The Federal Highway Administration developed the Freight Analysis Framework (FAF) to estimate geographic freight flows on the nation's infrastructure [2]. These results can be depicted on maps like those on the following pages.

Nearly one-third of urban Interstate highways carried more than 10,000 trucks each day on average in 1998,[1] according to FAF estimates. By 2020, the portion of heavily used urban Interstates is expected to rise to 69 percent [2]. Rail freight flows appear to be more concentrated than trucking flows. In addition to growth in domestic freight shipments, increased trade with Mexico and Canada has altered the distribution of freight movement within the United States, creating high traffic areas near borders [3].

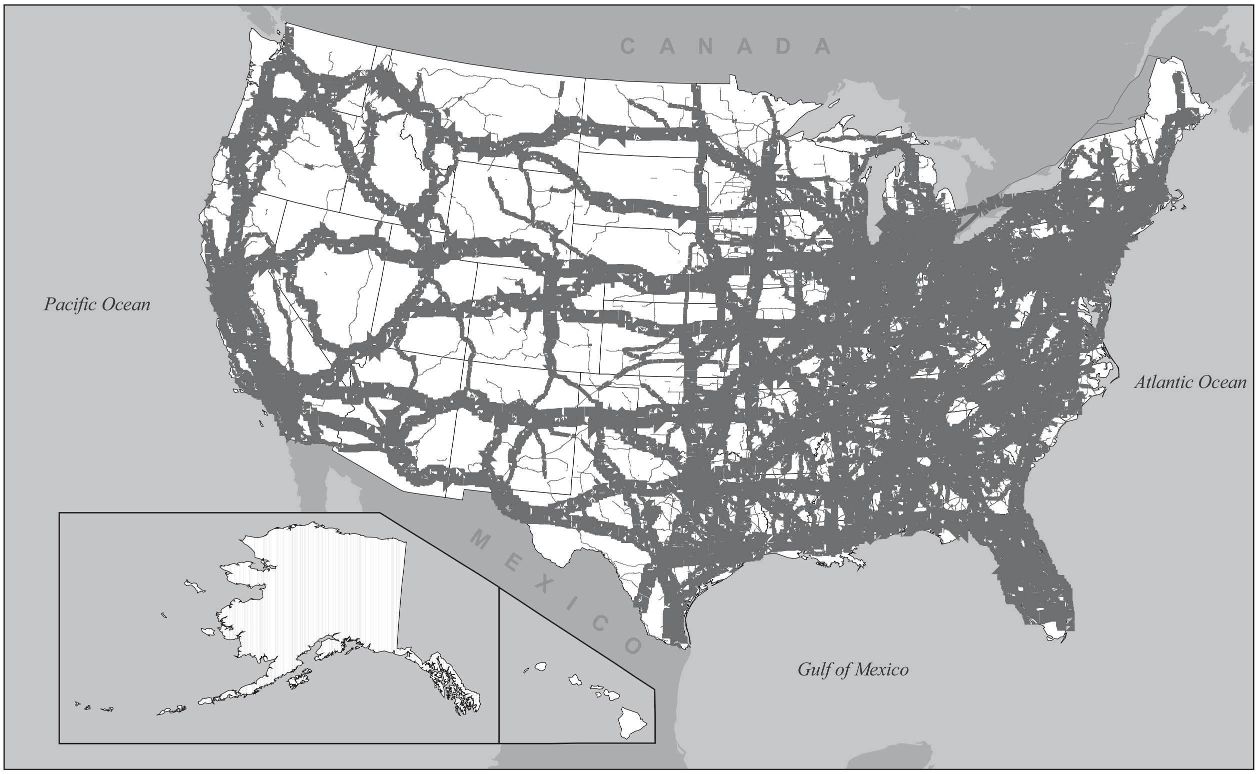
For waterborne freight, domestic flows are highly concentrated along the Mississippi and Ohio Rivers. Domestic waterborne ton-miles decreased 23 percent between 1990 and 2000 [1].

Sources

1. U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics (BTS), calculation based on USDOT, BTS, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-44, also available at http://www.bts.gov.
2. U.S. Department of Transportation, Federal Highway Administration, Freight Analysis Framework website, available at http://www.ops.fhwa.dot.gov/freight/adfrmwrk/ index.htm, as of March 2003.
3. _____, *The Freight Story* (Washington, DC: November 2002), also available at http://www.ops.fhwa.dot.gov/freight/, as of March 2003.

[1] At the time this report was prepared, 1998 was the most recent year for which data were available.

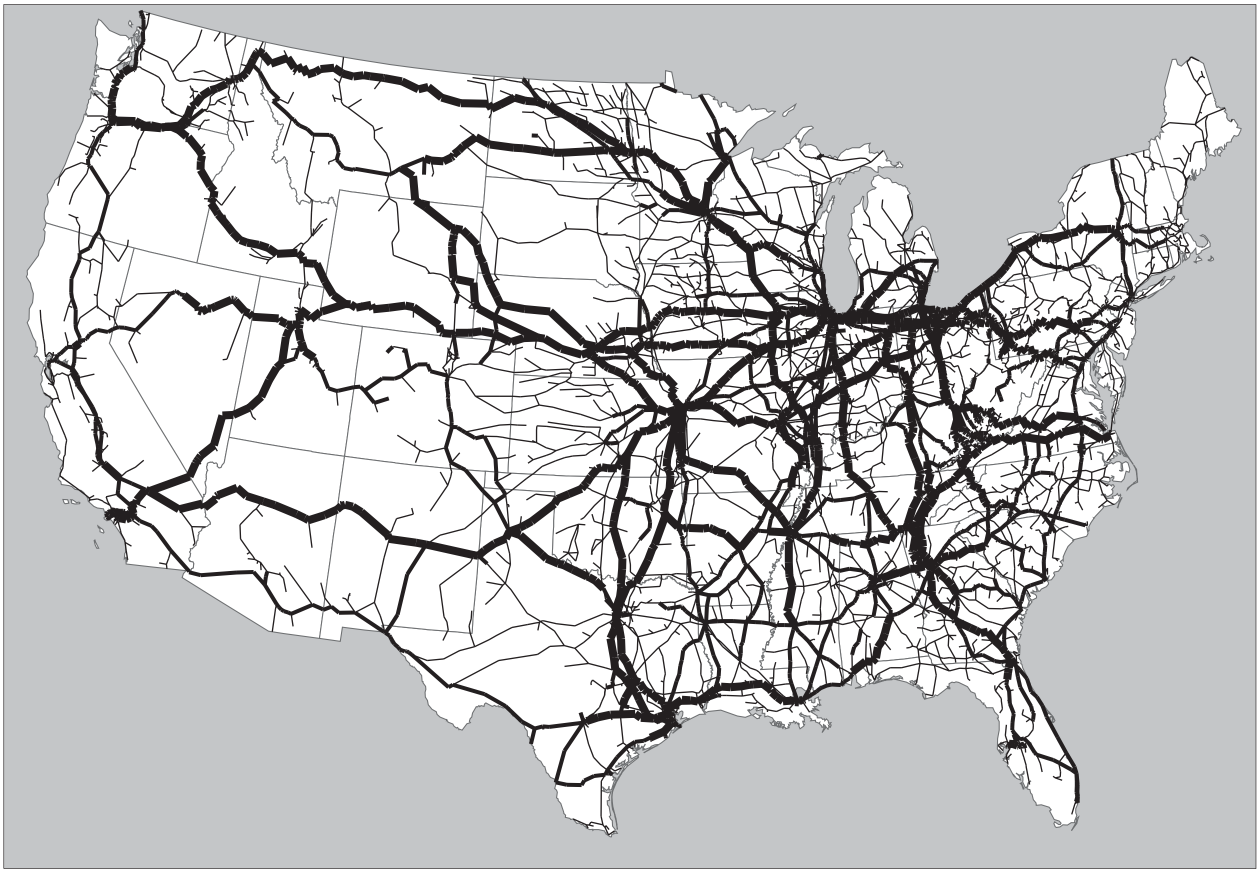
FIGURE 9 Truck Freight Flows in the United States: 1998



SOURCE: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Operations Core Business Unit, Freight Analysis Framework (FAF).

Network flows (tons)
- 500,000–2,000,000
- 2,000,001–5,000,000
- 5,000,001–10,000,000
- 10,000,001–50,000,000
- > 50,000,000

FIGURE 10 Rail Freight Flows in the United States: 1999



SOURCE: U.S. Department of Transportation, Federal Railroad Administration, Office of Policy, personal communication, August 2003.

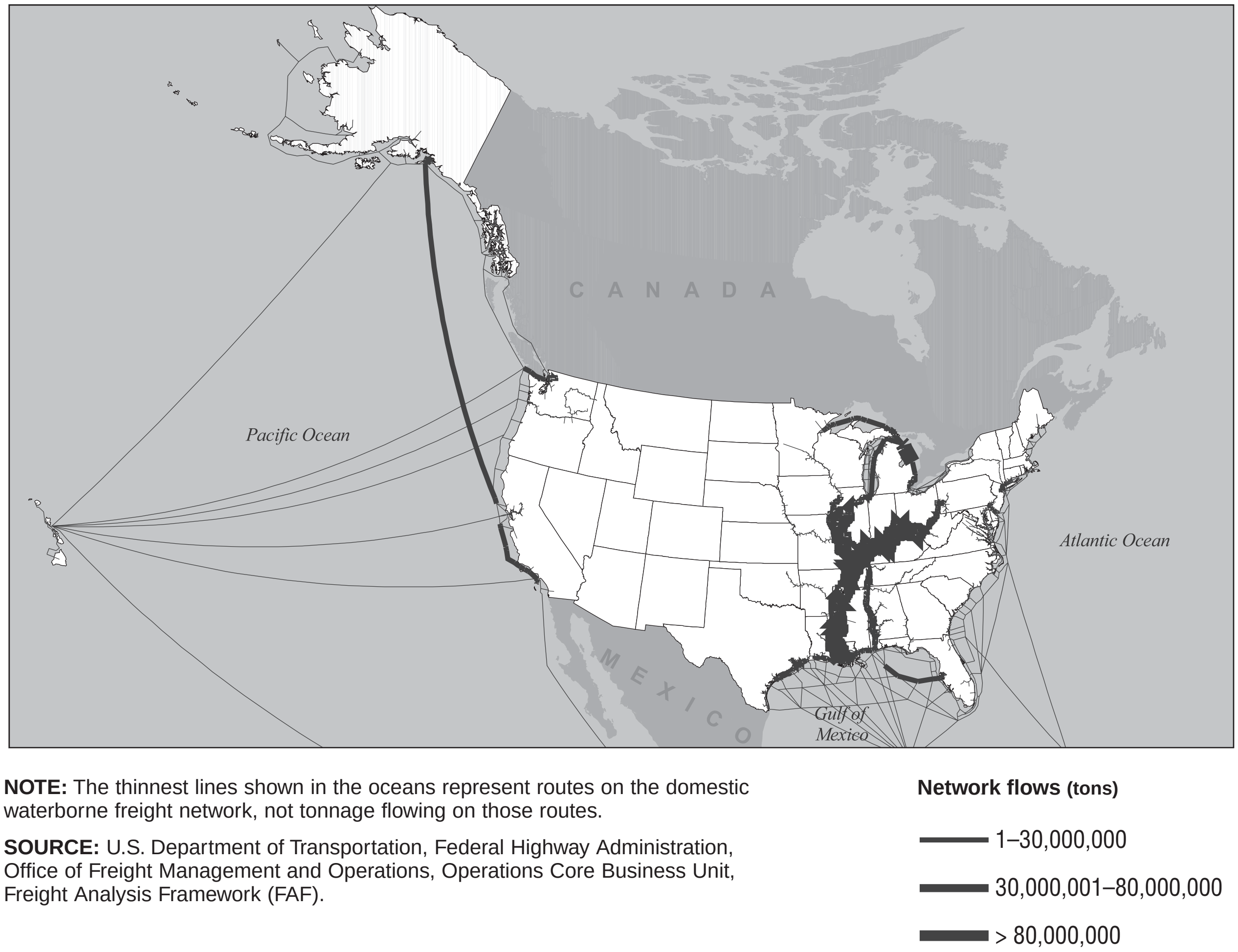
Network flows (tons)

< 5 million

5 million–20 million

> 20 million

FIGURE 11 Domestic Freight Flows by Waterborne Transportation: 1998



NOTE: The thinnest lines shown in the oceans represent routes on the domestic waterborne freight network, not tonnage flowing on those routes.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Operations Core Business Unit, Freight Analysis Framework (FAF).

Scheduled Intercity Travel Times

Intercity air, bus and rail schedules in many major intercity markets are tending to grow longer. Between February 1995 and February 2002, advertised travel times in selected city-pairs experienced varying degrees of schedule lengthening in most service categories.

A Bureau of Transportation Statistics (BTS) study in 2003 found that the extent of changes in scheduled travel time differed by mode (figure 12). In at least half of the direct service city-pairs (no transfer en route) studied for each mode, scheduled travel times were longer. Scheduled trip time increased in 177 of 261 nonstop airline city-pairs studied (68 percent), 44 of 72 direct rail service city pairs (61 percent), and 67 of 129 direct service intercity bus city-pairs (52 percent). For rail, 108 of 174 city-pairs (62 percent) with an en route transfer experienced longer travel times in 2002 compared with several years earlier. Although slightly more than half of direct service bus markets experienced longer scheduled travel times, 73 of 121 connecting bus city-pairs (60 percent) experienced equal or shorter travel times. Overall 46 percent of the intercity bus city-pairs had longer schedules.

BTS weighted the city-pair results by the number of scheduled frequencies to quantify the degree of scheduled travel time change in the markets studied. Overall, intercity bus scheduled trip time decreased by 1.2 percent while airline schedule times increased by 3.2 percent. While a majority of rail markets saw longer trip times, a 7.8 percent decrease in scheduled trip time in the high-frequency Northeast Corridor (NEC) markets resulted in an overall 0.4 percent decrease in weighted average Amtrak city-pair scheduled travel time.

A variety of factors contribute to scheduled travel time change, and more than one factor may affect the same mode. For example, scheduled trip times for direct intercity bus service increased, but in city-pairs involving an en route transfer, scheduled trip times decreased as greater frequencies compared to 1995 resulted in shortened transfer times. For rail service, route changes, breaking of direct connections between trains, introduction of mail and express package handling at intermediate stations, and congestion or changes in track conditions on routes shared with freight trains all resulted in longer scheduled times. On the other hand, technology and infrastructure improvements in conjunction with the start of Amtrak's Acela Express helped decrease intercity rail scheduled travel time in NEC city-pairs. The largest percentage increases in airline trip times came in the shorter distance city-pairs. This is likely due to airport congestion, which affects all flights but has a greater proportional impact on shorter flights.

Sources

1. National Railroad Passenger Corp. (Amtrak), *National, Northeast and Schedule Change Timetables*, 1994/1995 and 2001/2002 issues.
2. Greyhound Lines, *System Timetable* (Dallas, TX: January 1995).
3. OAG Worldwide Limited, OAG Flight Schedules database (Downer's Grove, IL: February 1995 and February 2002)
4. Russell's Guides, *Russell's Official National Motor Coach Guide* (Cedar Rapids, IA: January 1995 and February 2002).

City-Pairs Analysis

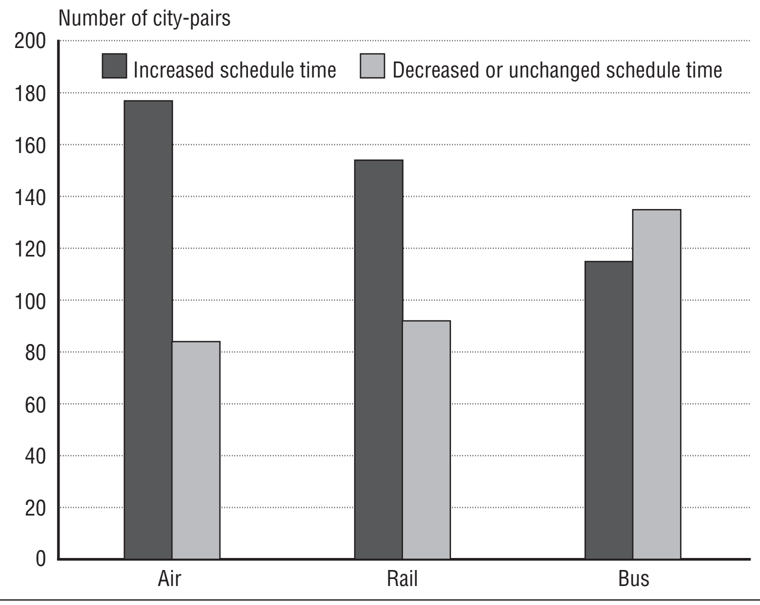
For airline city-pairs, the Bureau of Transportation Statistics (BTS) selected only nonstop flights. Since ground transportation modes operate linear routes serving many intermediate cities, BTS selected direct rail or bus service whether or not intermediate stops were scheduled. In the event that direct service was not available from the rail or bus carriers, BTS used the single fastest connecting schedule as the basis for the analysis. In some city-pairs, rail/bus connections sponsored by Amtrak ("Amtrak Thruway") were considered as rail service except where the bus portion represented more than half of the travel miles.

The number of rail and bus city-pairs is lower than the number of air city-pairs because the air analysis in some cases considered multiple airports in the same city. Also, some rail city-pairs were not used because the only possible routing is so impractical that service is effectively not available. For example, a traveler using Amtrak for the 300-mile trip between Pittsburgh and Cincinnati would have to travel 800 miles via Chicago with a 12-hour layover.

While the city-pairs in the study encompass many of the nation's major intercity travel markets, the lack of publicly available data on specific city-pair traffic volumes for all three modes prevented BTS from constructing reliable samples of markets to represent the entirety of each mode. Therefore, the results of this study cannot be generalized for the industry as a whole and are applicable only to the markets considered.

BTS recognizes that there is variability in scheduled travel times, especially for airline schedules, on both a month-to-month and year-to-year basis. The lack of bus and rail data for prior years in an electronic format precluded current consideration of additional time periods in this analysis. BTS will analyze additional time periods and look at the variability of scheduled travel times for all three modes in future work on this subject.

FIGURE 12 Changes in Average City-Pair Schedule Time: February 1995 and February 2002



NOTE: Air data cover non-stop service only. Bus and rail data include direct and connecting service.

SOURCES: National Passenger Railroad Corp. (Amtrak), *National, Northeast and Schedule Change Timetables* (Washington, DC: 1994/1995 and 2001/2002 issues); Russell's Guides, *Official National Motor Coach Guides* (Cedar Rapids, IA: January 1995 and February 2002 editions); Greyhound Lines, *System Timetable* (Dallas, TX: January 1995).

Urban Highway Travel Times

Highway travel times increased between 1990 and 2000 in 70 of the 75 urban areas studied by the Texas Transportation Institute. The average Travel Time Index (TTI) for these areas in 2000 was 1.39, an increase from 1.31 in 1990 [2]. This means that in 2000, it took 39 percent longer, on average, to make a peak period trip in urban areas compared with the time it would take if traffic were flowing freely (see box).

Travel times tend to deteriorate as urban area size increases (figure 13). For instance, Los Angeles, California, had the highest TTI (1.90) in 2000, while Anchorage, Alaska, and Corpus Christi, Texas, had the lowest (each 1.04). Of the urban areas with the highest index in 2000, only three had a population under 1 million: Austin, Texas (1.27); Charlotte, North Carolina (1.27); and Albuquerque, New Mexico (1.26). At the other end of the spectrum, urban areas of over 1 million people with low indices include Buffalo-Niagara Falls, New York (1.08) and Oklahoma City, Oklahoma (1.09).

Between 1990 and 2000, the greatest increases in TTI generally occurred in small- and medium-sized metropolitan areas, while the increases were more moderate in the very large and small areas[1] (figure 14). Overall, the average index for large urban areas increased by 10.2 percent, while that for medium urban areas was up by 8.3 percent. In small and very large areas, the increases were 4.7 percent and 4.1 percent, respectively.

The Texas Transportation Institute analyzed congestion for the Federal Highway Administration (FHWA) for almost 400 urban areas between 1987 and 2000 [3]. In 2000 for those areas, an average peak period trip required 51 percent longer than the same trip under nonpeak, noncongested conditions, equivalent to an index of 1.51. The values in the FHWA report differ from those in the Texas Transportation Institute annual study, due to differences in the scope of the two analyses.

In urban areas, where highway infrastructure is typically well developed, the principal factor affecting travel times is highway congestion resultings from both recurring and nonrecurring events. Recurring delay is largely a phenomenon of the morning and evening commute, although in some places congestion may occur all day and on weekends. National estimates, based on model simulations, of the effect of nonrecurring events on freeways and principal arterials suggest that about 38 percent are due to crashes, followed by weather (27 percent), work zones on freeways (24 percent), and breakdowns (11 percent) [1].

[1] Very large urban areas have a population of over 3 million; large urban areas, 1 million to 3 million population; medium urban areas, 500,000 to 1 million; and small urban areas, less than 500,000.

Sources

1. Chin, S.M., O. Franzese, D.L. Greene, H.L. Hwang, and R. Gibson, "Temporary Losses of Highway Capacity and Impacts on Performance," Oak Ridge National Laboratory, 2002.
2. Texas A&M University, Texas Transportation Institute, *2002 Urban Mobility Report* (College Station, TX: 2002).
3. U.S. Department of Transportation, Federal Highway Administration and Federal Transit Administration, *2002 Status of the Nation's Highways, Bridges, and Transit: Conditions & Performance, Report to Congress* (Washington, DC: January 2003).

Travel Time Index

Developed by the Texas Transportation Institute, the Travel Time Index is the ratio of peak period travel time to free-flow travel time. A value of 1.0 indicates that traffic is moving freely. A value of 1.3 indicates that it takes 30 percent longer to make a trip than in free-flow conditions. If, say, a trip takes 20 minutes in free-flow conditions and the index is 1.3, then the trip would take, on average, 6 minutes longer to complete during a peak period.

FIGURE 13 Travel Time Index by Metro Area Population for 75 Metro Areas: 2000

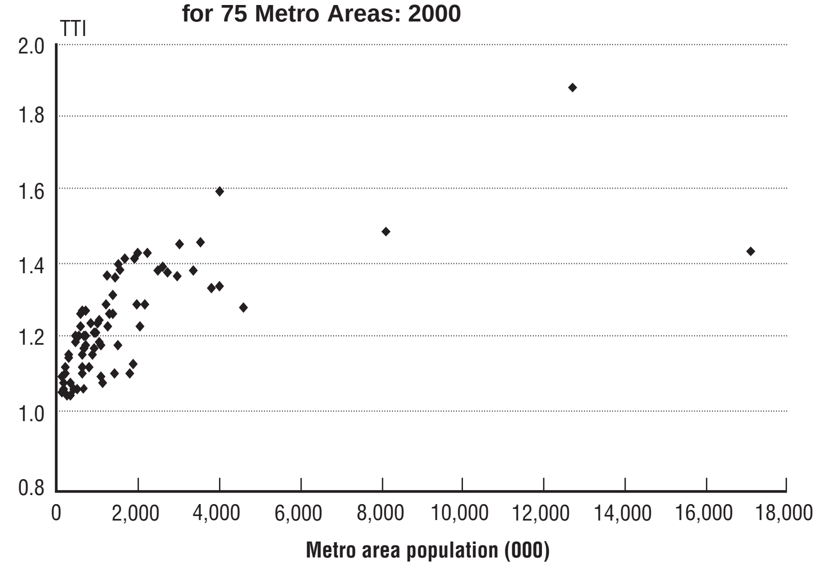
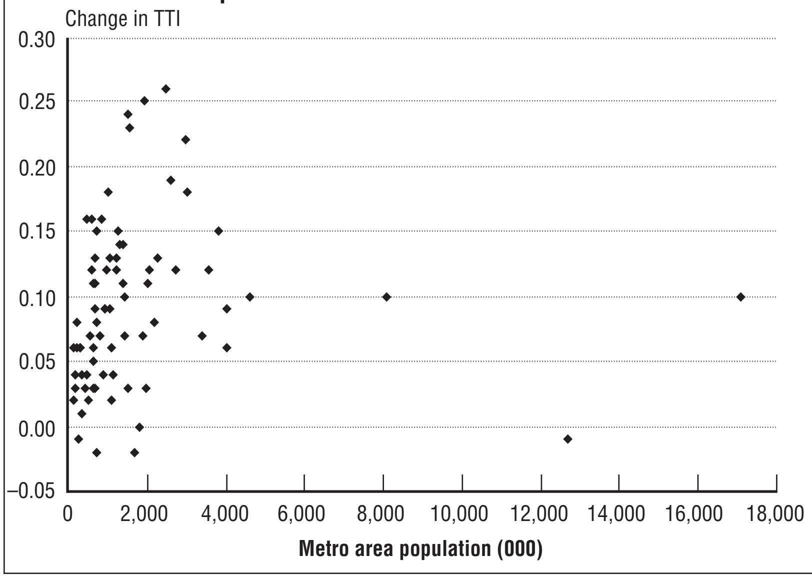


FIGURE 14 Change in Travel Time Index by Metro Area Population for 75 Metro Areas: 1990–2000



NOTE: The Travel Time Index is the ratio of peak period travel time to free-flow travel time. It expresses the average amount of extra time it takes to travel during the peak period relative to free-flow travel.

SOURCE: Texas A&M University, Texas Transportation Institute, *2002 Urban Mobility Report* (College Station, TX: 2002), also available at http://tti.tamu.edu/, as of May 2003.

U.S. Air Carrier On-Time Performance

Just over 82 percent of domestic air flights arrived on time in 2002, compared with 75 percent in 1996. Late flights totaled 16 percent in 2002, down from 23 percent in 1996 (figure 15). Over this period, late, cancelled, or diverted flights peaked at 1.6 million in 2000, declining to just below 942,000 in 2002.

The total number of flight operations at the nation's airports decreased by 5 percent, to 64.9 million, between 2000 and 2002 after having increased by 8 percent, from 63.0 million to 67.7 million, between 1992 and 2000 [2]. The decrease in flight operations due to the air system shutdown on September 11, 2001, and the aftermath, along with the consequences of a weak economy, affected overall airline performance. However, a trend to improved on-time performance began in early 2001 when the Federal Aviation Administration (FAA) and major airlines began implementing the National Airspace System Operational Evolution Plan [1].

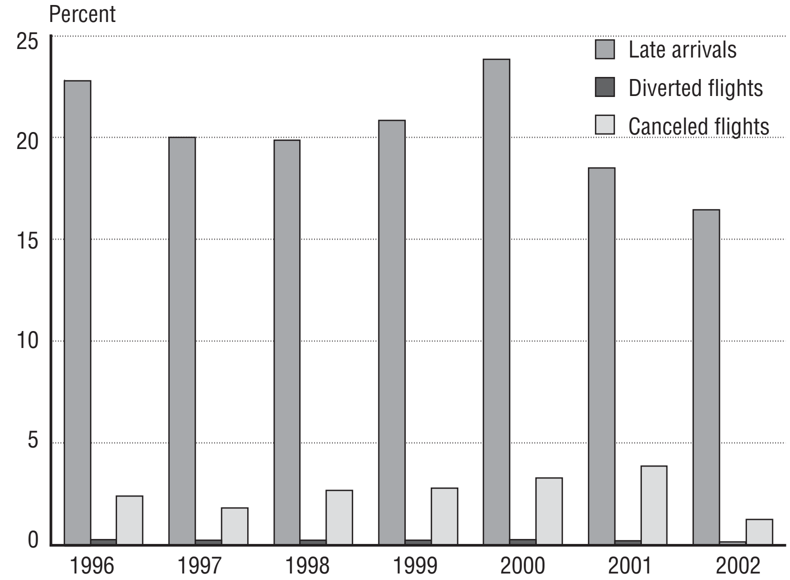
Air carriers with at least 1 percent of total domestic scheduled service passenger revenues are required to report these on-time performance data to the Bureau of Transportation Statistics (BTS).[1] A flight has an "on-time departure" if the aircraft leaves the airport gate less than 15 minutes after its scheduled departure time, regardless of the time the aircraft actually lifts off from the runway. An arriving flight is counted as on-time if it arrives less than 15 minutes after its scheduled gate arrival time. Most delays take place while a plane is on the ground, although the actual cause of a delay may occur elsewhere in the system. Weather, usually the most common cause of delays, was responsible for 72 percent of FAA-recorded delays in 2002 [2]. BTS began collecting causes of delays and cancellations in June 2003 (see chapter 3).

Sources

1. U.S. Department of Transportation, Federal Aviation Administration, NAS Operational Evolution Plan, available at http://www2.faa.gov/programs/oep/index.htm, as of May 2003.
2. _____, OPSNET database, as of May 2003 (not publicly available).

[1] Alaska Airlines, America West Airlines, American Airlines, American Eagle Airlines, Continental Airlines, Delta Air Lines, Northwest Airlines, Southwest Airlines, United Airlines, and US Airways were required to report in 2002. Beginning in January 2003, reports were also required from Atlantic Southeast Airlines, AirTran Airways, ATA (formerly doing business as American Trans Air), Atlantic Coast Airlines, ExpressJet Airlines, and SkyWest Airlines. In addition, JetBlue Airways started voluntarily filing on-time performance data in 2003.

FIGURE 15 **U.S. Air Carrier On-Time Performance: 1996–2002**



SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, Airline On-Time Performance Database; and personal communication (for November 2000–November 2002 data).

Amtrak On-Time Performance

Seventy-seven percent of Amtrak trains arrived at their final destination on time in 2002 [1]. While this represented a 2 percent improvement compared with 2001, it still fell short of the system's performance during the 1998 to 2000 period (figure 16). Amtrak counts a train as delayed only if it arrives more than 10 to 30 minutes beyond the scheduled arrival time, depending on the distance the train has traveled.[1] Amtrak on-time data are based on a train's arrival at its final destination and do not include delay statistics for intermediate points.[2]

In addition to the system total, Amtrak reported the performance for short- and long-distance trains through 2000.[3] Over the years, short-distance trains—those with runs of less than 400 miles—have consistently registered better on-time performance than long-distance trains—those of 400 miles or more. Annual on-time performance for short-distance trains reached as high as 81 percent in recent years, while the peak for long-distance trains was 61 percent on time in 1999 [2].

Amtrak collects data on the cause and cumulative hours of delay (figure 17). (A change in reporting methodology in 2000 has resulted in data that cannot be compared with data from 1999 and earlier years.) Since 1995, freight-related delays have consistently represented the cause of about half of total Amtrak delay time. In addition to interruptions in service due to freight trains, freight-related delays also stem from signal problems, trackwork, and speed restrictions while Amtrak trains are using tracks of other railroads. Amtrak trains operate over tracks owned primarily by private freight railroads except in most of the Northeast Corridor, along a portion of the Detroit-Chicago route, and in a few other short stretches across the country [2].

Sources

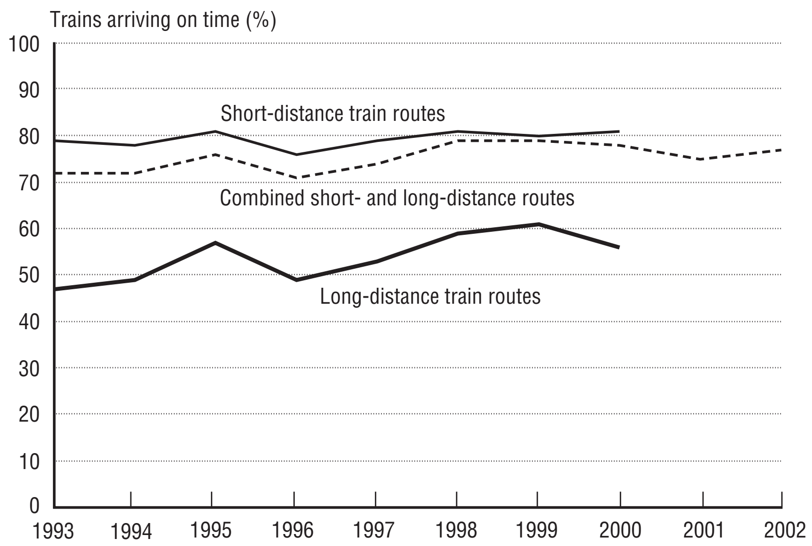
1. National Passenger Railroad Corp. (Amtrak), personal communication, Mar. 3, 2003.
2. _____, *Amtrak Annual Report* (Washington, DC: 2000 and 2001 issues), statistical appendix.

[1] Amtrak trips of up to 250 miles are considered on time if they arrive less than 10 minutes beyond the scheduled arrival time; 251–350 miles, 15 minutes; 351–450 miles, 20 minutes; 451–550 miles, 25 minutes; and greater than 550 miles, 30 minutes.

[2] Accordingly, a train traveling between Chicago and St. Louis (282 miles), for example, could arrive 15 minutes late at all intermediate points, yet arrive 12 minutes late at St. Louis and be reported as "on time."

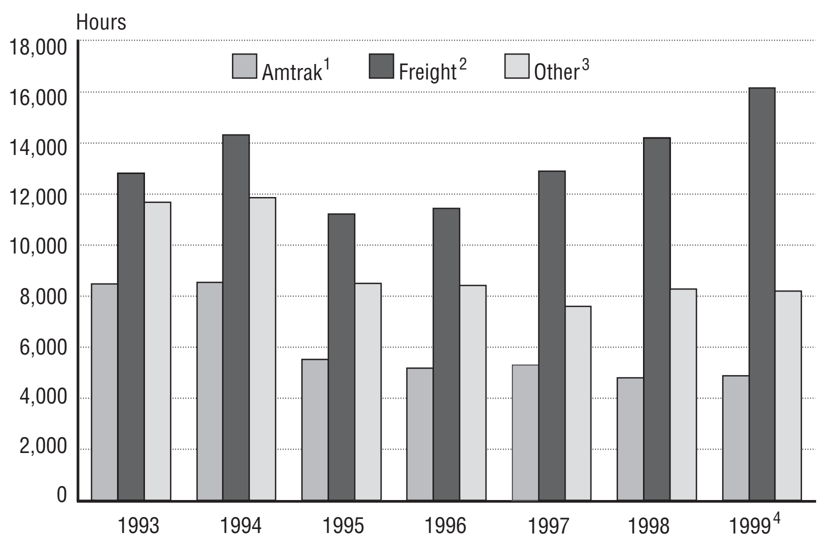
[3] Amtrak is no longer reporting short- and long-haul data separately.

FIGURE 16 Amtrak On-Time Performance: 1993–2002



NOTES: Short distance is less than 400 miles; long distance is ≥ 400 miles. As of 2001, Amtrak no longer reports short- and long-haul data separately.

FIGURE 17 Amtrak Hours of Delay by Cause: 1993–1999



[1] Includes equipment malfunctions, train servicing in stations, and passenger-related delays.

[2] Includes delays for track repairs/track conditions, freight train interference, and signal delays.

[3] Includes passenger train interference, waiting for connections, running time, weather-related delays, and miscellaneous.

[4] Amtrak changed its method for reporting delays in 2000. Therefore, data after 1999 are not comparable to previous years and are not used in this figure.

SOURCE: National Passenger Railroad Corp. (Amtrak), *Amtrak Annual Report* (Washington, DC: 2000 and 2001 issues), statistical appendix.

Highway Trucks by Weight

The United States truck fleet grew 23 percent between 1992 and 1997, according to the Vehicle Inventory and Use Survey conducted once every five years [1, 2]. The fleet includes a variety of vehicles, ranging from large 18-wheel combination trucks used to transport freight to small pickup trucks, often used for personal travel.

The fleet of medium and heavy trucks grew 18 percent between 1992 and 1997 (figure 18). However, the number of trucks in one of the heaviest subcategories (those weighing 100,001 to 130,000 pounds) grew 46 percent, from 12,300 trucks to 17,900. Overall, the number of trucks in the heavy category (over 26,000 pounds) grew 37 percent between 1992 and 1997.

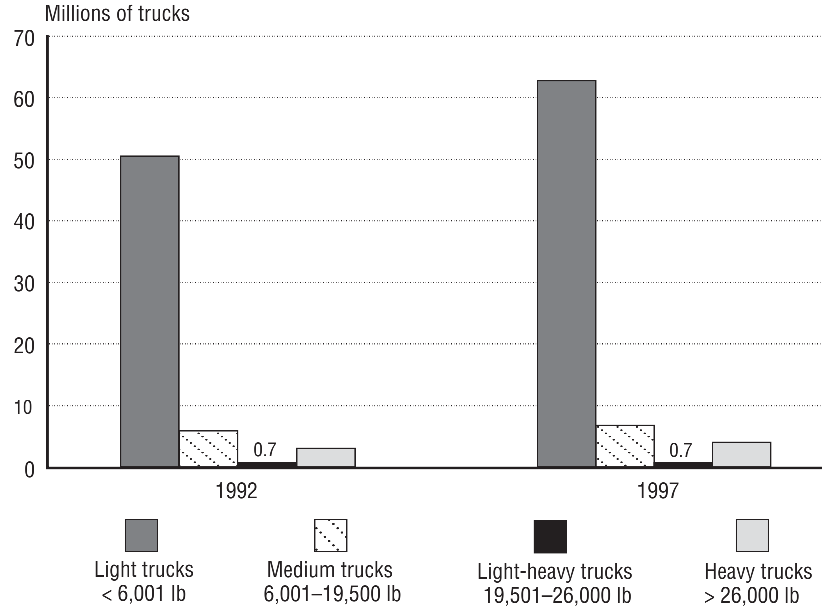
Light trucks, which include sport utility vehicles (SUVs), minivans, vans, and pickup trucks, represented 86 percent of the truck fleet in 1997.[1] Within the light truck category, pickup trucks outnumbered minivans and SUVs. However, the number of SUVs and minivans increased by 93 percent and 61 percent, respectively, over the previous five years—much faster than the growth rate for pickup trucks (8 percent). Light trucks represent a growing proportion of auto industry sales; consumers purchased more light trucks than passenger cars for the first time in 2001 [3].

Sources

1. U.S. Department of Commerce, U.S. Census Bureau, *1997 Economic Census: Vehicle Inventory and Use Survey: United States*, EC97TV-US (Washington, DC: 1999).
2. U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-21, also available at http://www.bts.gov/, as of April 2003.
3. U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2001* (Washington, DC: 2002), table MV-9, also available at http://www.fhwa.dot.gov/policy/ohpi/hss/index.htm, as of April 2003.

[1] Here, light trucks include trucks less than 6,001 lbs. In the original source of the data (the Vehicle Inventory and Use Survey), trucks between 6,001 lbs and 10,000 lbs are also categorized as light trucks. See figure 18 for further explanation.

FIGURE 18 Number of Trucks by Vehicle Weight: 1992 and 1997



NOTES: Weight is the empty weight of the vehicle plus the average vehicle load.

Excludes vehicles owned by federal, state, or local governments; ambulances; buses; motor homes; farm tractors; unpowered trailer units; and trucks reported as sold, junked, or wrecked prior to July 1 of the year preceding the survey.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-21, also available at http://www.bts.gov/, as of April 2003.

The original source of these data are the Census Bureau's *Vehicle Inventory and Use Survey* (VIUS). The truck categories in *National Transportation Statistics 2002* and this report differ from those in the VIUS, which has the following categories: light trucks—10,000 lbs or less; medium trucks—10,001 lbs–19,500 lbs; light-heavy trucks—19,501 lbs–26,000 lbs; and heavy-heavy trucks—26,001 lbs or more.

Vehicle Loadings on the Interstate Highway System

Large combination trucks[1] represent a small portion of traffic on the U.S. Interstate Highway System [1]. However, because they are heavier and have more axles than other vehicles, they may cause more pavement damage, a measurement that is estimated in terms of vehicle loadings (see box). In urban areas, these trucks made up only 6 percent of traffic volume, but accounted for 77 percent of loadings in 2001 (figure 19). These trucks also make up a greater portion of the vehicles on rural segments of the Interstate Highway System, representing 17 percent of traffic volume and 89 percent of loadings in 2001 (figure 20).

Between 1991 and 2001, large combination truck traffic volume grew from 14 percent to 17 percent on rural roads, while remaining the same on urban Interstate highways [1]. Concurrently, their share of loadings decreased on both rural and urban Interstate highways. Passenger cars, buses, and light trucks, which the Federal Highway Administration aggregates into one category, followed a different trend—representing a declining percentage of traffic volume but a growing percentage of loadings in urban areas [1].

[1] Large combination trucks weigh more than 12 tons and have 5 or more axles.

Source

1. U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2001*, table TC-3, available at http://www.fhwa.dot.gov/policy/ohpi/hss/index. htm, as of Feb. 26, 2003.

Measuring Vehicle Loadings

Planning agencies design roadways to have a specific lifespan based on the expected volume and weight of vehicle traffic [1]. Since traffic streams are composed of a variety of vehicles of different weights and axle configurations, an equivalent unit of pavement damage is used to calculate the wear caused by different types of vehicles. An equivalent single-axle load (ESAL) is a standard unit of pavement damage and is based on the amount of force applied to pavement by an 18,000-pound axle, which is roughly equivalent to a standard truck axle. This unit may be used to calculate the cumulative damage caused to a roadway by an expected traffic stream.

Source

1. American Association of State Highway and Transportation Officials, *Guide for Design of Pavement Structures* (Washington, DC: 1993), p. I-10 and appendix D.

FIGURE 19 Share of Loadings on Urban Interstate Highways by Vehicle Type: 2001

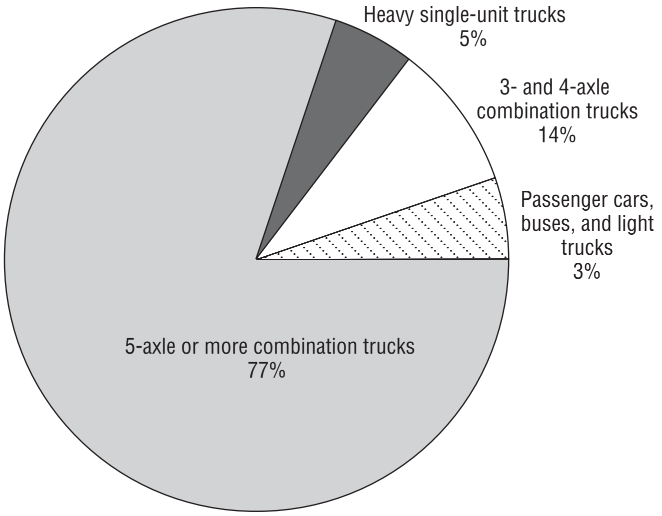
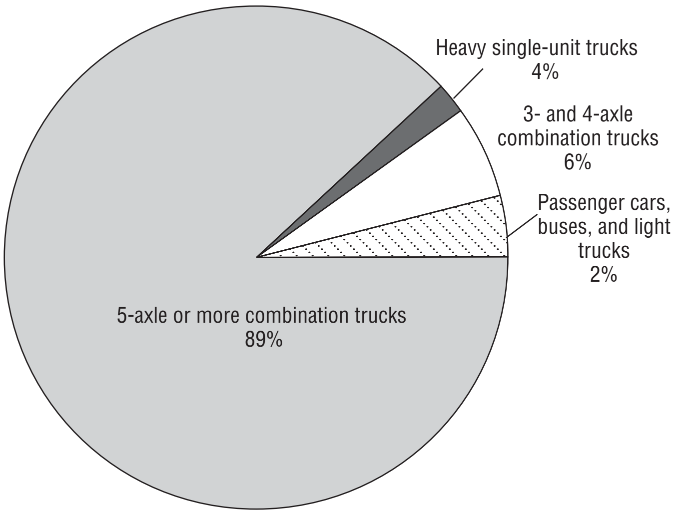


FIGURE 20 Share of Loadings on Rural Interstate Highways by Vehicle Type: 2001



NOTES: Percentages may not add to 100 due to rounding.

Loadings are based on equivalent single-axle loads (ESALs), a standard unit of pavement damage based on the amount of force applied to pavement by an 18,000-pound axle, which is roughly equivalent to a standard truck axle.

SOURCE: U.S. Department of Transportation, Federal Highway Adminstration, *Highway Statistics 2001* (Washington, DC: 2002), table TC-3.

Merchant Marine Vessel Capacity

Merchandise trade valued at over $718 billion moved by maritime vessels between U.S. and foreign seaports in 2001 [2]. Container shipments increased 71 percent between 1992 and 2001[1] [3].

The average capacity of containerships calling at U.S. ports increased 9 percent to nearly 40,000 deadweight tons (dwt)[2] between 1998[3] and 2001 (figure 21). The world's largest containerships, built primarily during the late 1990s and early 2000s, are over 3 football fields long (1,138 ft), 140 feet wide, and 50 feet deep [1].

Containership capacity increased faster than the average capacity of all types of vessels calling at U.S. ports, which grew 4 percent between 1998 and 2001. The average capacity of all vessels is larger than the average capacity of containerships because it includes tankers, which carry nearly 90,000 dwt on average and dock at specialized ports. Excluding tankers, average vessel capacity was just over 32,000 dwt in 2001.

Sources

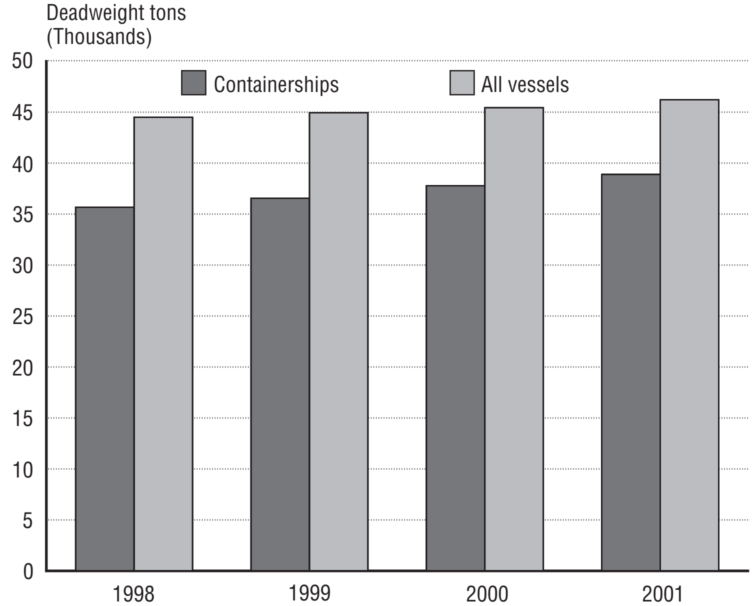
1. Maersk-Sealand, Vessels web page, available at http://www.maersksealand.com/, as of April 2003.
2. U.S. Department of Transportation, Bureau of Transportation Statistics, *U.S. International Trade and Freight Transportation Trends* (Washington, DC: 2003).
3. _____, *Maritime Trade and Transportation 2002* (Washington, DC: 2002).

[1] 1992 is the first year for which data are available. Percentage change was calculated in terms of 20-foot equivalent units (TEUs).

[2] Deadweight tons is an expression of vessel capacity. It is the lifting capacity of a vessel expressed in long tons (2,240 lbs), including cargo, commodities, and crew.

[3] 1998 is the first year for which data are available.

FIGURE 21 Average Capacity of Vessels Calling at U.S. Ports: 1998–2001



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculation based on U.S. Department of Transportation, Maritime Administration, *Vessel Calls at U.S. Ports* (Washington, DC: Annual issues), tables H-6 and H-8.

Railcar Weights

The volume of freight carried by railroads increased 26 percent (in tons) and 30 percent (by carload) on railcars between 1991 and 2001 (figure 22). However, on average, the weight of each railcar remained fairly constant. The average weight of a loaded railcar ranged from 63 to 67 tons during the same period (figure 23).

The relatively steady average weight of a loaded railcar masks countervailing trends among selected freight commodities. The average weight of a carload of coal, which represented 46 percent of rail freight tonnage in 2001, was 110 tons in 2001, up from 99 tons in 1991 (figure 24). Farm products, food and kindred products, nonmetallic minerals, and chemicals and allied products, which together represented 29 percent of tonnage in 2001, were also shipped in heavier average carloads in 2001 than in 1991 [2].

Miscellaneous mixed shipments is the only category of goods that was transported in lighter average carloads [2]. Miscellaneous mixed shipments are primarily intermodal freight composed of shipping containers on flatbed railcars [1]. The containers, which are primarily used to move manufactured goods that tend to be lighter and more valuable than raw materials, may be transported by waterborne vessel and truck, as well. Miscellaneous mixed shipments increased by 54 percent in terms of tonnage and by 79 percent in terms of carloads between 1991 and 2001, resulting in carloads that were 14 percent lighter in 2001 [2].

Sources

1. Association of American Railroads, *Railroad Facts 2001 and 2002* (Washington, DC: 2001 and 2002).
2. Calculations based on Association of American Railroads, *Railroad Ten-Year Trends, 1990–1999* (Washington, DC: 2000).

FIGURE 22 Measures of U.S. Railroad Freight Volume: 1991–2001

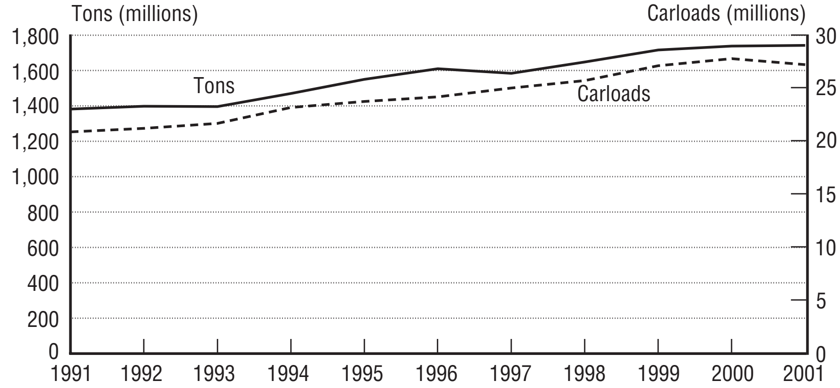


FIGURE 23 Average Loaded U.S. Railcar Weight: 1991–2001

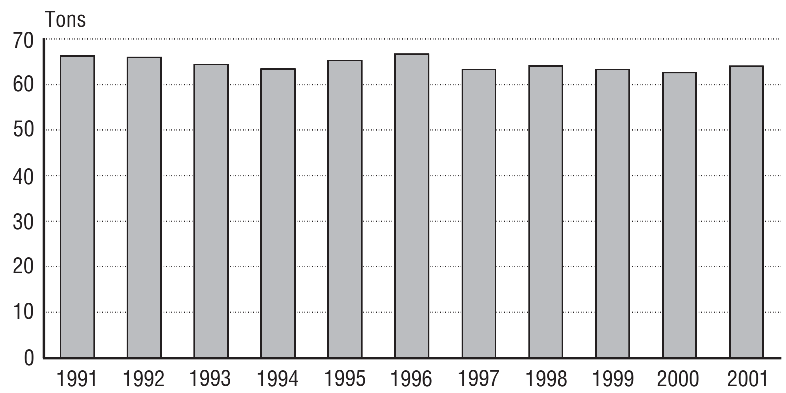
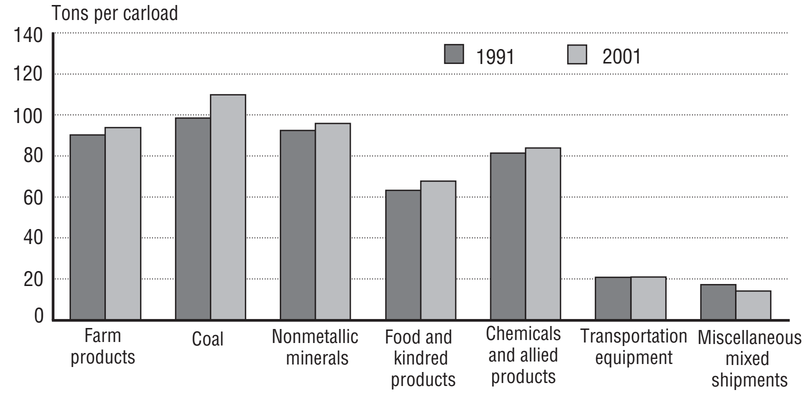


FIGURE 24 Average Loaded U.S. Railcar Weight for Selected Commodities: 1991 and 2001



NOTES: Figure 23—Average railcar weight is total tons transported divided by total carloads transported. **Figure 24**—Miscellaneous mixed shipments is mostly intermodal traffic. Some intermodal traffic is included in commodity-specific categories instead.

SOURCES: All except noted—Association of American of Railroads, *Railroad Facts 2001* and *2002* (Washington, DC: 2001 and 2002 issues). **Figure 24, 1991 data**—U.S. Department of Transportation, Bureau of Transportation Statistics calculations based on Association of American Railroads, *Railroad Ten-Year Trends 1990–1999* (Washington, DC: 2000).

Daily Passenger Travel

In their daily nonoccupational travel, people in the United States journeyed about 4 trillion miles in 2001, or 14,500 miles per person per year[1] [1]. On average, people traveled 40 miles per day, 88 percent of it (35 miles) in a personal vehicle[2] such as an automobile (figure 25). The total number of vehicle-miles for this passenger travel in 2001 was nearly 2.3 trillion.

Americans took 411 billion daily trips annually, or an average of 1,500 trips per person per year. On a daily basis, individuals averaged about four trips per day (figure 26) [1].

Source

1. U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, 2001 National Household Travel Survey, Preliminary Data Release Version 1 (day trip data only), available at http://nhts.ornl.gov/, as of January 2003.

[1] These data differ from those in section 2, Passenger-Miles of Travel. See the box on page 26 for a discussion on differences between these two datasets.

[2] Personal vehicles are cars, vans, sport utility vehicles, pickup trucks, other trucks, recreational vehicles (not including watercraft), and motorcycles.

2001 National Household Travel Survey (NHTS)

The 2001 NHTS was sponsored by the Bureau of Transportation Statistics and the Federal Highway Administration of the U.S. Department of Transportation. Households were asked about all the trips[1] they took on a specific day (daily travel), known as the "travel day," and about trips of 50 miles or more taken from home in the 27 days preceding and including the travel day, a period known as the "travel period." Detailed characteristics were collected for each trip including, among other things, the mode of transportation, the purpose of the trip, and the distance traveled. Additionally, households were asked to provide information about their social and demographic characteristics including income, vehicle ownership, as well as the age, sex, education level, and so forth of household members. The 2001 NHTS collected information from 26,000 households nationally.

The NHTS combines two previous surveys—the Nationwide Personal Transportation Survey (NPTS), a survey of daily travel, and the American Travel Survey (ATS), a survey of long-distance travel. The NPTS and ATS both were last conducted in 1995. Because of methodological changes, comparisons between the 2001 NHTS and the 1995 NPTS and ATS are not attempted here. Analysts need more time to study the effects of the methodological changes before meaningful comparisons can be made. The information presented here, therefore, is limited to preliminary data from the 2001 survey.

Moreover, data from the travel period component (i.e., long-distance travel) of the NHTS had not yet been released when this report was prepared. As a result, the information presented here is about the travel reported on the travel day, which is predominantly, though not exclusively, local travel. Without the long-distance travel data, vacation trips and travel by air tend to be underrepresented.

[1] A trip is defined as traveling from one address to another, whether it is down the street, across town, or cross country.

FIGURE 25 Miles Traveled per Day: 2001

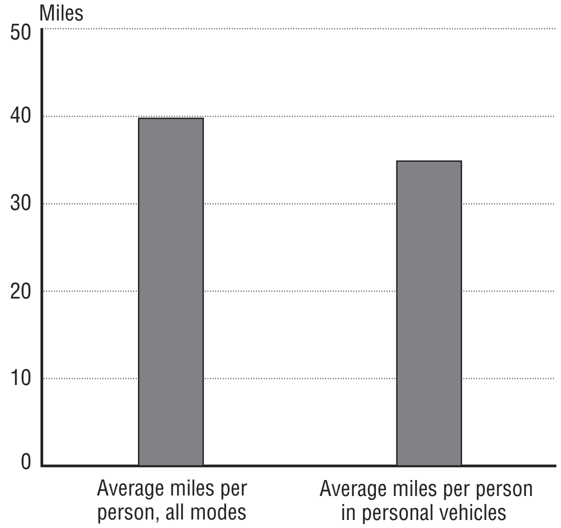
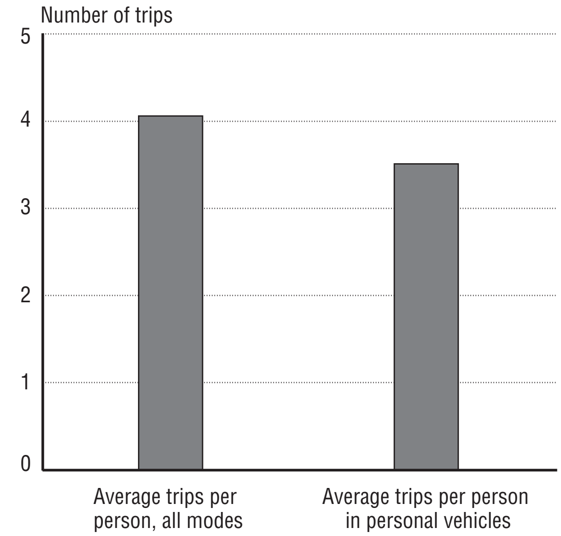


FIGURE 26 Trips Completed per Day: 2001



NOTE: Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, 2001 National Household Travel Survey (NHTS), Preliminary Data Release Version 1, available at http://nhts.ornl.gov/, as of January 2003.

Travel by Purpose

Commuting—trips made to and from work—accounted for 15 percent of all personal trips in 2001. In addition, other work-related trips (e.g., travel to meetings and conferences) accounted for 3 percent of all trips. The average length of a commuting trip was 12 miles,[1] whereas the average length of a work-related trip was just under 30 miles (figure 27).

People made the greatest number of daily trips, 45 percent, to shop, to visit doctors and dentists, and for other family and personal business such as using professional or personal services, attending a wedding or funeral, walking the dog, attending meetings, and dropping off or picking up someone else (figure 28). Most family and personal business trips tended to be relatively short, averaging about 7 miles, although visits to doctors and dentists averaged 10 miles each [1].

Social and recreational reasons for daily travel, including visits to friends and relatives, motivated just over one-quarter of all trips in 2001. These trips included going to the gym, exercising, or playing sports and going to the movies, a restaurant, or a public place, such as a park. The average distance of these trips was 8 miles, with trips to visit friends and relatives being longer than average at about 14 miles [1].

Trips to school and church accounted for 10 percent of trips in 2001 and averaged 6 miles in length. By contrast, vacation trips (including those for rest and relaxation) are taken relatively rarely but far from home. In 2001 (for daily trip reporting),[2] they accounted for less than 1 percent of trips but averaged 37 miles in length [1].

Source

1. U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, 2001 National Household Travel Survey, Preliminary Data Release Version 1 (day trip data only), available at http://nhts.ornl.gov, as of January 2003.

[1] The 2001 National Household Travel Survey defined a trip as each time a person went from one address to another. "Commute" trips were defined as those trips made for the purpose of going to or returning from work. However, given the definition of a trip, those reported as commuting trips were not necessarily anchored by the home or workplace (for return commutes). Therefore, care should be taken in analyzing work trips, recognizing that the distance for these trips is often, but not always, the distance from home to work.

[2] The 2001 National Household Travel Survey "travel period" data were not available when this report was prepared. Without these data, vacation trips and travel by air tend to be underrepresented.

FIGURE 27 Average Trip Distance by Purpose: 2001

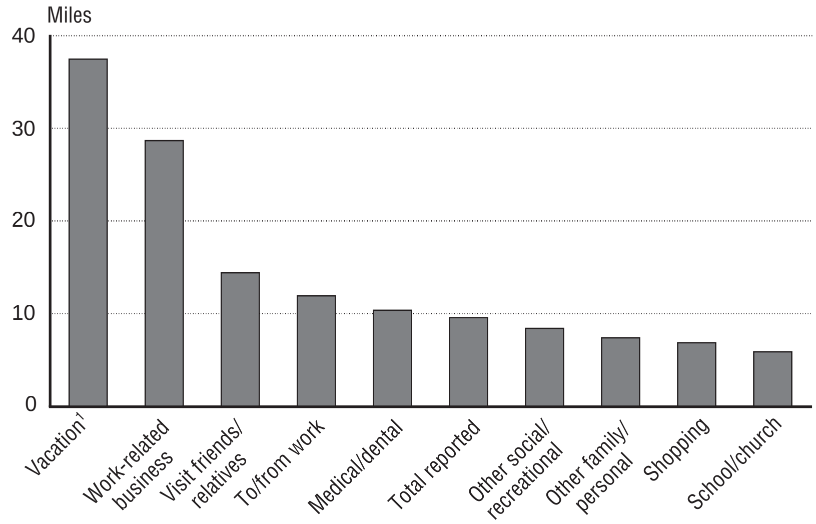
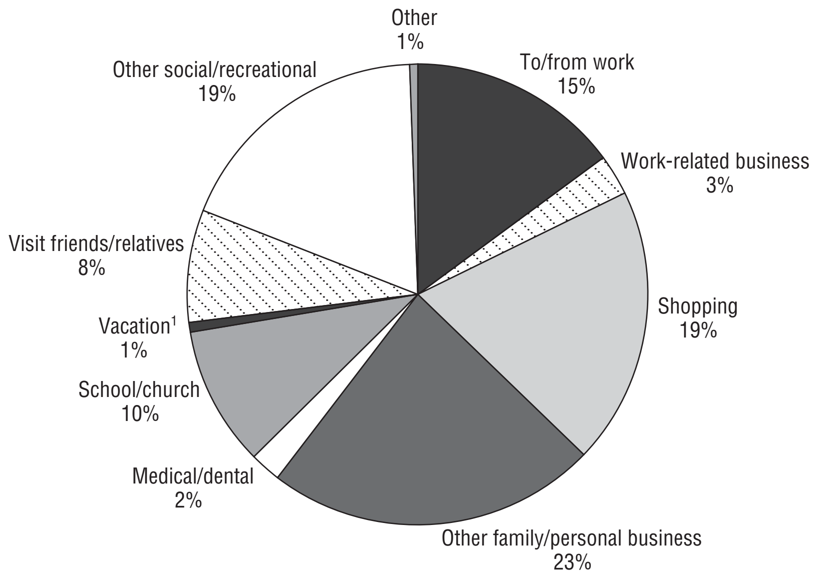


FIGURE 28 Share of Person Trips by Purpose: 2001



[1] "Vacation" includes rest and relaxation.

NOTE: The 2001 National Household Travel Survey defined a trip as each time a person went from one address to another. "Commute" trips were defined as those trips made for the purpose of going to or returning from work. However, given the definition of a trip, those reported as commuting trips were not necessarily anchored by the home or work-place (for return commutes). Therefore, care should be taken in analyzing to/from work trips, recognizing that the distance for these trips is often, but not always, the distance from home to work. Excluded from work-related business trips are trips made by people who are directly providing the transportation of passengers or goods, such as bus or truck drivers, delivery persons, etc.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, 2001 National Household Travel Survey, Preliminary Data Release Version 1 (day trip data only), available at http://nhts.ornl.gov/, as of January 2003.

Travel by Mode

Personal vehicles[1] are the predominant means by which people travel in the United States on a daily basis. In 2001, 87 percent of person trips and 88 percent of person-miles were made in personal vehicles (figures 29 and 30). Walking and riding a bicycle accounted for almost 10 percent of trips and less than 1 percent of miles. Both transit and school bus trips accounted for 2 percent each of trips and 1 percent each of miles, whereas only 0.1 percent of all daily trips but 8 percent of miles were made by air[2] [1].

Within the personal vehicle category, in 2001 passenger cars were still the most widely used, accounting for 59 percent of person trips and 55 percent of person-miles. Vans and sport utility vehicles were used for 27 percent of trips and miles. Pickup trucks accounted for 15 percent of miles and 13 percent of trips. Together, other trucks, recreational vehicles, and motorcycles were used for almost 1 percent of trips and 3 percent of miles [1].

In the 2001 National Household Travel Survey, the definition of transit includes buses (but excludes charter, tour, and intercity buses, school buses, and shuttle buses), subway or elevated rail, street car and trolley car, commuter train, and waterborne passenger lines and ferries. Buses were the most widely used transit vehicle (67 percent of transit person trips and 53 percent of transit person-miles). Subway or elevated rail was the second most widely used, accounting for about one-quarter of these trips and miles. Commuter trains were used for only 6 percent of transit trips but because of the relatively long trip distances involved, accounted for 18 percent of the transit person-miles.

Source

1. U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, 2001 National Household Travel Survey, Preliminary Data Release Version 1 (day trip data only), available at http://nhts.ornl.gov, as of January 2003.

[1] Personal vehicles include passenger cars, vans, sport utility vehicles, pickup trucks, other trucks, recreational vehicles (not including boats), and motorcycles.

[2] The 2001 National Household Travel Survey "travel period" data were not available when this report was prepared. Without these data, vacation trips and travel by air tend to be underrepresented.

FIGURE 29 Modal Share of Person Trips: 2001

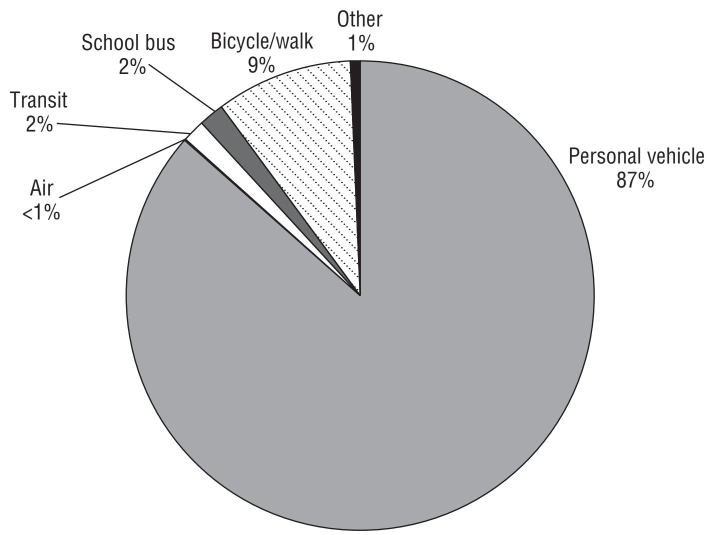
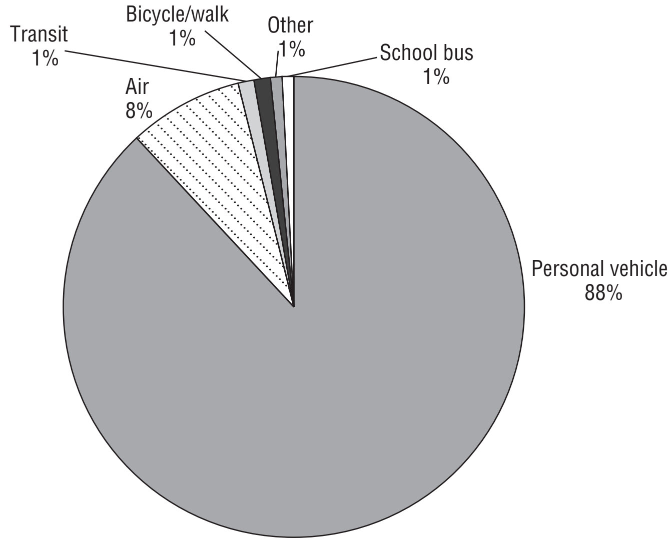


FIGURE 30 Modal Share of Person-Miles: 2001



NOTE: The 2001 National Household Travel Survey "travel period" data were not available when this report was prepared. Without these data, vacation trips and travel by air tend to be underrepresented.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, 2001 National Household Travel Survey, Preliminary Data Release Version 1 (day trip data only), available at http://nhts.ornl.gov/, as of January 2003.

Vehicle Ownership and Availability

Slightly less than one-third of households said they had one personal vehicle[1] available for use in 2001. A little more than one-third of households (40 million out of 107 million households) had 2 vehicles and slightly less than one-quarter had 3 or more vehicles available (figure 31). Almost 8 percent of households (8.5 million) had no vehicle available [1].

The amount of travel people do and the way they travel is strongly related to the availability of personal vehicles in their household. For instance, persons in households without vehicles took approximately 1,000 trips per person in 2001, while persons in households with at least 1 vehicle took 1,500 trips each. Persons in households without a vehicle traveled about 6,900 miles annually, less than half the 14,900 person-miles traveled by those in households with at least 1 vehicle. In addition, persons in households with at least 1 household vehicle made nearly 9 of every 10 trips by personal vehicle compared with less than 4 of 10 for those in households without a vehicle. Persons in households without access to vehicles made 37 percent of their trips on foot and another 20 percent by transit. This compares with 8 percent and 1 percent by foot and transit, respectively, by households with at least one vehicle [1].

Households without vehicles tend to have characteristics different from households with vehicles. For instance, households with total incomes of less than $25,000 are almost 10 times more likely not to have a vehicle when compared with those with incomes greater than $25,000 (figure 32). Though related to income, households in rented residences are five times more likely not to have a vehicle. Household vehicle ownership is also closely related to the number of people living in the household. Eighteen percent of single-person households have no vehicle, as compared with only 4 percent of multiperson households. Furthermore, the unavailability of vehicles in households in urban areas is almost twice that of households in rural areas [1].

Source

1. U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, 2001 National Household Travel Survey, Preliminary Data Release Version 1 (day trip data only), available at http://nhts.ornl.gov, as of January 2003.

[1] Personal vehicles include passenger cars, vans, sport utility vehicles, pickup trucks, other trucks, recreational vehicles (not including boats), and motorcycles.

FIGURE 31 U.S. Households by Number of Vehicles: 2001

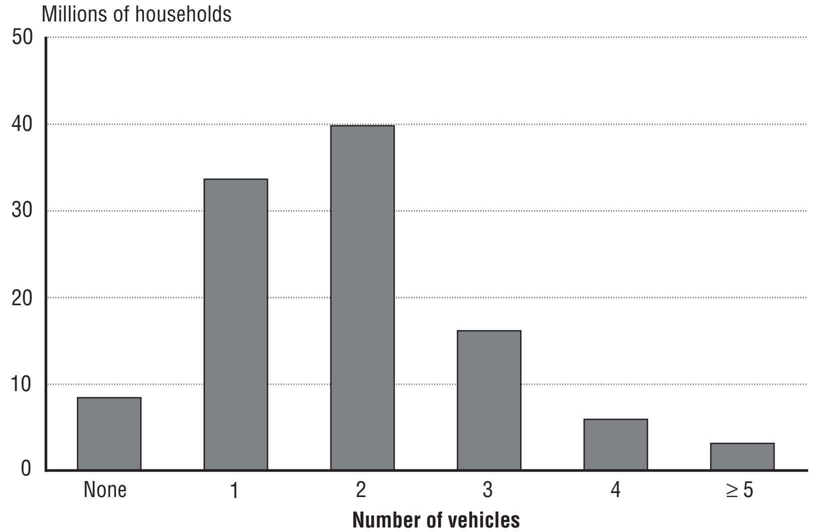
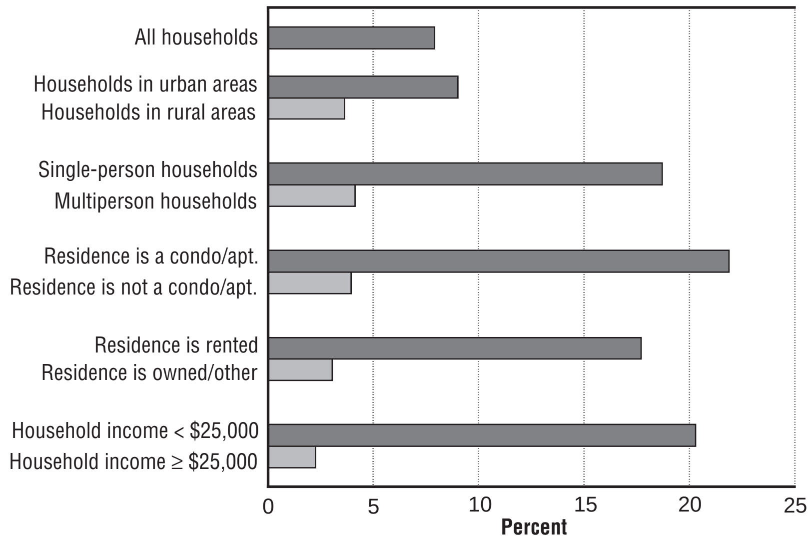


FIGURE 32 Proportion of Households Without Vehicles by Household Type: 2001



KEY: apt. = apartment; condo = condominium.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, 2001 National Household Travel Survey, Preliminary Data Release Version 1 (day trip data only), available at http://nhts.ornl.gov/, as of January 2003.

Household Spending on Transportation

On average, households spent $7,406 (in chained 1996 dollars[1]) on transportation in 2001. This represented 21 percent of all household expenditures that year. Only housing cost households more (31 percent) [1].

Over the last 10 years, consumer spending on private transportation (mainly motor vehicles and related expenses) increased (figure 33). On average, households spent nearly $3,600 on new and used motor vehicles in 2001, up 47 percent from about $2,500 in 1991. Spending on other vehicle expenses, including insurance, financing charges, maintenance, and repairs, also increased from about $1,720 to nearly $2,400 (14 percent). Meanwhile, gasoline and oil expenditures rose 3 percent, to nearly $1,100 in 2001. On average, households spent almost $400 on "other transportation"[2] in 2001, an increase of 6 percent between 1991 and 2001.

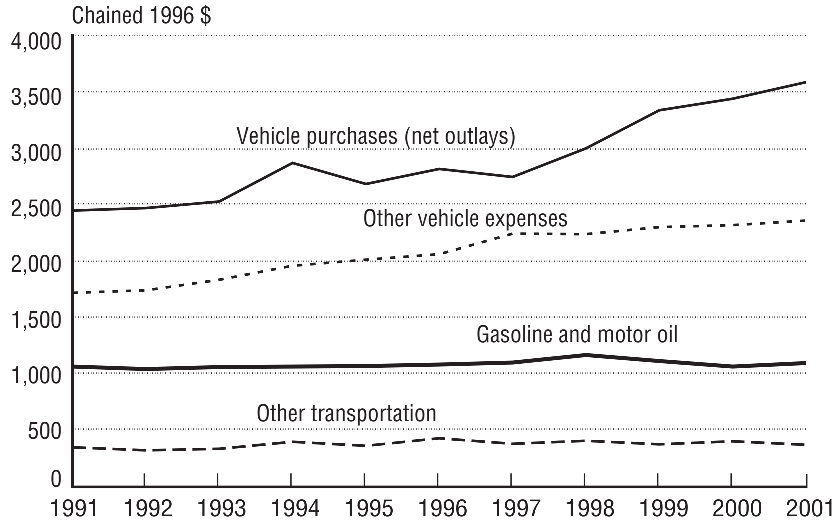
Source

1. U.S. Department of Labor, Bureau of Labor Statistics, *Consumer Expenditure Survey*, available from http://www.bls.gov/cex/home.htm, as of February 2003. Note: the survey data are collected in terms of *consumer units* rather than *households*. There are an average of 2.5 persons in each consumer unit.

[1] All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

[2] In its survey, the Bureau of Labor Statistics uses the term "public transportation," rather than "other transportation." This category includes both local transit, e.g., bus travel, and long-distance travel, e.g., airplane trips.

FIGURE 33 Average Household Transportation Expenditures: 1991–2001



NOTES: Data are based on survey results.

The Bureau of Labor Statistics uses the term consumer unit rather than household. There are an average of 2.5 persons in each consumer unit. A consumer unit is defined as members of a household related by blood, marrige, adoption, or other legal arrangement; a single person living alone or sharing a household with another but who is financially independent; or two or more persons living together who share responsibility for at least two-thirds of major types of expenses—food, housing, and other expenses.

Other transportation includes both local transit (e.g., bus and taxi travel) and long-distance travel (e.g., airplane trips).

All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey data query, November 2002.

Cost of Owning and Operating an Automobile

Driving an automobile 15,000 miles per year cost 50¢ per mile in 2001, or 16 percent more than it did in 1991, when total costs were 43¢ (figure 34). These data, which are expressed in 1996 chained dollars,[1] include fixed costs (e.g., depreciation, insurance, finance charges, and license fees) and variable costs (e.g., gasoline and oil, maintenance, and tires). Over the decade, fixed costs have consistently represented about 75 percent of total per-mile costs. Gasoline and oil, a component of variable costs, represented 14 percent of driving costs per mile in 2001, up from 12 percent in 2000 [1].

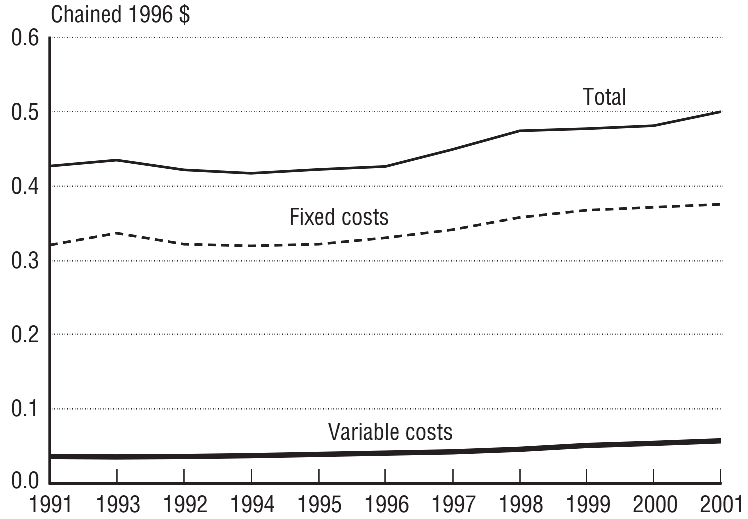
About 87 percent of the daily trips Americans took in 2001 occurred in highway vehicles, including their own automobiles [2]. The other 13 percent traveled via public transportation or air, rode bicycles, walked, or traveled by other means.

Sources

1. American Automobile Association, *Your Driving Costs* (Heathrow, FL: 2000 and 2001 issues).
2. U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, 2001 National Household Travel Survey, Preliminary Data Release Version 1 (day trip data only), available at http://nhts.ornl.gov, as of January 2003.

[1] All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

FIGURE 34 Average per Mile Cost of Owning and Operating an Automobile: 1991–2001



NOTES: Assumes 15,000 miles driven per year. All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

SOURCES: 1991–1998—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 3-14, also available at http://www.bts.gov. **1999–2002**—American Automobile Association, *Your Driving Costs* (Heathrow, FL: 1999–2002 issues).

Cost of Intercity Trips by Train and Bus

Amtrak collected an average of 20¢ per revenue passenger-mile in fiscal year (FY) 2000 (in chained 1996 dollars[1]), up 33 percent from 15¢ per revenue passenger-mile in FY 1993[2] (figure 35). During the 1990s, Amtrak shifted its focus to urban routes in the northeast and west. When Amtrak reduced its number of route-miles by 3 percent in 1995, revenue per passenger-mile increased by 13 percent the following fiscal year. When track operational length was further reduced by 7 percent in 1999, revenue per passenger-mile increased 7 percent the following fiscal year [1, 2].

Average intercity Class I bus fares rose 27 percent, from $21 to $26 (in chained 1996 dollars), between 1990 and 2000 (figure 36). The average bus fare is based on total intercity passenger revenues and the number of intercity bus passenger trips, as reported by carriers to the Bureau of Transportation Statistics. Since passenger-mile data are not reported, average bus fare per passenger-mile cannot be calculated and compared with similar Amtrak fare data.

Sources

1. Association of American of Railroads, *Railroad Facts* (Washington, DC: 1994–2002 issues).
2. National Railroad Passenger Corp. (Amtrak), *Amtrak 2000 Annual Report, Statistical Appendix* (Washington, DC: 2001).

[1] All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

[2] Amtrak published ticket yield data for FY 1991 through FY 2000 in its *2000 Annual Report*. The *2001 Annual Report*, published online in February 2003, contains consolidated financial statements only.

FIGURE 35 Amtrak Average Revenue per Revenue Passenger-Mile: 1993–2001

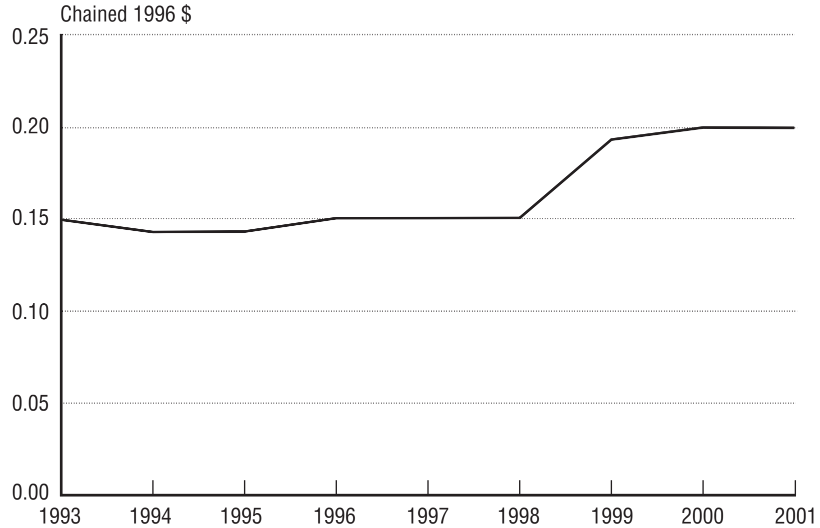
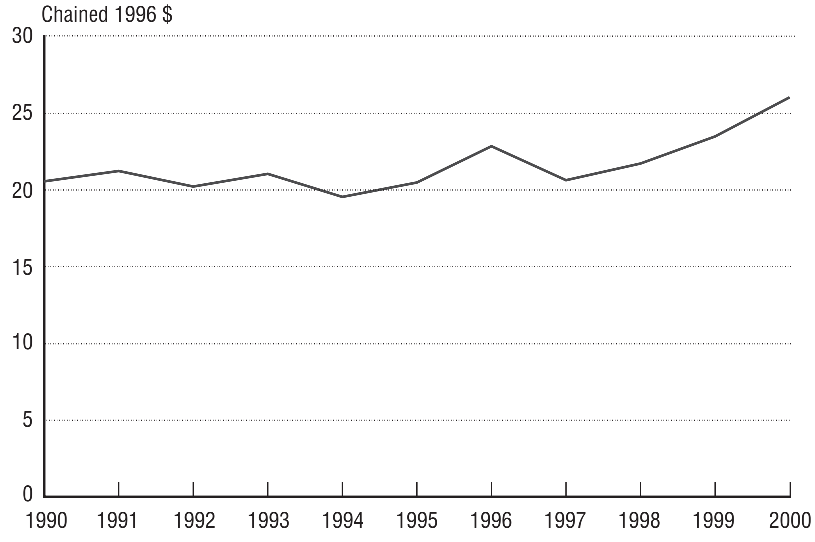


FIGURE 36 Average Class I Intercity Bus Fares: 1990–2000



NOTES: Amtrak data are not available prior to 1993. All dollar amounts are chained 1996 dollars. Current dollar amounts are available in appendix B and were adjusted to eliminate the effects of inflation over time.

SOURCES: Figure 35—American Association of Railroads, *Railroad Facts* (Washington, DC: 1994–2002 issues). **Figure 36**—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 3-15b, also available at http://www.bts.gov.

Average Transit Fares

Transit fares remained relatively stable during the 1990s (figure 37). Increases in fares per passenger-mile for some modes of transit were offset by lower fares per passenger-mile for other modes.

Local transit bus service, which accounts for 60 percent of public transportation ridership (by number of unlinked passenger trips[1]), is slightly more expensive than it was 10 years ago (figure 38). Transit bus service cost 20¢ per mile in 2000, up from 18¢ per mile in 1990 (in chained 1996 dollars).[2] Bus ridership, which dropped by about 15 percent during the mid-1990s, rebounded by 2000. Rail transit—heavy, commuter, and light rail—was less expensive in 2000 than in 1990, with light-rail fares dropping the most, at 30 percent.

Heavy rail comprises most of the nation's subway systems. It is the second most heavily used form of transit with over 30 percent of total transit ridership. The cost of using heavy rail declined from 19¢ to 18¢ per passenger-mile between 1990 and 2000 [1].

Source

1. American Public Transportation Association, *Public Transportation Fact Book 2001*, Tables 18 and 26, available at http://www.apta.com/stats/fares/faremode.htm, as of February 2003. Data for 2000 are preliminary.

[1] See Urban Transit Ridership in section 7, "Availability of Mass Transit," for a discussion of unlinked trips.

[2] All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

FIGURE 37 Average Transit Fare per Passenger-Mile: Fiscal Years 1990–2000

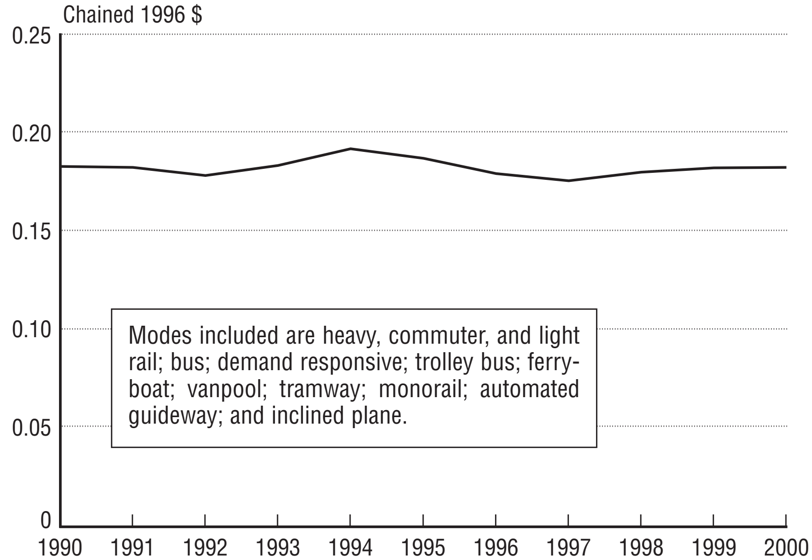
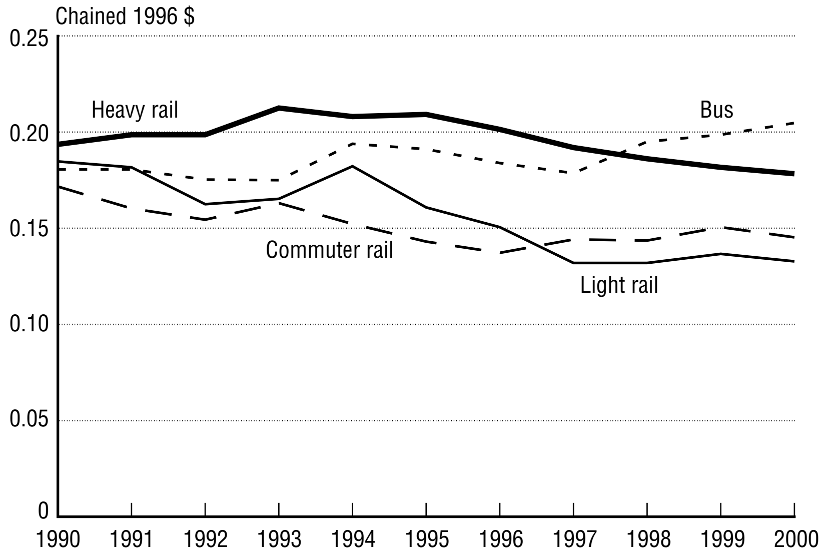


FIGURE 38 Average Transit Fare per Passenger-Mile for Selected Service Types: Fiscal Years 1990–2000



NOTES: Data for 2000 are preliminary. Beginning in 1991, fares include subsidies formerly classified as "Other" operating funding.

Commuter rail: Urban/suburban passenger train service for short-distance travel between a central city and adjacent suburbs run on tracks of a traditional railroad system. Does not include heavy- or light-rail transit service.

Heavy rail: High-speed transit rail operated on rights-of-way that exclude all other vehicles and pedestrians.

Light rail: Urban transit rail operated on a reserved right-of-way that may be crossed by roads used by motor vehicles and pedestrians.

Demand responsive: A nonfixed-route, nonfixed-schedule form of transportation that operates in response to calls from passengers or their agents to the transit operator or dispatcher.

All dollar amounts are expressed in chained 1996 dollars. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

SOURCES: American Public Transportation Association, *Public Transportation Fact Book 2001*, tables 18 and 26, available at http://www.apta.com/stats/fares/faremode.htm, as of February 2003. **Modal definitions**—U.S. Department of Transportaton, Bureau of Transportation Statistics, *Pocket Guide to Transportation 2003* (Washington, DC: 2003), glossary.

Commuting Expenses of the Working Poor

The U.S. working poor[1] totaled more than 9 million (6 percent of all workers) in 1999 [1]. Half of these workers spent almost 10 percent of their income on commuting expenses in that year[2] (figure 39). This is over twice the percentage of income that the median of the total population spent on commuting (4 percent). This disparity grows to four times when compared with the median for workers earning $45,000 or more per year (2 percent of income).

Half of all workers who use their own vehicles spent 5 percent or more of their income in 1999 on commuting (figure 40). However, among the working poor using their own vehicle, half spent at least 21 percent of their income on commuting. For all workers taking public transit, half spent 3 percent or more of their income, compared with the median for the working poor of 13 percent of their income.[3] Most workers used their own vehicle to commute in 1999; however, the working poor were more likely than other groups to use alternative commuting modes. For instance, 87 percent of workers earning $22,000 or more per year used their own vehicle to commute, compared with 66 percent of the working poor. A substantial number of the working poor used the less expensive options of carpool or vanpool (12 percent), public transit (6 percent), biking or walking (11 percent), or commuted some other way (8 percent).

[1] The official government poverty line for a single adult with no dependents was $8,501 in 1999. (U.S. Census Bureau, 2002, http://www.census.gov/hhes/poverty/threshld/thresh99.html) Here, the working poor are defined as workers with an annual personal income of less than $8,000.

[2] Data are in current 1999 dollars. For further information, see U.S. Department of Transportation, Bureau of Transportation Statistics, *Commuting Expenses: Disparity for the Working Poor*, Issue Brief (Washington, DC: 2003).

[3] In this analysis, the Bureau of Transportation Statistics found that 0.5 percent of workers reported using both their own vehicle and public transit to commute. Overall, 2 percent of workers reported using multiple modes.

Source

1. U.S. Department of Commerce, U.S. Census Bureau and U.S. Department of Labor, Bureau of Labor Statistics, *Annual Demographic Survey*, March Supplement, table 10, available at http://ferret.bls.census.gov/macro/032000/pov/new10_001.htm, as of March 2003.

Commuting Expenses Data

The data presented here are based on an analysis by the Bureau of Transportation Statistics (BTS) of the U.S. Census Bureau's Survey of Income and Program Participation (SIPP) (available at http://www.sipp.census.gov/sipp). BTS plans to publish a full report in late 2003 on how the percentage of workers' income spent on commuting varies by race, gender, age, location, household, and income definition covering 1996 to 1999.

For this study, BTS selected only those with a paid job during the reference period from the SIPP sample. Workers' commuting expenses included fees and fares, for those who did not use their own vehicle to commute, and mileage expenses, parking fees, and tolls for those who used their own vehicle. The income figures represent cash income before taxes.

The percentage of income data presented here is in median values. A median is the middle value in a distribution, above and below which lie an equal number of values. For example, when the median spending on commuting by all workers who own their own vehicles is 5 percent of their income, half of all workers spend more than 5 percent of their income on commuting and the other half spend less than 5 percent.

Source

U.S. Department of Transportation, Bureau of Transportation Statistics, *Commuting Expenses: Disparity for the Working Poor,* Issue Brief (Washington, DC: 2003).

FIGURE 39 Share of Personal Income Spent on Commuting by Income Group: 1999

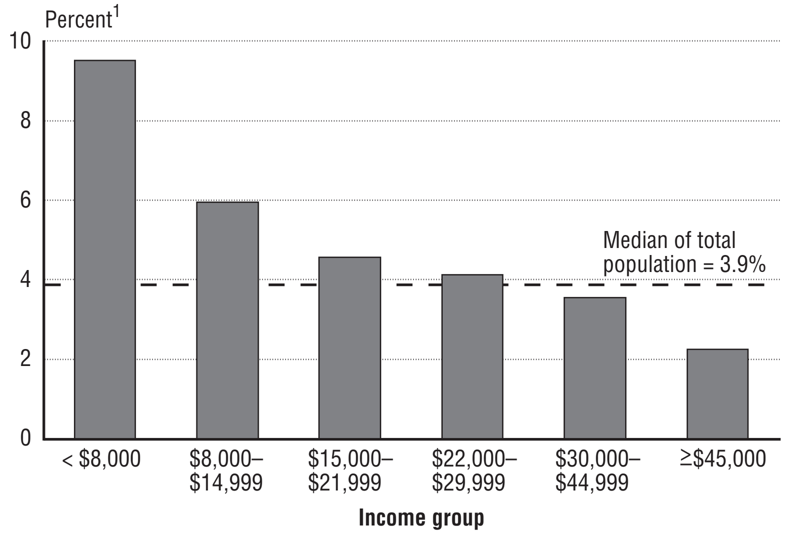
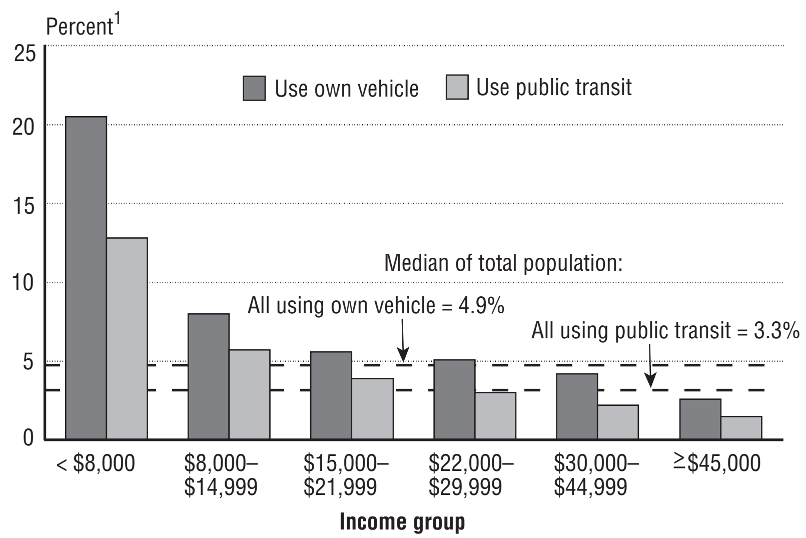


FIGURE 40 Share of Personal Income Spent on Commuting by Income Group and Transportation Mode: 1999



[1] Percent represents median of income group. The median is the point where half the income group spends more and half spends less than the specified percentage.

NOTE: All dollar amounts are in current 1999 dollars.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, U.S. Census Bureau, *Survey of Income and Program Participation* (Hyattsville, MD: 2001), also available at http://www.bls.census.gov/sipp/, as of April 2003.

Airfare Index Research Data

Commercial airlines offer a variety of discount fares to fill their flights, but these special discount airfares, facilitated by internet commerce and "frequent flyer" programs, complicate efforts to measure changes in the prices people pay for commercial air travel. To improve these measurements, the Bureau of Transportation Statistics (BTS) and the Bureau of Labor Statistics (BLS) have research underway to develop an Origin and Destination (O&D) Survey Airfare Index (see box). Some data from this ongoing research are presented here.

The O&D Survey index research data can be used to compare changes in prices among various cities. In one comparison of three medium-size cities, a dip appears between 1995 and 1998 for flights originating in Colorado Springs, Colorado (figure 41). This is a time during which the discount carrier Western Pacific operated flights from Colorado Springs and indicates the effect it had on bringing airfares down before it withdrew from the market. The O&D Survey index can be used to compare prices for international travel, as well. The third quarter spikes in a comparison of travel originating in Frankfurt, London, and Tokyo indicate that a high percentage of passengers traveling to the United States from these cities pay peak fares July through September (figure 42). These types of specific domestic and foreign points of origin comparisons are possible because of the size of the O&D Survey sample on which the index is based.

The O&D Survey index can be compared with the official BLS Airline fare index (figure 43). As the BLS index covers only itineraries originating in the United States, it is most comparable to the O&D Survey "U.S. Origin Only" series. However, these two indices give different results. For instance, between the fourth quarter of 1998 and the fourth quarter of 2000, the BLS index increased 17 percent, while the similar O&D Survey index increased only 13 percent. This difference is probably due mainly to the O&D Survey index's inclusion of special discount fares combined with consumers' increasing use of special discount tickets during this period. The more comprehensive O&D Survey index, which combines U.S. and foreign flight origin data, rose even less (11.6 percent). The "foreign origin only" component increased just 4.1 percent but fluctuates more over the period.

Origin and Destination (O&D) Survey Airfare Index Data

The Bureau of Transportation Statistics (BTS) quarterly *Passenger Origin and Destination (O&D) Survey* provides the data for the O&D Survey Airfare Index. Through this passenger survey, BTS collects data on a 10 percent sample of airline itineraries. Each sample observation comprises a fare value (actual fare paid, including tax), a sequence of airports and carriers, and other details of an itinerary traveled by a passenger or group of passengers.

The O&D Survey Index data presented here were developed only for *research* purposes by BTS statisticians, in consultation with researchers from the Bureau of Labor Statistics (BLS). This ongoing BTS research[1] is aimed at developing a new method of computing price indices for air travel, based on transaction prices. The current official U.S. Consumer Price Index for commercial air travel is the BLS Airline Fare Index, but it does not reflect the full range of fares consumers pay.[2]

[1] For a description of the experimental index estimation methodology, see Lent and Dorfman, "A Transaction Price Index for Air Travel," 2003, available on request from the Bureau of Labor Statistics.

[2] A description of the BLS estimation method is available on the BLS website at http://www.bls.gov/cpi/cpifacaf.htm.

FIGURE 41 Origin and Destination Survey Index[1] by City of Origin for Three Medium-sized U.S. Cities: 1995–2000
(All classes of service)

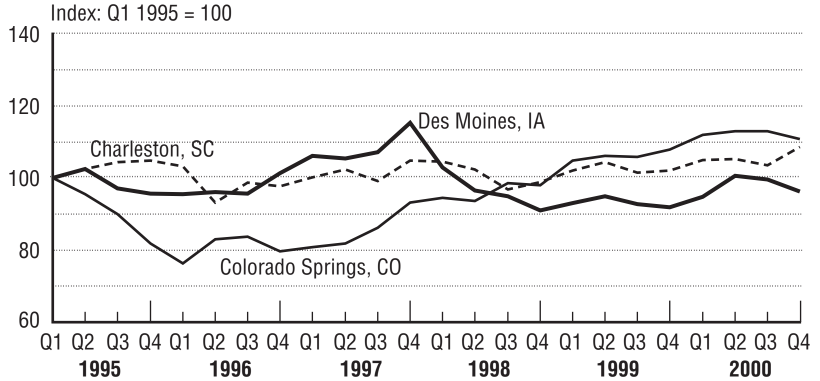


FIGURE 42 Origin and Destination Survey Index[1] by City of Origin for Three Large International Cities: 1995–2000
(All classes of service)

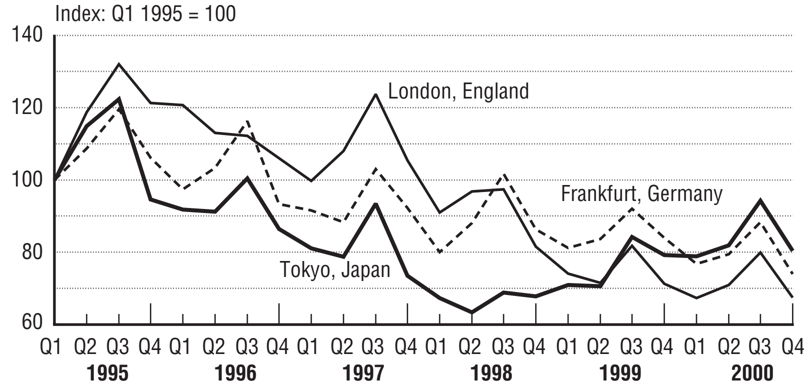
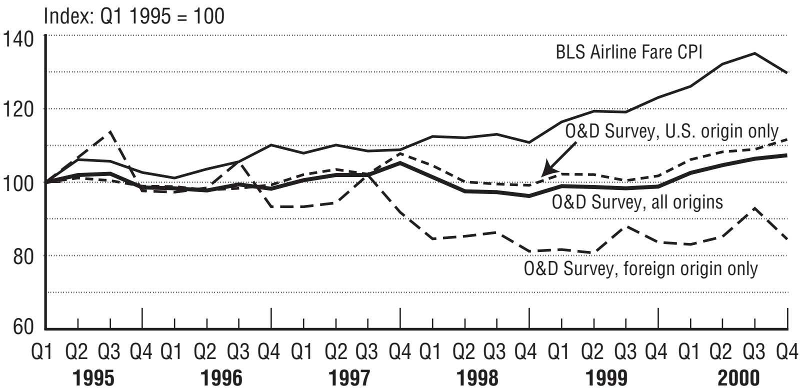


FIGURE 43 Comparison of Airfare Indices: 1995–2000
(Not seasonally adjusted)



[1] The O&D Survey indices are computed using the Fisher Index formula, which differs from the formulas used to compute the Bureau of Labor Statistics Airline Fare Consumer Price Index.

NOTE: These data were developed for research purposes only and are not official BTS data.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics (BTS) and U.S. Department of Labor, Bureau of Labor Statistics, calculations based on data from BTS's quarterly *Passenger Origin & Destination Survey*, March 2003. **Figure 41**—U.S. Department of Labor, Bureau of Labor Statistics, Airline Fare Consumer Price Index, available at http://www.bls.gov/cpi/home.htm#data, as of March 2003.

Transit Passenger-Miles Traveled

Transit passenger-miles traveled (pmt) grew 24 percent between 1991 and 2001, from 37.5 billion pmt to 46.5 billion pmt [1, 2]. As they have historically, buses had the largest pmt share in 2001, generating 19.6 billion pmt or 42 percent of all transit pmt (figure 44). Also in 2001, heavy-rail pmt totaled 14.2 billion or 31 percent, commuter rail reached 9.5 billion pmt or 20 percent, light rail had 1.4 billion pmt or 3 percent, and other modes of transit, such as ferryboat and demand responsive,[1] generated 1.8 billion pmt or 4 percent [2].

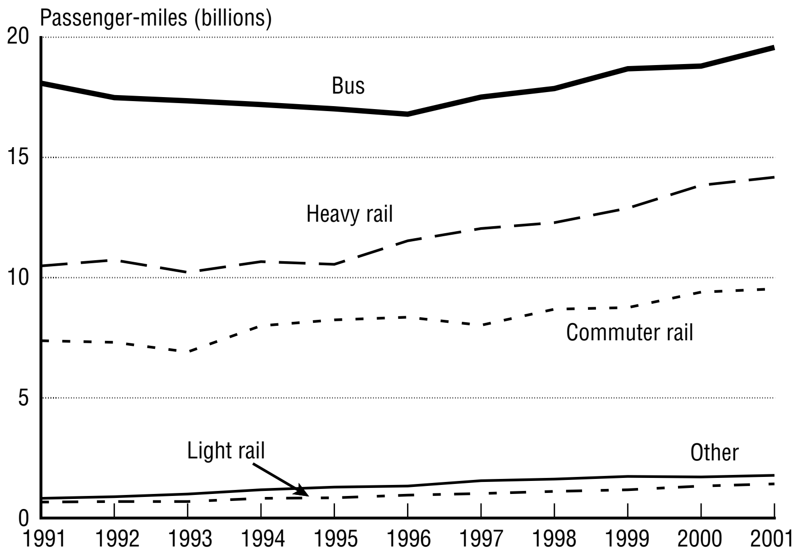
The top 30 transit authorities (ranked by unlinked passenger trips) logged 35.1 billion passenger-miles in 2001 or 76 percent of all transit pmt that year [2]. In 2001, people riding New York City Transit traveled 10.1 billion passenger-miles (or 22 percent of all passenger-miles out of the top 30 authorities) and the Chicago Transit Authority generated 1.8 billion pmt or 5 percent [3].

[1] Demand-responsive transit operates on a nonfixed route and a nonfixed schedule in response to calls from passengers or their agents to the transit operator or dispatcher.

Sources

1. U.S. Department of Transportation, Federal Transit Administration, *National Transit Summaries and Trends, 1996*, available at http://www.ntdprogram.com, as of May 2003.
2. _____, "National Transit Summaries and Trends," 2002 draft, available at http://www.ntdprogram.com, as of February 2003.
3. _____, National Transit Database, available at http://www.ntdprogram.com, as of March 2003.

FIGURE 44 Passenger-Miles by Type of Service: 1991–2001



NOTE: Other includes modes such as demand responsive, automated guideway, Alaska Railroad, cable car, ferryboat, inclined plane, monorail, trolleybus, and vanpool.

SOURCES: 1991–1994—U.S. Department of Transportation, Federal Transit Administration, *1994 National Transit Summaries and Trends* (Washington, DC: 1996); **1995**—U.S. Department of Transportation, Federal Transit Administration, *1997 National Transit Summaries and Trends* (Washington, DC: 1999); **1996–2001**—U.S. Department of Transportation, Federal Transit Administration, National Transit Database, Data Tables (Washington, DC: 1996-2001 issues).

Transit Ridership

Transit ridership has grown steadily since 1996, reaching 9.0 billion unlinked trips (see box) in 2001, an increase of 19 percent (figure 45). This represents an annual change of 4 percent compared with the growth in U.S. resident population of 1 percent over the same period. Between 1991 and 1996, transit ridership did not grow appreciably [1].

Among the various types of transit service, bus ridership comprised the majority of unlinked trips (5,215 million) in 2001, having grown 16 percent between 1996 and 2001. However, rail transit ridership, with almost 3,480 million trips in 2001, posted stronger growth (39 percent). Among the rail components, light rail grew 29 percent; heavy rail, 27 percent; and commuter rail, 19 percent (figure 46). Heavy-rail ridership posted 2,728 million trips; commuter rail, 418 million trips; and light rail, 334 million trips in 2001. Other modes, such as ferryboats and demand responsive, posted a combined 313 million trips [1].

Source

1. U.S. Department of Transportation, Federal Transit Administration, "National Transit Summaries and Trends," 2002 draft, available at http://www.ntprogram.com, as of February 2003.

Linked and Unlinked Trips vs. Number of Passengers

Transit authorities reporting to the Federal Transit Administration (FTA) provide the number of passengers who board public transportation vehicles rather than the number of passengers they serve. Passenger boardings are called unlinked and linked passenger trips. Unlinked trips are total boardings on an individual vehicle. Linked trips refers to the total number of riders and measures the actual number of complete trips from origin to destination, including transfers. Unlinked trips are viewed as a measure of transit utilization (at the system, route, or subroute level), while linked trips are used to measure revenue passengers. The ratio of unlinked to linked trips indicates the relative usage of transfers in the transit system [2]. Determining the actual number of passengers using a transit system can be a significant task because of the tracking requirements for the number of transfers from one vehicle or mode to the next, from one agency to another, and from the use of day passes and cash.

Because FTA does not have an official methodology for estimating the actual number of passengers that ride transit systems, individual transit agencies develop their own passenger counting and estimation methodology based on their resources and local attributes. Individual transit agencies may estimate the actual number of passengers based on a variety of methods and data-collection tools to help control for double counting, such as, automatic passenger counting units, on-board surveys, manual people counters, video camera tracking, and fare box analysis.

The American Public Transportation Association (APTA) made an estimate, based on an average weekday, of the actual number of passengers carried by member authorities in 2000. APTA concluded that the number of people using the national transit system is 45 percent of the number of total unlinked trips reported or 14 million people, based on 32 million daily unlinked trips. This estimate reflects the average travel patterns of approximately 50 percent of all transit riders who take 2 trips per day between home and employment and those dependent on transit who could take up to 10 trips per day [1].

Sources

1. American Public Transportation Association, *2002 Public Transportation Fact Book* (Washington, DC: February 2002).
2. Boyle, D.B., "Passenger Counting Technologies and Procedures," *TCRP Synthesis of Transit Practice 29* (Washington, DC: Transportation Research Board, 1998).

FIGURE 45 Transit Ridership by Selected Type of Service: 1991–2001

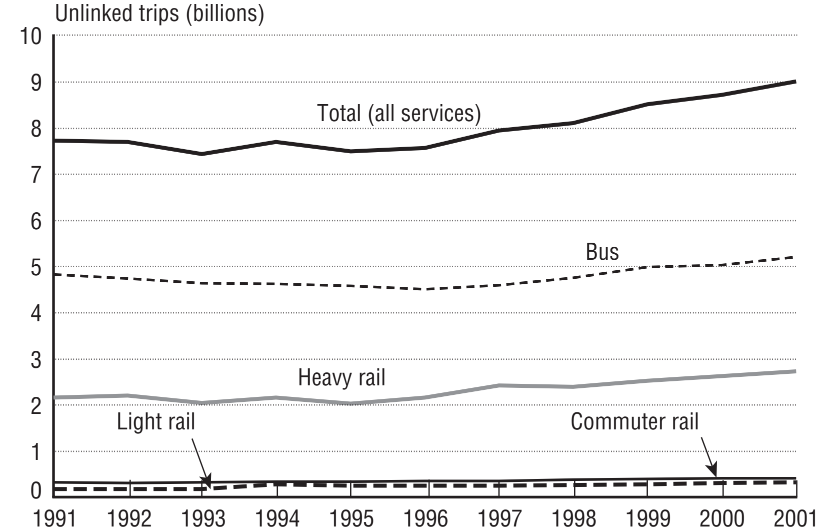
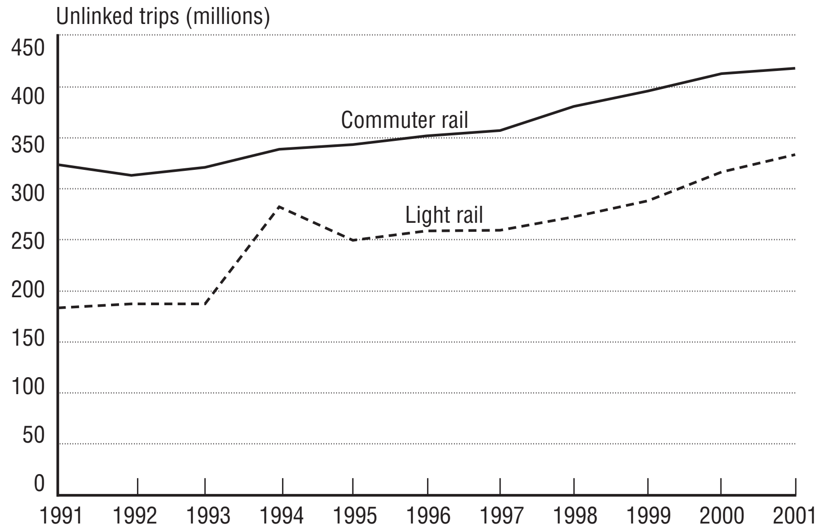


FIGURE 46 Transit Ridership by Selected Type of Service: 1991–2001



NOTES: Total includes other modes not shown, such as ferryboats, demand responsive, inclined planes, and trolley buses. See the Glossary for definitions of heavy rail, light rail, and commuter rail.

SOURCE: U.S. Department of Transportation, Federal Transit Administration, National Transit Summaries and Trends, 2002 draft, available at http://www.ntdprogram.com, as of February 2003.

Transit Ridership by Transit Authority

Approximately 77 percent of all unlinked transit passenger trips since at least 1996 have been made within the service area of just 30 transit authorities. These 30 top authorities logged 6.9 billion unlinked trips in 2001[1] (figure 47). New York City Transit alone reported 2.7 billion, or 30 percent, of all unlinked passenger trips. The Chicago Transit Authority followed with 485 million or 5 percent of all trips [2].

The top 30 transit authorities served a population of about 101 million in 2001 [2]. All transit authorities reporting to the National Transit Database determine their population-served data using definitions of bus and rail service in the Americans with Disabilities Act of 1990 and their own local criteria for other service such as ferryboat and vanpool. Some double counting of populations served occurs, especially among authorities operating in the largest metropolitan areas such as New York City, Los Angeles, Chicago, and San Francisco [2].

According to a Bureau of Transportation Statistics survey,[2] an average of 71 percent of household respondents indicated they had public transportation available in their area [1].

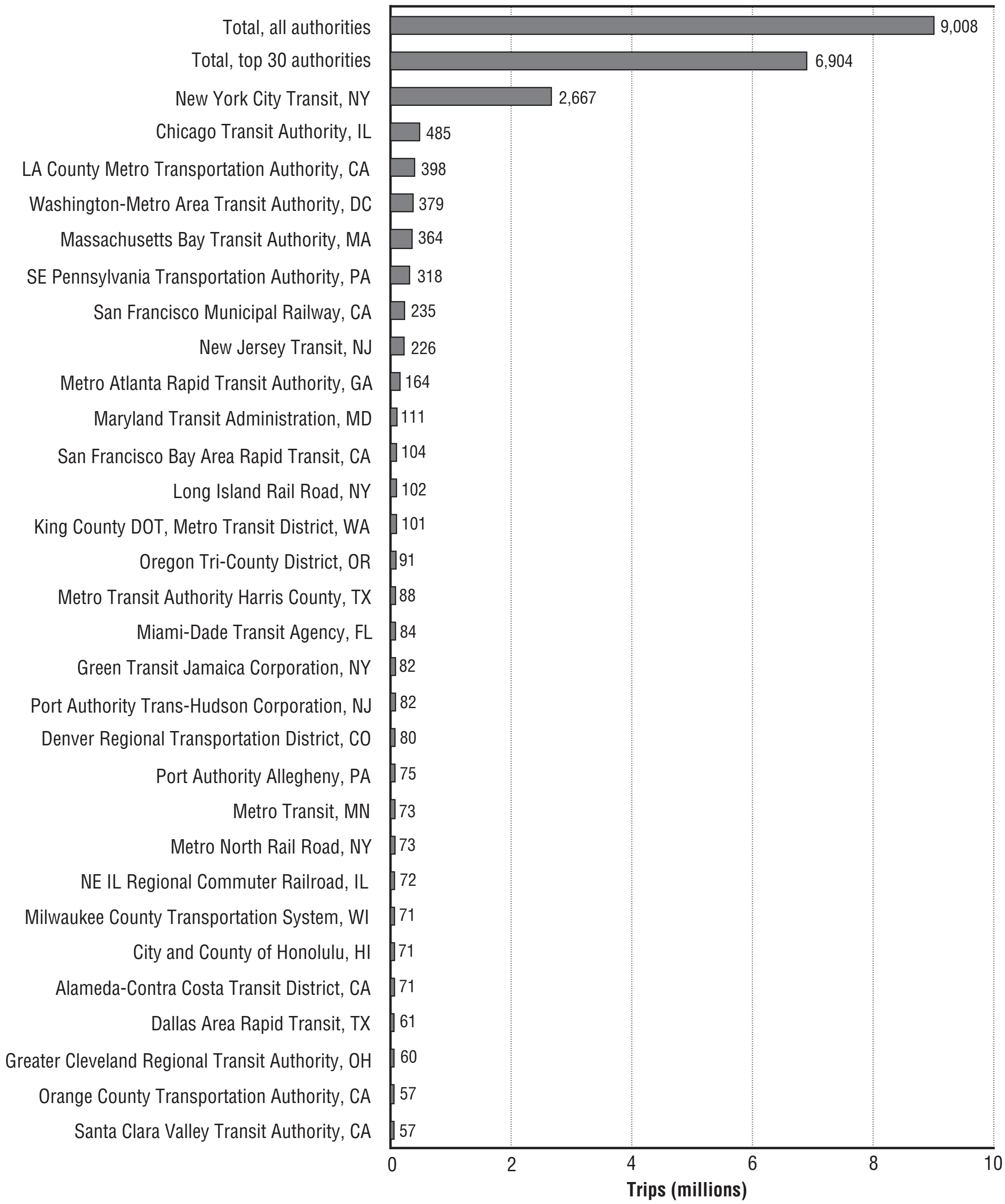
Sources

1. U.S. Department of Transportation, Bureau of Transportation Statistics, Omnibus Survey, Summer 2002, available at http://www.bts.gov, as of June 2003.
2. U.S. Department of Transportation, Federal Transit Administration, National Transit Database, 1996 and 2001 issues, available at http://www.ntdprogram.com/, as of March 2003.

[1] In 2001, 602 transit authorities submitted data to the Federal Transit Administration. However, due to reporting omissions, only 580 transit authorities are reflected in that year's database.

[2] In the summer of 2002, BTS's Omnibus Survey collected data on public transportation in June, July, and August.

FIGURE 47 Top 30 Transit Authorities by Unlinked Passenger Trips: 2001



NOTES: Oregon Tri-County is a municipal corporation of the State of Oregon. Green Transit Jamaica Corporation is a contractor for the New York City Department of Transportation.

SOURCE: U.S. Department of Transportation, Federal Transit Administration, National Transit Database, available at http://www.ntdprogram.com, as of February 2003.

Lift- or Ramp-Equipped Buses and Rail Stations

The nationwide fleet of lift- or ramp-equipped transit buses increased to 87 percent (58,785 buses) in 2001 from 52 percent of the bus fleet (29,088 buses) in 1993 (figure 48). While increased compliance with Americans with Disabilities Act (ADA) requirements (see box) occurred from 1993 to 2001, the rate of compliance has differed among bus types (figure 49). The large bus fleet had the highest level of compliance in 1993 and articulated buses the lowest. By 2001, the large bus fleet continued to have the highest rate (95 percent, or 40,501 vehicles), followed by medium buses with 94 percent (7,337 vehicles). Meanwhile, small buses had the lowest level of compliance (85 percent, or 9,176 vehicles). Articulated bus compliance fell in the middle at 89 percent, or 1,771 vehicles [2].

Rail transit infrastructure consists of track and stations. In 2001, 50 percent (1,374) stations were ADA accessible, serving automated guideway transit, cable cars, commuter rail, heavy rail, inclined plane, light rail, monorail, and the Alaska Railroad. In 2001, light-rail riders enjoyed 76 percent accessibility (408 stations), followed by commuter-rail riders with 50 percent accessibility (583 stations) and heavy-rail riders with 35 percent accessibility (352 stations) [1].

Transit Accessibility Under the ADA

While the Americans with Disabilities Act (ADA) of 1990 requires public transit services, under specific conditions, to be accessible to persons with special needs, it did not impose a statutory deadline for fleet accessibility. The ADA did require all key stations to be accessible by July 1993, but allowed the Federal Transit Administration to grant an extension up to July 2020 for stations requiring structural modifications to bring them into compliance [1].

The ADA was enacted in 1990; data have been collected since 1993.

Source

1. U.S. Department of Transportation, Federal Transit Administration, *FY 2002 Performance Plan* (Washington, DC: 2003), also available at http://www.fta.dot.gov/performfy2001/pg2.html, as of February 2003.

Sources

1. U.S. Department of Transportation, Federal Transit Administration, National Transit Database 2001, available at http://www.ntdprogram.com, as of March 2003.
2. _____, *National Transit Summaries and Trends*, 2002 draft, available at http://www.ntdprogram.com, as of February 2003.

FIGURE 48 **Share of Transit Buses that are Lift- or Ramp-Equipped: 1993–2001**

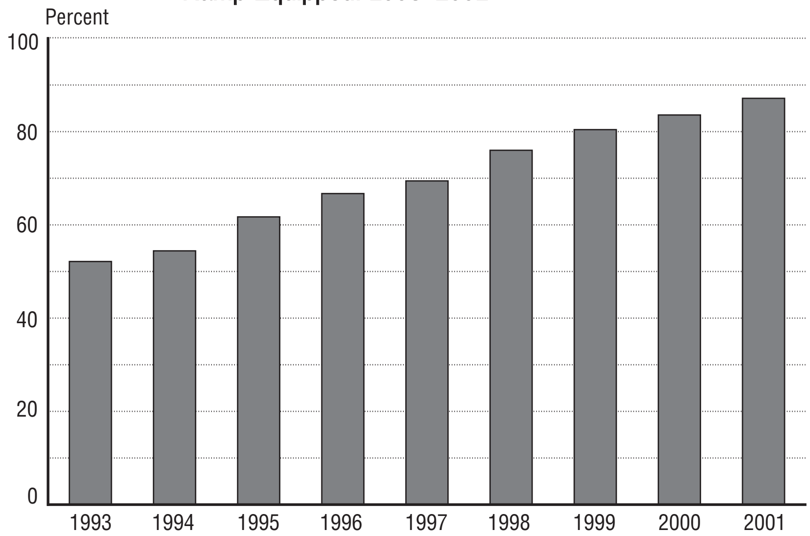
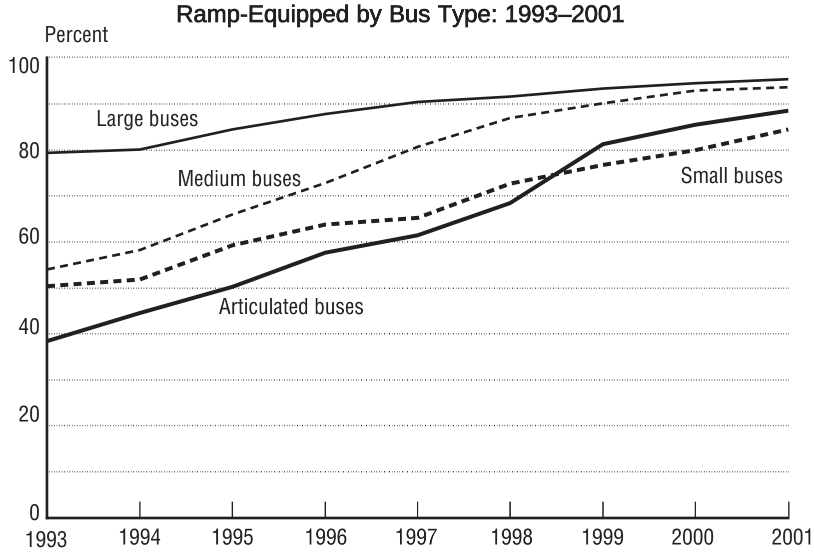


FIGURE 49 **Share of Transit Buses that are Lift- or Ramp-Equipped by Bus Type: 1993–2001**



NOTES: Large buses have more than 35 seats, medium buses have 25–35 seats, and small buses have less than 25 seats. Articulated buses are extra-long buses that measure between 54 and 60 feet.

SOURCE: U.S. Department of Transportation, Federal Transit Administration, "National Transit Summaries and Trends," 2002 draft, available at http://www.ntdprogram.com, as of February 2003.

Commercial Motor Vehicle Repairs

In the United States, there were nearly 600,000 motor carriers—common, contract, or private—using buses or trucks to provide commercial transportation of passengers or freight in 2000 [2]. These companies accounted for 28 percent of the nation's freight ton-miles and 3 percent of passenger-miles that year[1] [1]. Repair data for most of this fleet are not public information.

Over 2.0 million roadside truck inspections were completed in 2001, up from 1.6 million in 1990, to ensure that trucks are in compliance with federal safety regulations and standards (figure 50). Nearly one-quarter of those inspected in 2001 were taken out of service for repairs (figure 51). Although the number of inspected trucks taken out of service for repairs has remained fairly constant, the proportion of those trucks as a percentage of all inspected trucks has declined from 34 percent in 1990 to 23 percent in 2001.

[1] Ton-miles are calculated by multiplying the weight in tons of each shipment transported by the miles hauled. Passenger-miles are calculated by multiplying the number of passengers transported by the number of miles traveled.

The downtime for a truck undergoing an inspection can vary from 30 to 60 minutes. Trucks that are placed out-of-service for repairs may be delayed from a few minutes to several days, depending on circumstances.

Sources

1. U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), tables 1-34 and 1-44, also available at http://www.bts.gov/, as of April 2003.
2. U.S. Department of Transportation, Federal Motor Carrier Safety Administration data, as cited in American Trucking Associations, *American Trucking Trends 2002* (Washington, DC: 2002).

FIGURE 50 Roadside Truck Inspections: 1990–2001

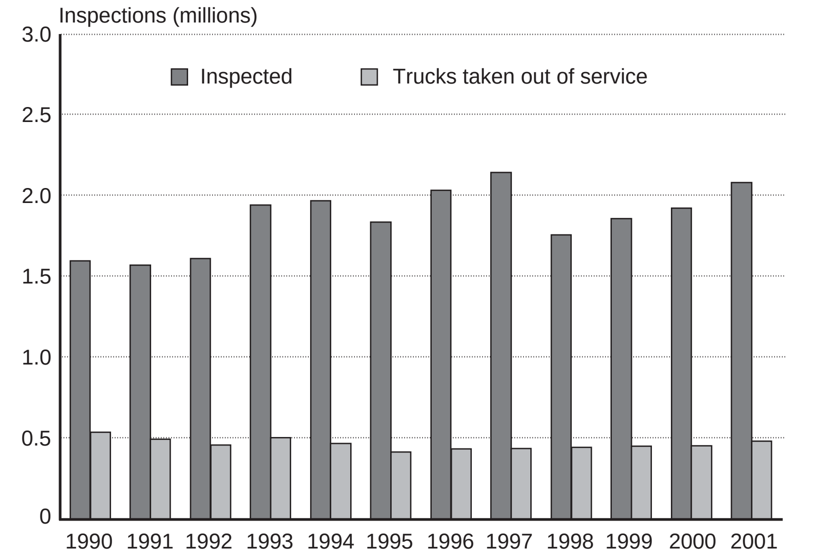
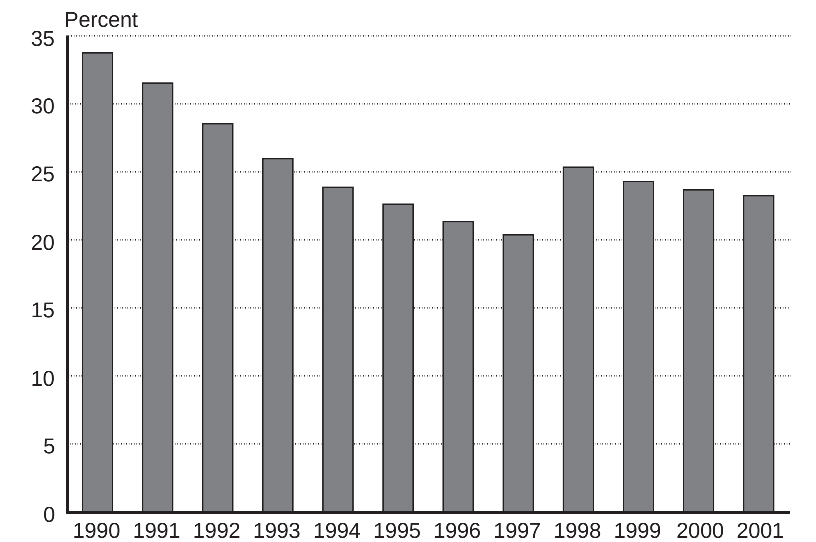


FIGURE 51 Inspected Trucks Taken Out of Service for Repairs: 1990–2001



SOURCES: U.S. Department of Transportation, Federal Motor Carrier Safety Administration, Motor Carrier Management Information System, available at http://www.fmcsa.dot.gov, as of June 2003. **1999–2001 data (figure 50) and 2001 data (figure 51)**—personal communication, Federal Motor Carrier Safety Administration, Aug. 11, 2003.

Highway Maintenance and Repairs

Work zones on freeways cause an estimated 24 percent of the nonrecurring delays on freeways and principal arterials [1]. According to the Federal Highway Administration, the purpose of maintenance—which includes restoration, resurfacing, minor widening, and reconstruction—is to keep highways in usable condition not to extend service life. Pavement resurfacing represented just over half (51 percent) of the miles of federal-aid roads undergoing federally supported construction or maintenance in 2001 (figure 52), up from about 42 percent in 1997.[1]

The level of funding applied to highway maintenance is an indirect measure of the amount of maintenance activity and, thus, presence of work zones on highways. Although well-maintained roads are vital to a smoothly functioning transportation system, the maintenance activity may temporarily disrupt the flow of vehicles, causing traffic delays and congestion.

Funding for highway maintenance increased by 15 percent (in constant 1987 dollars)[2] between 1990 and 2001 (figure 53). The amount of funds disbursed by federal, state, and local governments for maintenance activities totaled $20.3 billion in 2001. This represented 24 percent of total disbursements for highways in 2001 [2].

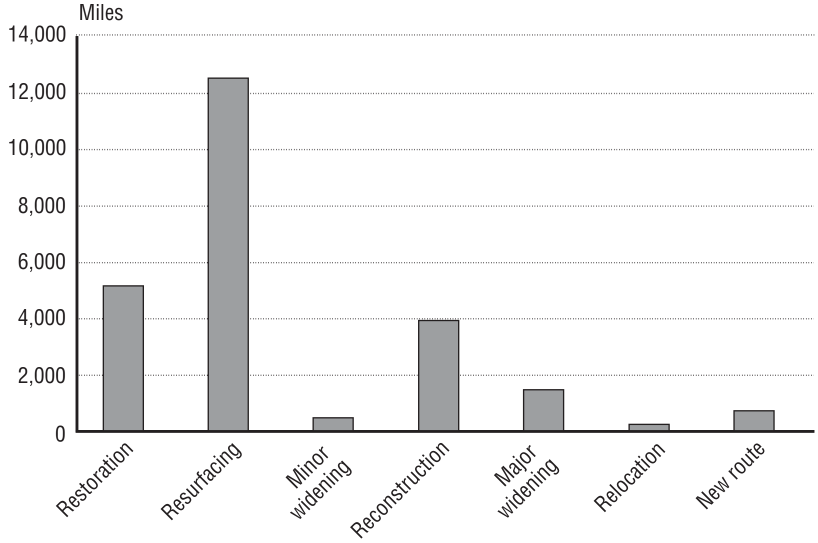
Sources

1. Chin, S.M., O. Franzese, D.L. Greene, H.L. Hwang, and R. Gibson. "Temporary Losses of Highway Capacity and Impacts on Performance," Oak Ridge National Laboratory, May 2002.
2. U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2001* (Washington, DC: 2002), table HF-2, also available at http://www.fhwa.dot.gov/ohim, as of February 2003.

[1] 1997 is the earliest year for which these data are available.

[2] Instead of chained 1996 dollars, constant 1987 dollars are used here because the Federal Highway Administration publishes its data accordingly.

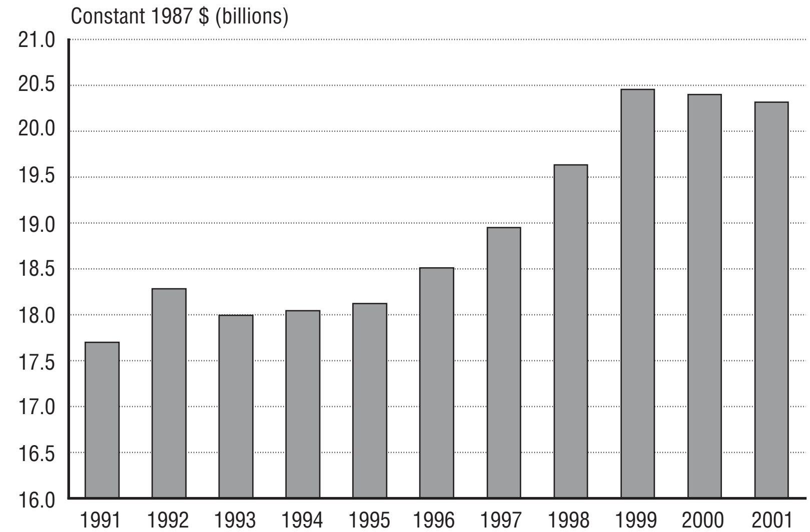
FIGURE 52 Federal-Aid Roadway Projects Underway by Improvement Type: 2001



NOTES: Maintenance includes any work required to keep highways in usable condition that does not extend the service life of the roadway beyond the original design. Restoration includes renovation. Although the following categories are not generally considered maintenance, they are included for comparison: major widening, relocation, and new route.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2001* (Washington, DC: 2002), "Miles of Federal-Aid Roadway Projects Underway by Improvement Type" chart, also available at http://www.fhwa.dot.gov/ohim, as of June 2003.

FIGURE 53 Federal, State, and Local Government Highway Maintenance Expenditures: 1991–2001



NOTE: Although dollar values in most other sections of this book have been converted to chained 1996 dollars, these data are presented in constant 1987 dollars. The Federal Highway Administration, which collects the data, adjusts current dollar data to constant 1987 dollars using an index it designed for that purpose.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2001* (Washington DC: 2002), "Highway Expenditures by Government Type, Current and Constant Dollars" chart, also available at http://www.fhwa.dot.gov/ohim, as of June 2003.

Rail Infrastructure and Equipment Repairs

Class I railroads[1] provide vital freight transportation services—carrying more than one-third of domestic freight ton-miles[2] each year [2]. In order to provide efficient and timely services, these companies maintained nearly 170,000 miles of track in 2001, down from nearly 200,000 miles in 1991 [1]. Class I track mileage has been declining for many decades especially on lower density lines, in part because ownership and maintenance is expensive. As such, rail companies have focused more on replacing worn rails and crossties than on laying new track.

Throughout the 1990s, rail companies replaced an average of 743,000 tons of rail each year (figure 54). The yearly replacements, which can vary substantially because of the long life of rails, ranged from a high of 875,000 tons in 1992 to a low of 643,000 tons in 1997. Using the most common rail weight (130 to 139 lbs per yard), it would take approximately 120 tons of rail to cover one mile [1].

There was some growth in the amount of new rails added to the Class I system in the late 1990s as firms increased capacity to handle growing amounts of coal traffic and reconfigured their systems as a result of mergers. Over 200,000 tons of new rail were added both in 1998 and 1999, up from 19,000 in 1990.

Railroads also replace crossties periodically in order to ensure the integrity of their tracks. Throughout the 1990s, railroads replaced an average of 12.2 million crossties each year (figure 55). The yearly replacements ranged from a high of 14.1 million crossties in 1990 to a low of 10.4 million in 1998. There was some growth in the number of new crossties added to the Class I system in the late 1990s as firms increased capacity or reconfigured their systems. In 1998, 1.8 million new crossties were added; but by 2001, the number of new crossties added declined to almost the level seen a decade earlier.

Railroads also periodically replace or rebuild locomotives and freight cars. On average, new and rebuilt locomotives made up 4 percent of Class I railroad fleets between 1990 and 2001 (figure 56). The number of locomotives that were new or rebuilt varied from a low of 3 percent in 1992 to a high of 7 percent in 1994. Likewise, the number of freight cars that were new or rebuilt varied from 3 percent in 1992 to 6 percent in 1998.

Sources

1. Association of American Railroads, *Railroad Facts 2002 Edition* (Washington, DC: 2002).
2. U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-44 and appendix D, also available at http://www.bts.gov.

[1] Rail companies with annual operating revenues of $266.6 million or more in 2001.

[2] Ton-miles are calculated by multiplying the weight in tons of each shipment transported by the miles hauled.

FIGURE 54 Rail Installed or Replaced by U.S. Class I Railroads: 1990–2001

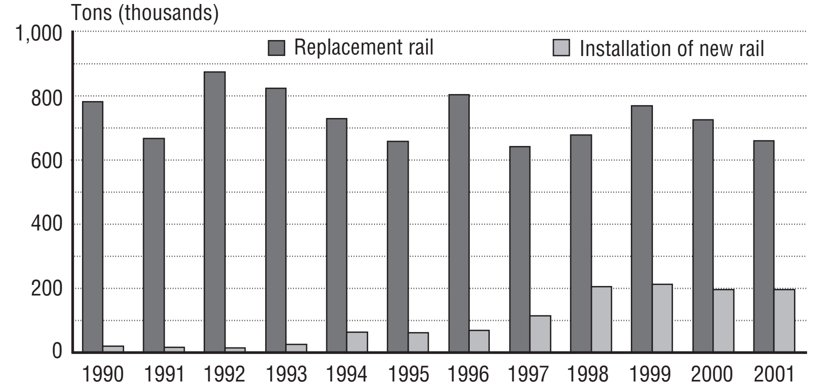


FIGURE 55 Crossties Installed or Replaced by U.S. Class I Railroads: 1990–2001

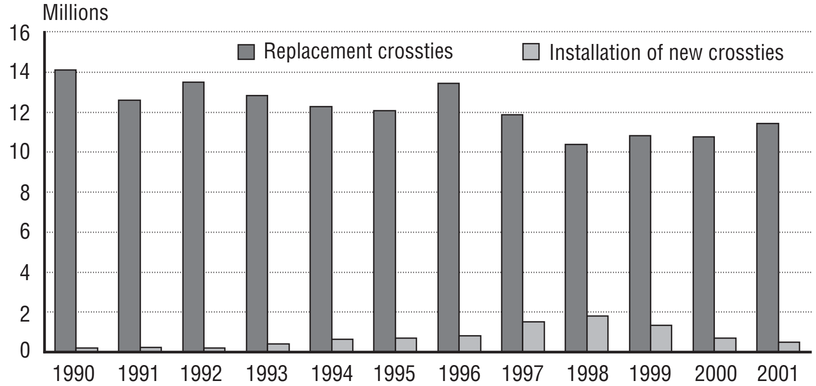
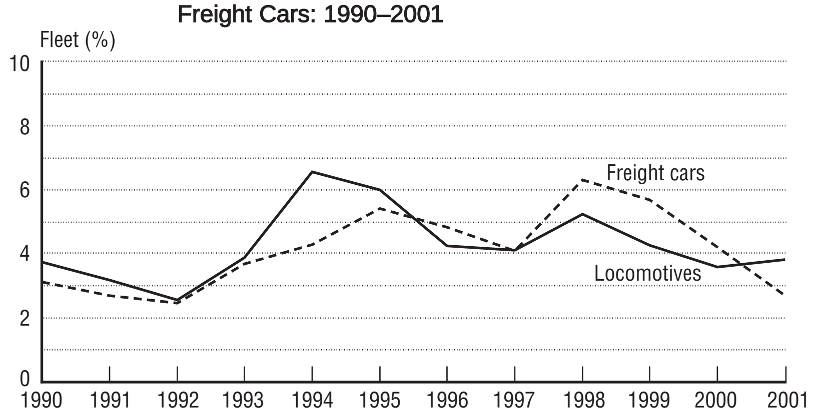


FIGURE 56 New or Rebuilt Locomotives and Freight Cars: 1990–2001



NOTE: Locomotive data are for Class I railroads only. Freight car data cover Class I railroads, other railroads, and private car owners.

SOURCES: Except as noted—Association of American Railroads, *Railroad Ten-Year Trends, 1990–2000* (Washington, DC: 2000); **2000–2001 data**—Association of American Railroads, *Analysis of Class I Railroads* (Washington, DC: 2000 and 2001). **Figure 56**—Association of American Railroads, *Railroad Facts* (Washington, DC: 1999 and 2002).

Transit Vehicle Reliability

Transit service[1] interruptions due to mechanical failures remained relatively level from 1995 through 2000,[2] averaging between 18 and 19 mechanical problems per 100,000 revenue vehicle-miles [1, 2] (figure 57).

Among transit vehicles, buses and light rail had the highest rates of mechanical failure in 2000. Buses broke down an average of 28 times per 100,000 revenue vehicle-miles, while light-rail vehicles broke down 15 times per 100,000 revenue vehicle-miles. Light-rail vehicle breakdowns have changed the most since 1995. In that year, there were 32 mechanical failures per 100,000 revenue vehicle-miles. However, between 1995 and 2000, the number of light-rail authorities rose to 25, up from 22 in 1995 [1, 2].

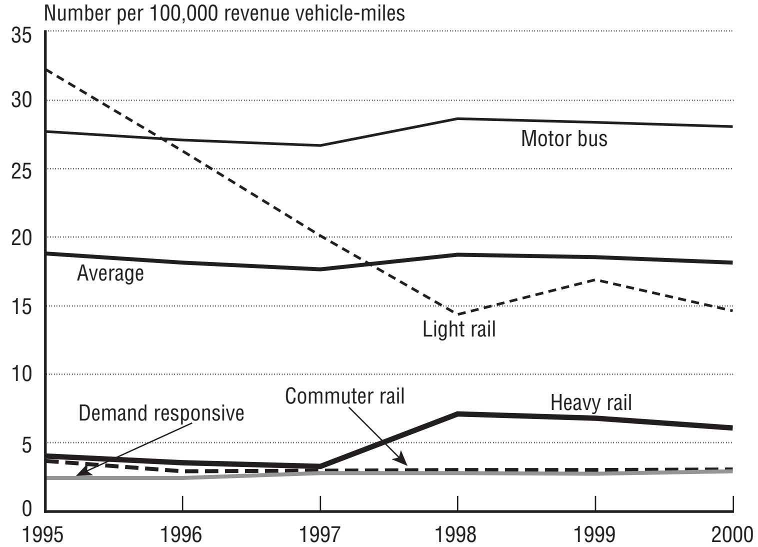
Sources

1. U.S. Department of Transportation, Federal Transit Administration, *National Summaries and Trends* (Washington, DC: Annual issues), also available at http://www.ntdprogram.com/, as of April 2003.
2. U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-32 and Transit Profile, also available at http://www.bts.gov/, as of April 2003.

[1] Here transit service includes:
Light rail—streetcar-type vehicles operated on city streets, semi-exclusive rights-of-way, or exclusive rights-of-way. Service may be provided by step-entry vehicles or by level boarding.
Commuter rail—urban passenger train service for short-distance travel between a central city and adjacent suburb.
Heavy rail—electric railways with the capacity to transport a heavy volume of passenger traffic and characterized by exclusive rights-of-way, multicar trains, high speed, rapid acceleration, sophisticated signaling, and high-platform loading. Also known as "subway," "elevated (railway)," or "metropolitan railway (metro)."
Demand responsive—nonfixed-route, nonfixed-schedule vehicles that operate in response to calls from passengers or their agents to the transit operator or dispatcher.

[2] Data prior to 1995 and later than 2000 were collected using different definitions of what constitutes an interruption of service and are not comparable.

FIGURE 57 Interruptions of Service by Type of Transit: 1995–2000



NOTE: Interruptions of service include major and minor mechnical failures. If the vehicle operator was able to fix the problem and return the vehicle to service without assistance, the incident is not considered an interruption of service. For modal definitions, see table 57 in appendix B.

SOURCES: U.S. Department of Transportation, Federal Transit Administration, National Transit Library, *2001 Reporting Manual*, available at http://www.ntdprogram.com/, as of April 2003; and American Public Transportation Association, Maintenance data tables, available at http://www.apta.com/research/stats/maint/index.cfm, as of April 2003.

Lock Repairs on the Great Lakes Saint Lawrence Seaway System

Great Lakes Saint Lawrence Seaway System (the Seaway) locks are usually closed during the winter for several months due to ice. Excluding the winter closure, the 2001 season consisted of 277 days. The lock system of the portion of the Seaway operated and maintained by the United States experienced 111 hours (about 4½ days) of downtime during the 2001 season. Lock equipment malfunctions caused only seven hours of delay during the 2001 season, 6 percent of all downtime. Weather-related poor visibility, high winds, and ice caused over half of all lock downtime. Vessel incidents caused another 45 percent of delays. Over the last decade, weather has been the cause of most delays (figure 58). Exceptions occurred in 1993 when water level/flow caused 124½ hours of delay and in 1998 and 1999 when vessel incidents caused over 40 hours of delay.

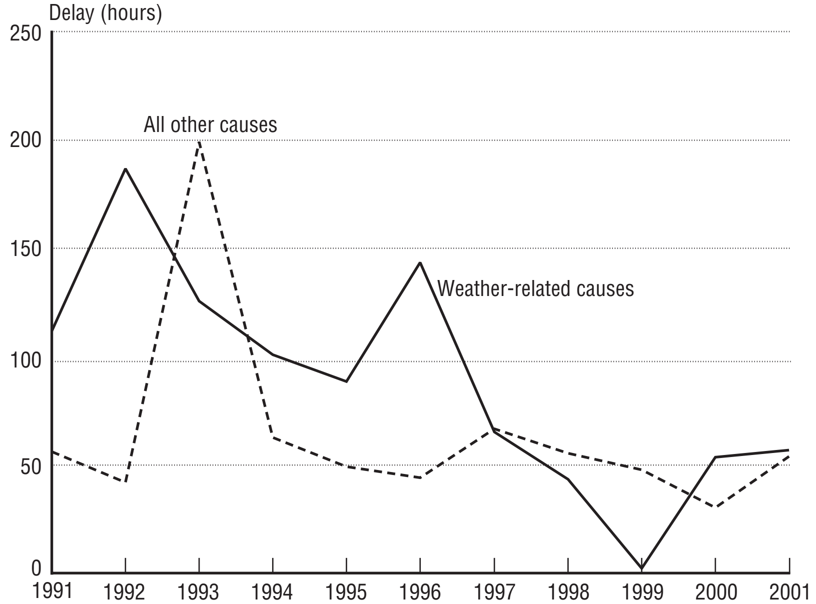
The Seaway is a waterway operated jointly by the United States and Canada. It encompasses the Saint Lawrence River, the five Great Lakes, and the waterways connecting the Great Lakes. It extends 2,300 miles—from the Gulf of the Saint Lawrence at the Atlantic Ocean in the east to Lake Superior in the west [1]. The U.S. Saint Lawrence Seaway Development Corporation (the Corporation) operates and maintains the U.S. portion of the Saint Lawrence Seaway, which includes two locks.

Operations and maintenance represent the bulk of the Corporation's expenditures. Over 80 percent of Corporation expenditures went toward personal services and benefits—mainly for staffing the locks—during fiscal year 2000. Maintenance and engineering cost $3.3 million. In December 1999, the U.S. Army Corps of Engineers surveyed the two lock structures operated and maintained by the United States. They concluded that the locks were generally well maintained but recommended maintenance and capital improvements [2]. The Corporation has developed five-year capital and maintenance plans for the years 2001 through 2005 that include $6 million in capital expenditures.

Sources

1. U.S. Department of Transportation, Bureau of Transportation Statistics, Maritime Administration, and U.S. Coast Guard, *Maritime Trade & Transportation 2002* (Washington, DC: 2002).
2. U.S. Department of Transportation, Saint Lawrence Seaway Development Corp., *Fiscal 2000 Annual Report, Great Lakes Seaway System Moves Forward in the 21st Century* (Washington, DC: 2001), also available at http://www.greatlakes-seaway.com/en/pdf/fy2000ar.pdf, as of February 2003.

FIGURE 58 Saint Lawrence Seaway Lock Delays by Cause: 1990–2001



NOTES: "Weather-related" includes poor visibility and high wind/ice; "All other" includes vessel incidents, lock equipment malfunction, civil interference, and water level/flow.

SOURCE: U.S. Department of Transportation, Saint Lawrence Seaway Development Corporation, *Annual Reports* (Washington, DC: various years). Reports for years 1993–2000 available at http://www.greatlakes-seaway.com/en/aboutus/slsdc_annrept.html, as of April 2003.

Intermittent Interruptions of Transportation Services

Natural disasters, accidents, labor disputes, terrorism, security breaches, and other unforeseeable incidents can result in major disruptions to the transportation system. Although a comprehensive account of these unpredictable interruptions has not been undertaken nor data compiled on them, numerous studies and other analyses have sought to evaluate the effects of individual events on the transportation system.

Terrorist attacks and security alerts have affected transportation services for decades. However, efforts to increase transportation security have grown markedly since the attacks of September 11, 2001. The short- and long-term effects of September 11 on transportation and ancillary services are still being assessed. In the short-term, airport enplanements and flight activity were substantially lower immediately after September 11 (figure 59). In fact, all flights scheduled for September 12 were canceled, and many other flights were canceled during the remainder of the month and the months that followed. Air passenger traffic has not fully recovered two years after the attacks, however other factors, such as an economic downturn, may also be part of the cause.

Vehicle accidents are a common cause of transportation delays. National estimates, based on model simulations, suggest that nearly 40 percent of nonrecurring delays on freeways and principal arterials are due to crashes. Weather, another unpredictable factor, accounts for 27 percent of highway delays. Relatively fewer delays resulted from road work-zones (24 percent) and vehicle breakdowns (11 percent) [1]. Although motor vehicle accidents are, by far, the most frequent type of transportation accident, other modes also experience major disruptions due to accidents. A freight train carrying hazardous materials derailed in a Baltimore tunnel in 2001 [2]. The resulting fire lasted several days and forced the city to close some highways and rail passages. Freight and passengers were delayed as trains were diverted hundreds of miles throughout the Middle Atlantic region.

The United States, because of its size and varied geography, is vulnerable to many types of natural disasters that can affect transportation. The flooding of the Mississippi River in 1993 shut down large portions of the inland waterway system, washed out rail track, damaged rail bridges, and closed an estimated 250 highway segments and bridges [3]. The following year, the Northridge earthquake had a major impact on the Los Angeles metropolitan area transportation system. Measuring 6.8 on the Richter scale, the earthquake knocked out four freeways, caused the collapse of parking structures, and ruptured numerous natural gas distribution lines [4, 5].

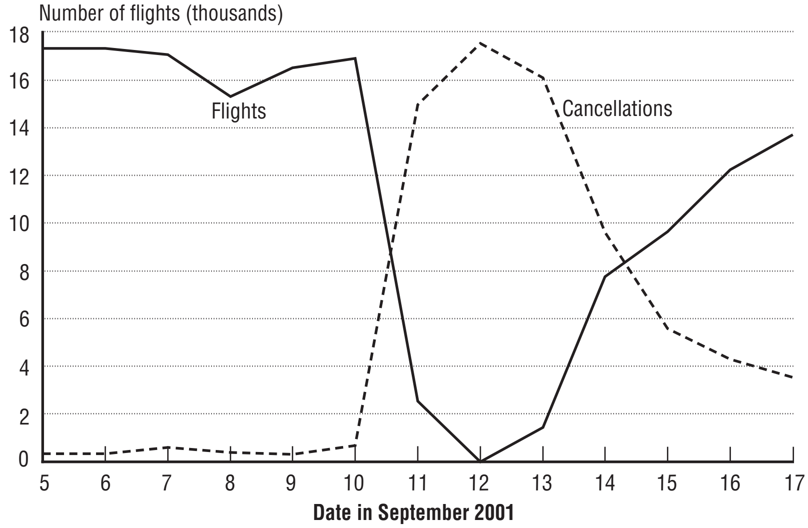
Disputes initiated by labor or business and other business adjustments can disrupt the passenger and freight transportation system. For example, a strike by San Francisco Bay Area Rapid Transit employees caused huge traffic jams on bridges and highways in 1997; a strike by United Parcel Service employees stalled shipments of goods later that year; and a labor lockout by terminal operators shut down west coast ports for 10 days in 2002 [6, 7]. A different type of business-related disruption caused problems on the Union Pacific Railroad in 1997.

Following a merger with Southern Pacific Railroad in 1996, accidents and congestion overwhelmed the expanded railroad, resulting in federal intervention [6].

Sources

1. Chin, S.M., O. Franzese, D.L. Greene, H.L. Hwang, and R. Gibson. "Temporary Losses of Highway Capacity and Impacts on Performance," Oak Ridge National Laboratory, May 2002.
2. National Transportation Safety Board, "Update on July 18, 2001 CSXT Derailment in Baltimore Tunnel," press release, Dec. 4, 2002, available at http://www.ntsb.gov/, as of April 2003.
3. U.S. Department of Transportation, Bureau of Transportation Statistics, *Transportation Statistics Annual Report 1994* (Washington, DC: 1994).
4. _____, *Transportation Statistics Annual Report 1995* (Washington, DC: 1995).
5. _____, *Journal of Transportation and Statistics: Special Issue on the Northridge Earthquake* 1(2), May 1998.
6. _____, *Transportation Statistics Annual Report 1998* (Washington, DC: 1998).
7. _____, *U.S. International Trade and Freight Transportation Trends* (Washington, DC: 2003).

FIGURE 59 U.S. Domestic Flight Operations: September 5–17, 2001



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Form 234 Delay Data for September 2001, tabulated Nov. 5, 2001.

Transportation Fatality Rates

There were 45,130 fatalities related to transportation in 2001, almost 16 fatalities per 100,000 U.S. residents [1, 2, 3, 5]. This is a decline of 11 percent from 18 fatalities per 100,000 residents in 1991, when there were 44,320 fatalities. Nearly 93 percent of all transportation fatalities in 2001 were highway-related (figure 60). Most of these people who died were occupants of passenger cars or light trucks (including pickups, sport utility vehicles, and minivans). Air, rail, transit, water, and pipeline transportation result in comparatively few deaths per capita (see box). Transit, for instance, led to about 0.11 deaths per 100,000 residents in 2001.

Highway safety improved between 1991 and 2001. Highway-related fatalities declined from 16 fatalities per 100,000 U.S. residents to 15 fatalities per 100,000 residents (or 6 percent) over the period. The decline in highway fatalities is most apparent for occupants of passenger cars (figure 61). During the period, only fatalities per 100,000 residents of occupants of light trucks rose, from 3 to 4 per 100,000 residents. (This is a period during which the number of registered light trucks increased from 53 million to 84 million [4].) Motorcyclist fatalities per 100,000 residents have been rising since 1997.

Similar trends in highway fatality rates are apparent when the rate is based on vehicle-miles traveled (vmt). Passenger car occupant fatalities per 100 million vmt declined 25 percent between 1991 and 2001, while light truck occupant fatalities per 100 million vmt rose slightly (figure 62). Motorcyclist fatalities grew 59 percent by 2001 after falling from 30.6 fatalities per 100 million vmt in 1991 to 21.0 fatalities per 100 million vmt in 1997.[1]

Fatality Data

Each transportation mode tends to define *fatality* differently and may generate its fatality data using different methods. Therefore, comparisons across modes should be viewed very carefully. For further information on modal fatality definitions, see the glossary section of this report.

Sources

1. U.S. Department of Commerce, U.S. Census Bureau, Census 2000, available at http://www.census.gov/main/www/cen2000.html, as of June 2003.
2. U.S. Department of Homeland Security, U.S. Coast Guard, Data Administration Division, personal communication, June 6, 2003.
3. U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 2-1, also available at http://www.bts.gov/, as of April 2003.
4. U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 1991* and *Highway Statistics 2001* (Washington, DC: 1991 and 2001), table VM-1, 2001 edition available at http://www.fhwa.dot.gov/policy/ohpi/hss/index.htm, as of June 2003.
5. U.S. Department of Transportation, Federal Transit Administration, *National Trends and Summary 2001* (Washington, DC: 2002).

[1] These motorcycle data are not shown in figure 62 but appear in table 62 in appendix B.

FIGURE 60 Transportation Fatality Rates by Mode: 2001

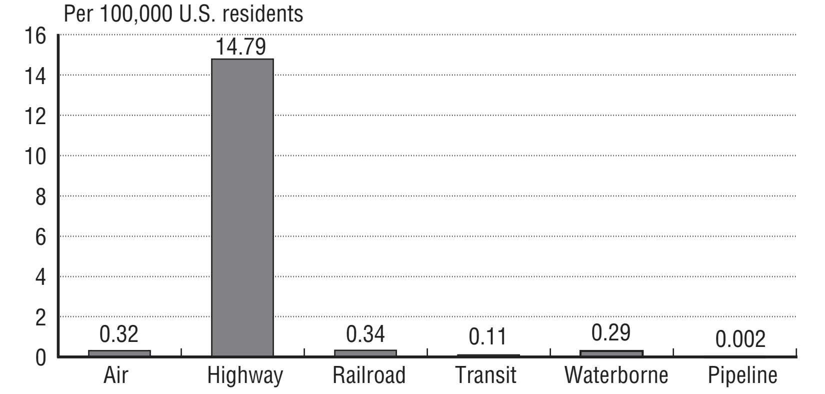


FIGURE 61 Highway Fatalities per 100,000 Residents for Selected Vehicle Types: 1991–2001

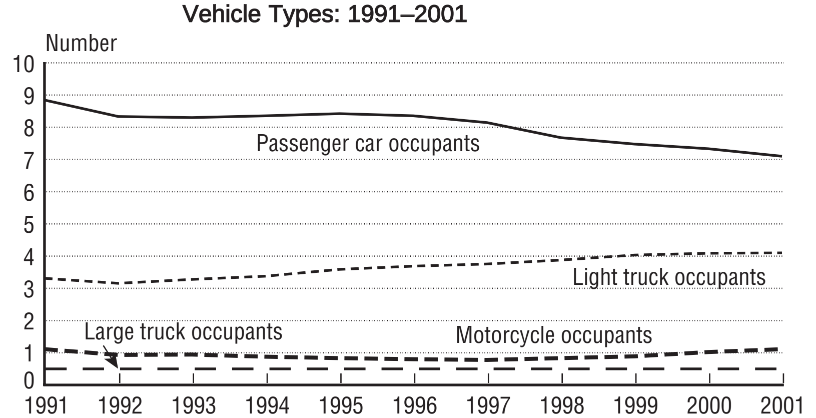
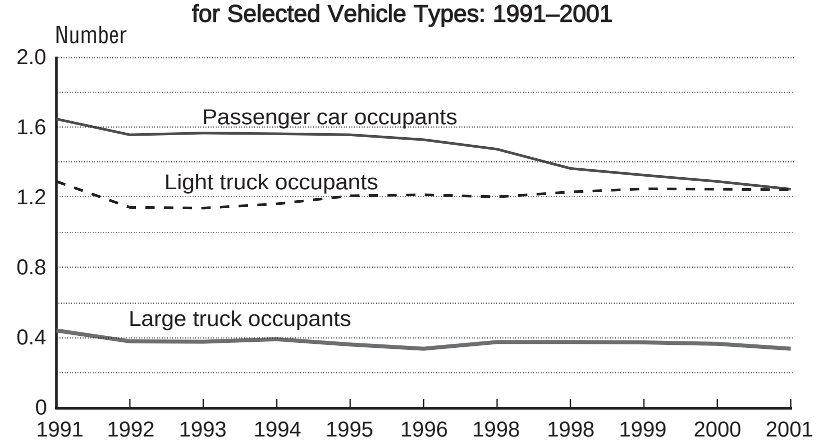


FIGURE 62 Highway Fatalities per 100 Million Vehicle-Miles for Selected Vehicle Types: 1991–2001



NOTES: Air includes commercial and general aviation. Waterborne includes commercial and recreational vessels. See note on table 60 for complete information on inclusions by mode and definitions of light and large trucks for figures 61 snd 62. Commercial aviation data for 2001 do not include fatalities that resulted from the terrorist attacks on New York City and Washington, DC.

Figure 62 excludes the motorcycle occupant fatality rate data, because the rate is much higher than for the other selected highway modes. Those data are available on table 62 in appendix B.

SOURCES: Except as noted—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 2-1, also available at http://www.bts.gov/, as of April 2003. **Population**—U.S. Department of Commerce, U.S. Census Bureau, Census 2000, available at http://www.census.gov/main/www/cen2000.html, as of June 2003. **2001 Waterborne**—U.S. Department of Homeland Security, U.S. Coast Guard, Data Administration Division, personal communication, June 6, 2003. **2001 Transit**— U.S. Department of Transportation, Federal Transit Administration, *National Trends and Summaries 2001* (Washington, DC: 2002).

Years of Potential Life Lost from Transportation Accidents

For people under 65 years of age, the Centers for Disease Control (CDC) has ranked transportation accidents as the third leading cause of death in the United States (after cancer and heart disease) each year from 1991 to 2000 [1]. During those years, an average of nearly 36,000 people under 65 died each year from transportation accidents.[1]

While transportation accidents amounted to 6 percent of the deaths of those under age 65 between 1991 and 2000, these fatalities represented 10 percent of the total years of potential life lost (YPLL) during this period (figure 63). YPLL, which is computed by adding up the remaining life expectancies of all victims (up to 65 years of age) at their deaths, is a measurement that accounts for the age distribution among different causes of injury mortality and other common causes of death (see box). Accordingly, the difference between the percentage of deaths and YPLL indicates that people who die from transportation accidents tend to be younger on average than victims of other causes of death.

Motor vehicle crashes are the most frequent cause of transportation-related fatalities. YPLLs associated with deaths related to motor vehicle accidents can be compared with YPLLs for deaths from all other modes of transportation (figure 64). This shows that, over the 10 years, motor vehicle deaths also contributed to the bulk of YPLLs due to transportation accidents.

Data for Calculating Years of Potential Life Lost

Data used here come from a national mortality database compiled by the Centers for Disease Control's National Center for Health Statistics. Years of potential life lost (YPLL) are computed from this data by matching the ages of victims with the corresponding entries in the life expectancy tables. Remaining years of life expectancy from the age of death to 65 years are counted toward YPLL. Victims 65 years and older are not included. YPLL data for 1982 through 2000 are available online through the Web-Based Injury Statistics Query and Reporting System (WISQARS).

Source

Centers for Disease Control, National Center for Injury Prevention and Control, Web-Based Injury Statistics Query and Reporting System (WISQARS), available at http://www.cdc.gov/ncipc/wisqars/, as of March 2003.

Source

1. U.S. Department of Health and Human Services, Centers for Disease Control, National Center for Health Statistics, *National Vital Statistics Reports: Deaths,* 1991–2000 issues, available at http://www.cdc.gov/nchs/, as of March 2003.

[1] Because of methodological differences, fatality data from the CDC differ from those collected by the individual modal administrations.

FIGURE 63 Deaths and Years of Potential Life Lost Due to Transportation Accidents: 1991–2000

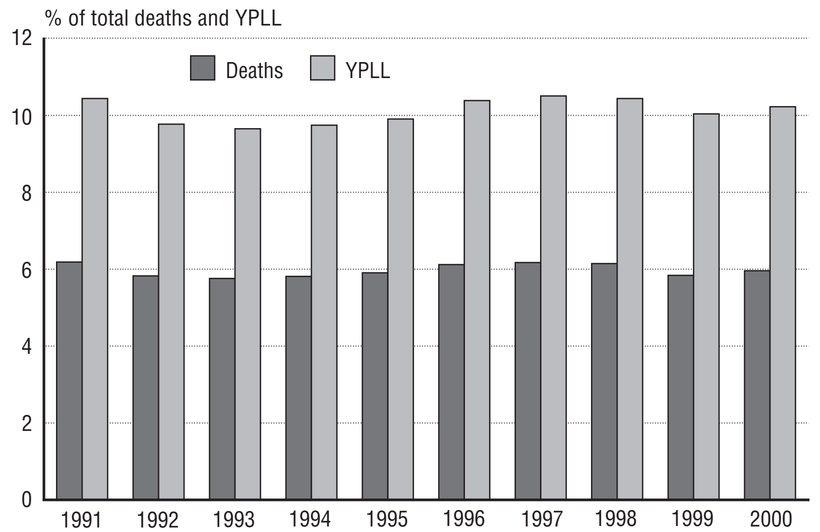
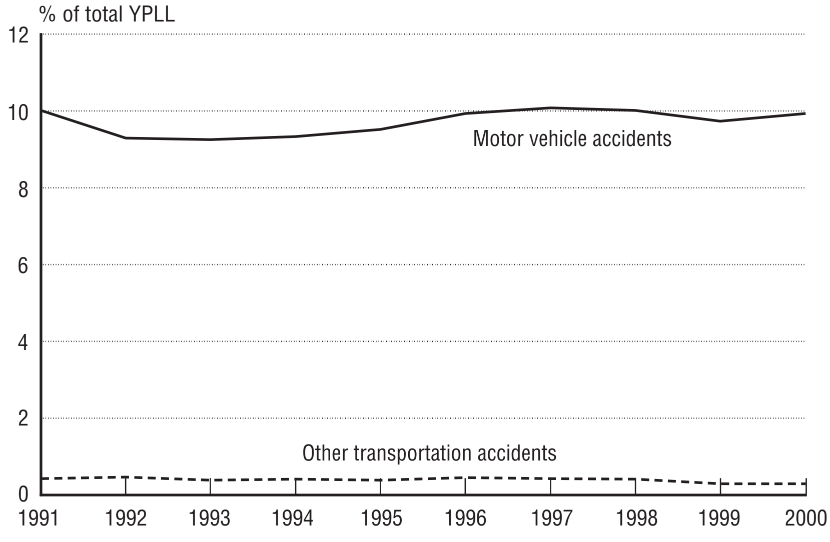


FIGURE 64 Years of Potential Life Lost Due to Motor Vehicle and Other Transportation Accidents: 1991–2000



NOTE: Years of potential life lost (YPLL) is the difference between the age of death and 65 years of age. Fatalities of people 65 years old and older are not included in this calculation.

SOURCE: U.S. Department of Health and Human Services, Centers for Disease Control, National Center for Injury Prevention and Control, Web-Based Injury Statistics Query and Reporting System (WISQARS), available at http://www.cdc.gov/ncipc/wisqars/, as of February 2003.

Transportation Injury Rates

Each year a far larger number of people are injured than killed in transportation-related accidents. An estimated 3.1 million people suffered some kind of injury involving passenger and freight transportation in 2001 (see box). Most of these injuries, about 98 percent, resulted from highway crashes[1] [1].

Highway injury rates vary by the type of vehicle used (figure 65). In 2001, 75 passenger car occupants were injured per 100 million passenger-miles traveled (pmt) compared with 58 light truck occupants. Occupants of large trucks and buses are even less likely to sustain an injury per mile of travel. Motorcycle riders are, by far, the most likely to get hurt. Transit-related injuries are also relatively high per mile. This is due, at least in part, to the inclusion of injuries on transit property, including those not caused by transit vehicle operations, such as injuries on escalators and in parking lots. (These transit injury data will be disaggregated starting with 2002 data.)

Injury rates for most modes declined between 1991 and 2001, with some exceptions.[2] Rates for light truck occupants rose 15 percent, from 50 per 100 million pmt in 1991 to 58 per 100 million pmt in 2001 (figure 66). Motorcycling has become safer per mile ridden over the decade, but since 1999, the injury rate has increased from 429 per 100 million pmt to 575 per 100 million pmt in 2001. Bus injuries per 100 million pmt have declined recently after increases in the mid-1990s.

Injury Data

Each transportation mode tends to define *injury* differently. In addition, each mode may generate its injury data using different methods. Therefore, comparisons across modes should be viewed very carefully. For further information on modal injury definitions, see the glossary section of this report.

In the following pages, another source of highway injury data—the National Electronic Injury Surveillance System operated by the U.S. Consumer Product Safety Commission—results in yet another set of highway injury data that differs from modal data presented here.

Source

1. U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), tables 1-34 and 2-2, also available at http://www.bts.gov/, as of February 2003.

[1] There is the potential for some double counting involving highway-rail grade crossing and transit bus data.

[2] These calculations exclude bicycling, walking, and boating (including recreational boating), because there are no national annual trend data estimates of passenger-miles traveled for these modes of transportation.

FIGURE 65 Injury Rates for Occupants of Highway Vehicles: 2001

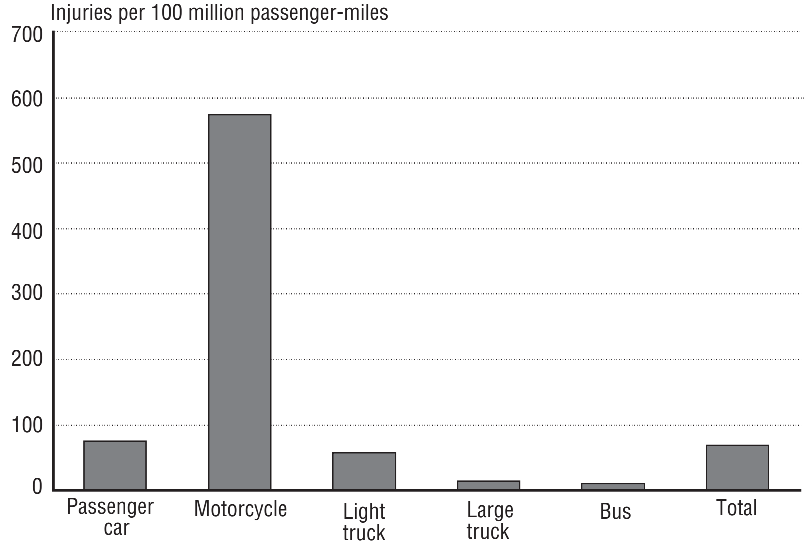
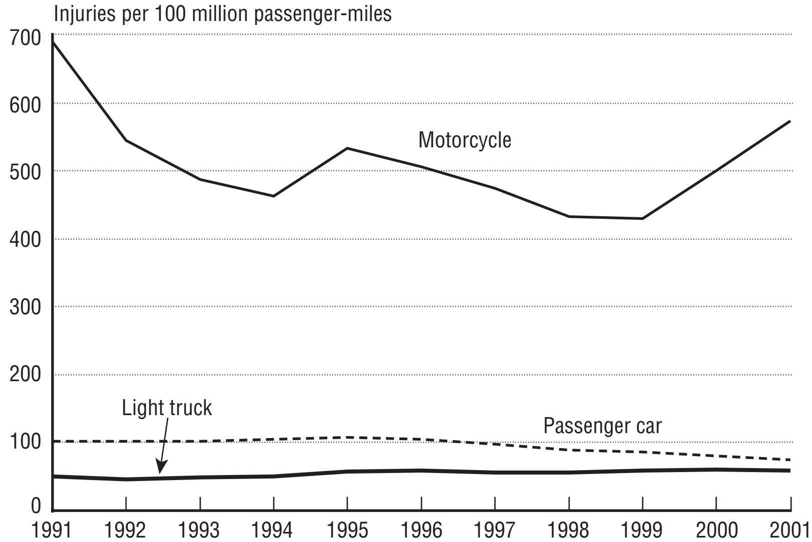


FIGURE 66 Injury Rates for Occupants of Selected Highway Vehicles and Motorcyclists: 1991–2001



NOTE: Bus and large truck occupant injury rates, 1991–2001, are included in table 66 in appendix B.

SOURCES: 1991–2000—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), tables 1–34 and 2-2, also available at http://www.bts.gov/, as of April 2003. **2001 data**—See corresponding tables in appendix B for full citation.

Motor Vehicle-Related Injuries

There were an estimated 3.6 million highway-related injuries in the United States in 2001, according to data reported to the U.S. Consumer Product Safety Commission (CPSC)[1] (see box) [1]. An estimated 3.3 million of these injuries involved motor vehicle occupants. The rest involved about 131,000 pedestrians, 111,000 motorcyclists, and 60,000 pedalcyclists.

More females than males were treated for minor injuries in 2001 across most age groups, with spikes for people aged 15 to 24 (figure 67). This age group sustained almost 1 million minor motor vehicle-related injuries. For serious injuries, more males than females were treated across all age groups up to about 65 years (figure 68). Again, serious injuries spiked at ages 15 to 24, but male injuries spiked substantially higher. This age group incurred about 84,000 serious injuries in 2001 of which 61 percent happened to males.

In summary, there were sharp peaks in injuries associated with youth: for motor vehicle occupants and motorcyclists, the peak spanned ages 15 to 24; for pedalcyclists and pedestrians, the peak spanned ages 10 to 14. Young males exhibited a substantially greater peak in serious injuries than young females. In addition, the percentage of injuries classified as serious was greater for motorcyclists (20 percent of all motorcyclist injuries were serious), pedestrians (19 percent), and pedalcyclists (10 percent) than it was for motor vehicle occupants (7 percent) (figure 69).

This analysis comes from a Bureau of Transportation Statistics (BTS) comprehensive study using 2001 data from the CPSC's National Electronic Injury Surveillance System. Only a small portion of the BTS study is presented here. The study included data on motor vehicle occupants, motorcyclists, pedalcyclists, and pedestrians injured on or near public roads,[2] but only on injuries involving collisions with moving motor vehicles.[3] BTS also compared data on minor and serious injuries.

National Electronic Injury Surveillance System (NEISS) Injury Data

Use of NEISS data from the U.S. Consumer Product Safety Commission (CPSC) enables analyses of injuries by factors such as age and gender, type of vehicle, and severity of injuries sustained. NEISS data are a probability sample of reports from hospital emergency rooms in the United States and territories open 24 hours a day with at least 6 beds. Each hospital has a computer linked to CPSC headquarters. Staff consistently computer code information in emergency room medical reports, which allows injuries to be analyzed and compared within and across transportation modes and over time. Physicians diagnose injuries, specify injured body part(s), determine disposition, and give other detailed medical information. NEISS data cannot estimate injuries treated at sites other than hospital emergency rooms (e.g., HMOs, physician's offices, and on-site medical facilities) and do not include investigative information aside from emergency room medical reports.

Source

1. U.S. Consumer Product Safety Commission, National Electronic Injury Surveillance System (NEISS), information available at http://www.cpsc.gov/Neiss/oracle.html, as of June 2003.

[1] Because of methodological differences, highway injury data from CPSC differ from those estimated by the National Highway Traffic Safety Administration (NHTSA) of the U.S. Department of Transportation. For 2001, NHTSA reported an estimated 3.0 million highway injuries.

[2] This includes injuries involving traffic on public roads and in driveways and parking lots, and at other locations near, but not on, public roads.

[3] This excludes occupants injured when entering or exiting parked vehicles, pedalcyclists injured by parked cars or other fixed objects, and pedestrians struck by pedalcyclists or off-road vehicles.

FIGURE 67 Minor Motor Vehicle-Related Injuries by Age and Gender: 2001

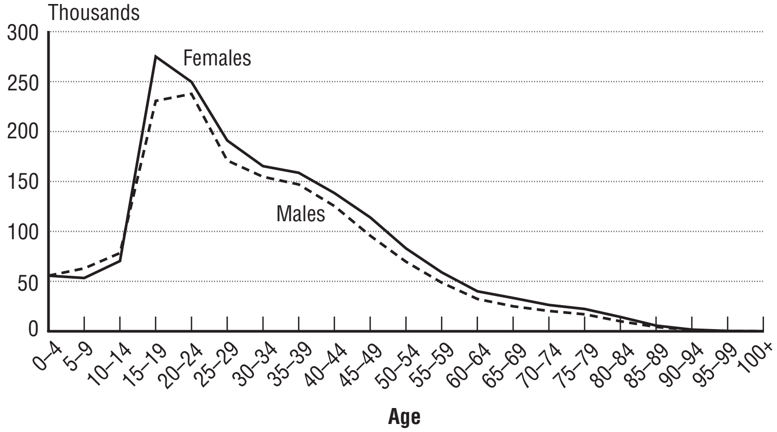


FIGURE 68 Serious Motor Vehicle-Related Injuries by Age and Gender: 2001

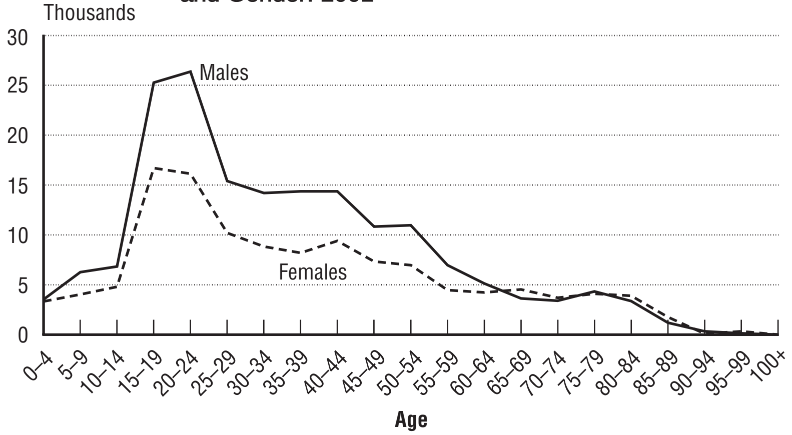
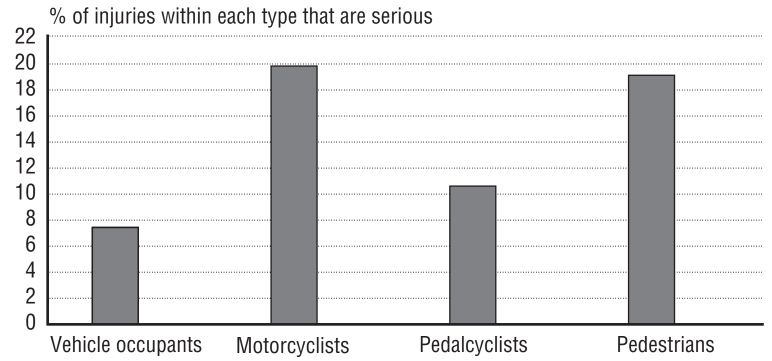


FIGURE 69 Serious Motor Vehicle-Related Injuries by Type: 2001



NOTES: A pedalcyclist is a person on a vehicle that is powered solely by pedals. A minor injury is one in which the victim was treated and released. A serious injury is one in which the victim was either hospitalized or treated and transferred to another facility. **Figure 69**—Data are the share of injuries that were serious for one person type (e.g., the share of seriously injured pedestrians of all injured pedestrians).

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Consumer Product Safety Commission, National Electronic Injury Surveillance (NEISS) System, available at http://www.cpsc.gov/Neiss/oracle.html, as of June 2003.

Economic Impacts of Motor Vehicle Crashes

Motor vehicle crashes in the United States cost an estimated $231 billion[1] in 2000, about $820 per person or 2 percent of the Gross Domestic Product[2] [1]. The largest components of the total cost (26 percent each) are market productivity—the cost of foregone paid labor due to death and disability—and property damage (figure 70). Household productivity—the cost of foregone household (unpaid) labor—accounted for 9 percent of the total cost. Workplace cost (2 percent) is the disruption from the loss or absence of an employee such that it requires training a new employee, overtime to accomplish the work of the injured employee, and administrative costs to process personnel changes.

Alcohol-involved crashes cost $50.9 billion or 22 percent of the total costs. Costs related to speeding were estimated to be $40.4 billion, 18 percent of the total. The failure of drivers and passengers to wear safety belts cost an estimated $26 billion, but the use of safety belts saved $50 billion [1].

Ultimately, all people pay for the cost of motor vehicle crashes through insurance premiums, taxes, out-of-pocket expenses, and the like. About one-quarter of the cost of crashes is paid directly by those involved, while society in general pays the rest (figure 71). Insurance companies, funded by all insured drivers whether they are involved in a crash or not, paid about half the cost in 2000. Government paid 9 percent of the cost. "Other" (13 percent) includes unpaid charges of health care providers and charities, costs borne by employers, and the cost of delay borne by travelers.

Source

1. U.S. Department of Transportation, National Highway Traffic Safety Administration, *The Economic Impact of Motor Vehicle Crashes 2000* (Washington, DC: 2002), also available at http://www.nhtsa.dot.gov/people/economic, as of December 2002.

[1] The costs detailed here are the economic costs not the intangible consequences of these events to individuals and families, such as pain and suffering and loss of life.

[2] All dollar amounts are in current 2000 dollars.

FIGURE 70 Components of the Economic Costs of Motor Vehicle Crashes: 2000

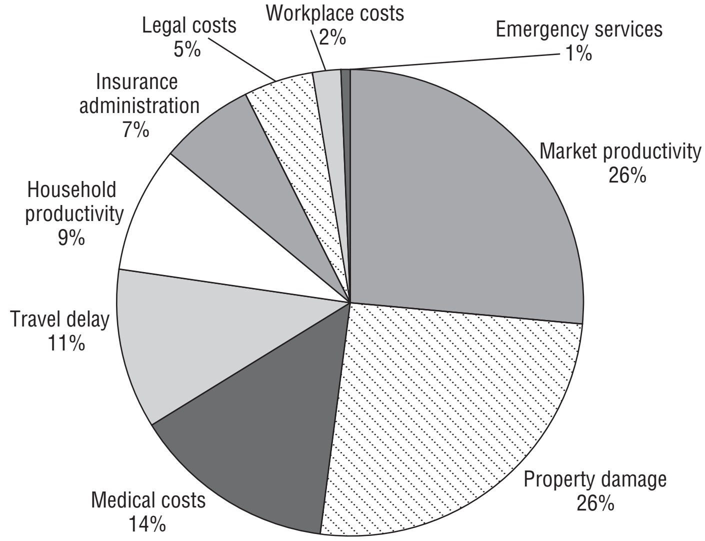
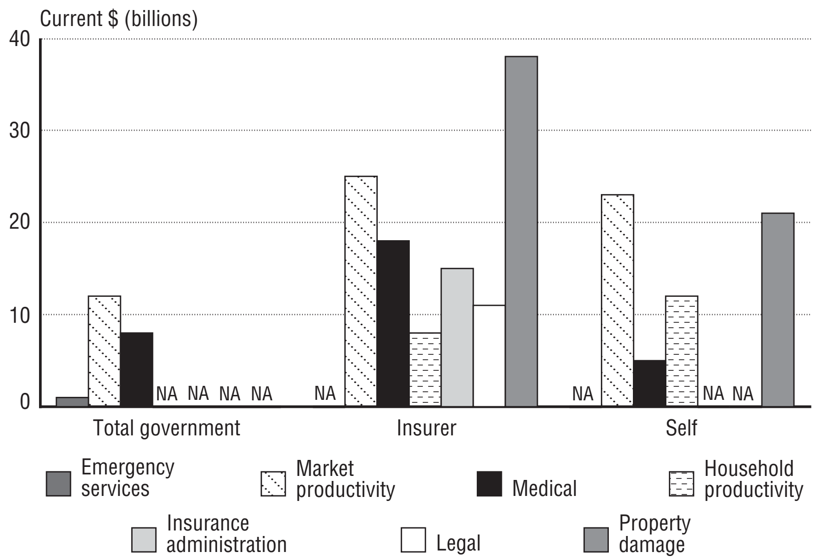


FIGURE 71 Estimated Sources of Payment for Motor Vehicle Crashes: 2000



KEY: NA = not applicable.

NOTE: Figure 71 does not include payments by sources other than the government, insurers, and individuals involved in the accident. These "other" payments amounted to $33 billion, mainly for travel delays.

SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration, *The Economic Impact of Motor Vehicle Crashes 2000* (Washington, DC: 2002), available at http://www.nhtsa.dot.gov/people/economic/, as of December 2002.

Key Air Emissions

Transportation in 2001 emitted 66 percent of the nation's carbon monoxide (CO), 47 percent of nitrogen oxides (NO_x), 35 percent of volatile organic compounds (VOC), 5 percent of particulates, 6 percent of ammonia, and 4 percent of sulfur dioxide.[1] Highway vehicles emitted almost all of transportation's share of CO in 2001, 80 percent of the NO_x, and 75 percent of all VOC (figure 72). Marine vessels and railroad locomotives each contributed 10 percent of transportation's NO_x emissions, and other nonroad vehicles[2] had a 20 percent share of VOC emissions. With the exception of ammonia, transportation air emissions have declined since 1991 (figure 73). NO_x shows only a slight decrease between 1991 and 2001.

Gasoline powered highway vehicles experienced the greatest decline in NO_x emissions, while diesel-powered highway vehicles and aircraft show increases between 1991 and 2001 (figure 74). New, tightened NO_x emissions standards for diesel and gasoline trucks are due to go into effect in 2007 and 2008 [1]. In addition, new NO_x standards will apply to certain marine engines built in 2004. The U.S. Environmental Protection Agency has also proposed new NO_x emissions standards for motorcycles and recreational boats. NO_x emissions standards for locomotives went into effect in 2000, and tightened standards will apply to locomotives built in 2005 and later [2].

[1] With its 2001 updates, the U.S. Environmental Protection Agency is no longer estimating lead emissions. In 2000, transportation emitted 13 percent of the nation's lead emissions. Aircraft emitted almost 96 percent of all transportation lead emissions. While the substance is no longer used in most fuels, it is still present in aviation fuels.

[2] Other nonroad vehicles include recreational marine vessels, airport service vehicles, and road maintenance equipment.

Transportation Air Emissions

National data on air emissions are estimated by the U.S. Environmental Protection Agency (EPA). EPA's National Emissions Inventory (NEI) is updated annually and covers mobile, stationary, and area sources of pollution regulated under the Clean Air Act. These pollutants include the so-called "criteria" and hazardous air pollutants.[1] Most criteria emissions have been estimated since 1970, hazardous emissions only since 1996.

EPA's mobile source category contains "onroad" (highway) and "nonroad" (all other modes) emissions. However, its nonroad category includes nontransportation sources such as farming and construction equipment, lawn and garden equipment, and logging, industrial, and light commercial equipment. To more accurately assess transportation air emissions, the Bureau of Transportation Statistics removes the nontransportation components from EPA's criteria mobile source emissions. It is this subset that is presented here as "transportation" emissions.

[1] For details on transportation's contribution to hazardous air pollutants, see U.S. Department of Transportation, Bureau of Transportation Statistics, *Transportation Statistics Annual Report 2000*, available at http://www.bts.gov/.

These key air emissions data (see box) are the most widely used indicator of transportation's impact on the environment. Key air emissions generated during the use of various vehicles, locomotives, aircraft, and vessels affect the nation's air quality and human health.

Sources

1. U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2003), tables 4-30 through 4-32, also available at http://www.bts.gov/, as of January 2003.
2. U.S. Department of Transportation, Federal Railroad Administration, personal communication, July 2003.

FIGURE 72 Share of Selected Air Pollution Emissions by Mode: 2001

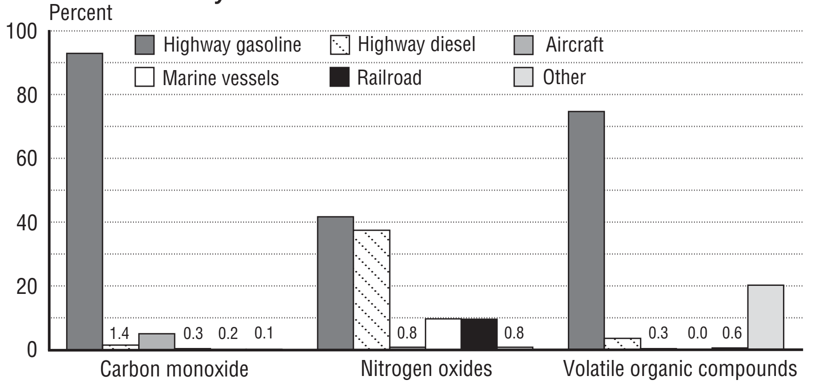


FIGURE 73 Transportation Air Emissions by Type of Pollutant: 1991–2001

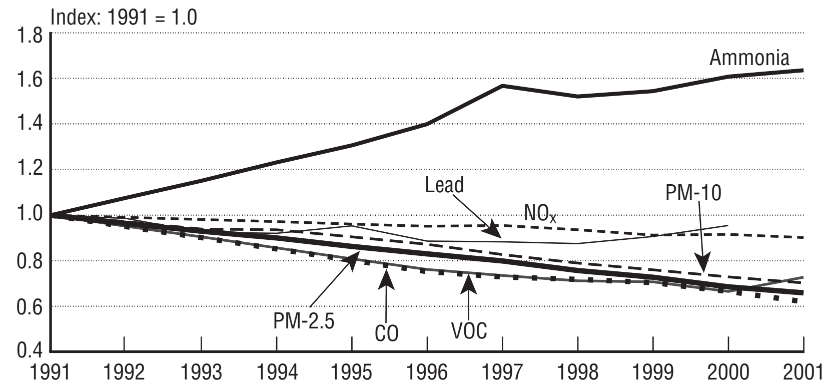
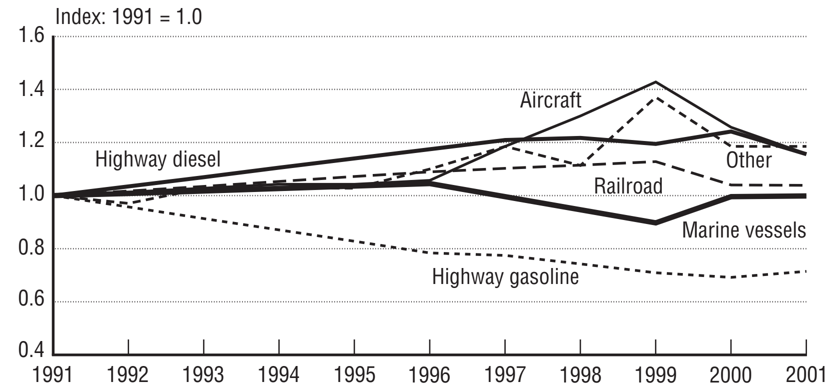


FIGURE 74 Nitrogen Oxide Emissions by Mode: 1991–2001



NOTES: Figure 72—EPA no longer estimates lead emissions. Modal shares in 2000 were: highway gasoline vehicles, 4.1%; aircraft, 95.9%. **Figure 73**—Revisions to previous estimates are all related to the development of the 1999 National Emissions Inventory (NEI). The 1999 estimates in the table are taken from Version 2 of the 1999 NEI and reflect many new data submissions from state and local air management agencies. The 1999 emissions estimates from mobile sources are in most cases based on the new MOBILE6 and the draft NONROAD2002 emissions models. This is the first time that estimates using these models have appeared in this format. Some but relatively few mobile source estimates were provided by state air agencies. The largest set of state-submitted data in 1999 was from California. Estimates for mobile sources for years prior to 1999 were made consistent with the estimates for 1999 and later, allowing for a generally consistent time trend except that state-submitted data were incorporated for 1999 only. See the tables in appendix B for definitions of "highway" and "other" vehicles.

SOURCE: U.S. Environmental Protection Agency (EPA), Office of Air Quality Planning and Standards, *National Emissions Inventory, Air Pollutant Emission Trends*, available at http://www.epa.gov/ttn/chief/trends/index.html/, as of August 2003.

Greenhouse Gas Emissions

U.S. greenhouse gas (GHG) emissions totaled 6,936 teragrams (trillion grams) of carbon dioxide equivalent ($TgCO_2Eq$) in 2001,[1] of which 1,867 $TgCO_2Eq$ (27 percent) were emitted by transportation. Transportation emissions have grown 22 percent since 1990, while total U.S. emissions rose 13 percent. Carbon dioxide (CO_2), the predominant greenhouse gas, accounted for 84 percent of all U.S. emissions in 2001 [1]. Nearly all (97 percent) of CO_2 emissions are generated by the combustion of fossil fuels. Transportation was responsible for 1,780.9 $TgCO_2Eq$, or 31 percent of all CO_2 emissions. Transportation CO_2 emissions grew 24 percent between 1991 and 2001, an average annual change of 2 percent.

Highway vehicle emissions rose at an average annual rate of 2 percent between 1991 and 2001 (figure 75). At the same time, locomotive emissions grew at 3 percent and domestic aircraft emissions rose less than 1 percent. Domestic maritime emissions increased 2 percent but were volatile throughout the period. Under the United Nations Framework Convention on Climate Change reporting guidelines, only domestic aircraft and maritime emissions are included in the modal data. The balance of emissions, labeled international bunker fuels, declined 2 percent on an annual average basis between 1991 and 2001.

Highway vehicles emitted 79 percent of all transportation CO_2 emissions in 2001. Passenger cars and light-duty vehicles, which include pickup trucks, sport utility vehicles, and vans, were responsible for 78 percent of those highway emissions (figure 76). Over the period 1991 to 2001, emissions of all other trucks grew fastest, at 4 percent annually. The second highest average annual growth rate among highway vehicles was 3 percent for light-duty trucks.

Most air pollutants impact local or regional air quality. Greenhouse gases, on the other hand, could alter the earth's climate on a regional and global scale. These potential changes include long-term fluctuations in temperature, wind, precipitation, and other perturbations of the Earth's climate system. GHGs, including CO_2, methane, and nitrous oxide occur naturally and as a result of human activities.

GHG Emissions Data

Both the U.S. Environmental Protection Agency (EPA) and the Energy Information Administration (EIA) produce estimated annual U.S. GHG emissions data. EPA is responsible for producing the official inventory of U.S. emissions, as required under the United Nations Framework Convention on Climate Change. Both agencies use EIA fuel consumption data as a basis for estimating most GHG emissions but differences in their methodologies can result in different datasets.[1] EIA usually releases its data about six months before EPA does. EPA provides more detail of interest to transportation, such as emissions by mode. EIA presents emissions in million metric tons of carbon equivalent (mmtce), while EPA uses teragrams of carbon dioxide equivalent ($TgCO_2Eq$) as required under the Convention. [1 $TgCO_2Eq$ = 1 mmtce x (44/12)]

[1] For further information, see U.S. Department of Transportation, Bureau of Transportation Statistics, *Transportation Statistics Annual Report 2001* (Washington DC: 2002), page 239.

Source

1. U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2001* (Washington, DC: April 2003), tables ES-3 and ES-8.

[1] Including sinks, net U.S. emissions totaled 6,098 $TgCO_2Eq$ in 2001. A natural sink, according to the U.S. Environmental Protection Agency, is "A reservoir that uptakes a pollutant from another part of its cycle. Soil and trees tend to act as natural sinks for carbon." Unnatural sinks are manmade depositories for pollutants (e.g., the Department of Energy is creating underground sinks into which CO_2 can be pumped).

FIGURE 75 Carbon Dioxide Emissions by Transportation Mode: 1991–2001

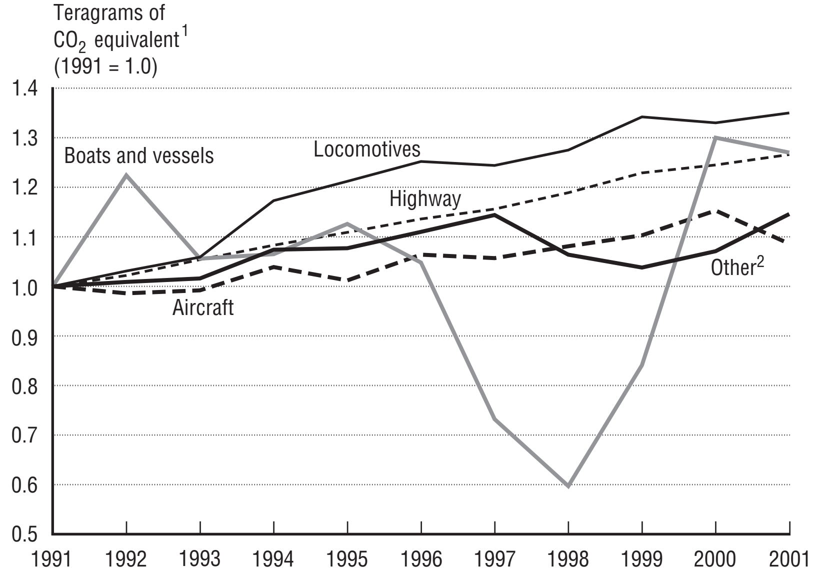
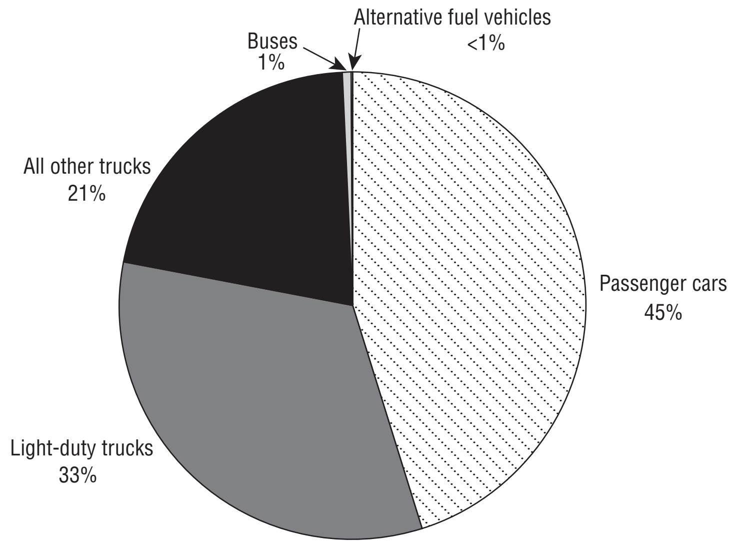


FIGURE 76 Share of Highway Mode Carbon Dioxide Emissions by Vehicle Type: 2001



[1] Teragrams of CO_2 equivalent—1 $TgCO_2$ Eq = 1 million metric ton of carbon equivalent x (44/12). A teragram = 1 trillion grams.

[2] "Other" carbon dioxide emissions are from motorcycles, construction equipment, agricultural machinery, pipelines, and lubricants.

NOTE: Figure 75—Highway includes passenger cars, buses, light-duty trucks, and other trucks.

SOURCE: U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2001* (Washington, DC: April 2003), table 1-14, also available at http://www.epa.gov, as of June 2003.

Oil Spills into U.S. Waters

Transportation-related sources typically account for most oil reported to be spilled into U.S. waters reported each year.[1] For instance, transportation's share of the total volume of oil spilled between 1991 and 2000 varied from a high of 97 percent in 1996 to a low of 77 percent in 1992. The volume of each spill varies significantly from incident to incident: one catastrophic incident can, however, spill millions of gallons into the environment. Consequently, the total volume of oil spilled each year is volatile (figure 77).

Maritime incidents are the source of most oil spills, particularly on a volume basis. On average, 1.8 million gallons of various types of oil were spilled each year by all transportation and nontransportation sources between 1991 and 2000. Of this, 77 percent of oil spilled came from incidents associated with maritime transportation, nearly 11 percent from pipeline incidents, and over 1 percent from all other transportation modes (figure 78). Oil cargo accounted for 58 percent of the total volume spilled in 2000 [1].

Failures in transportation systems (vessels, pipelines, highway vehicles, and railroad equipment) or errors made by operators can result in spillage of crude oil, refined petroleum products, and other materials and cause serious damage to the environment. The ultimate impact of each spill depends on the location and volume of the spill, weather conditions, and the natural resources affected. While data exist on oil spilled into U.S. waters, there is less information available on the resulting consequences to the environment.

Aggregating Oil Spill Data

The U.S. Coast Guard (USCG) summarizes reported oil spill data in its *Pollution Incidents In and Around U.S. Waters, A Spill Release Compendium: 1969–2000*. USCG aggregates the source data into five categories: marine vessels, pipelines, facilities, other, and unknown. The Bureau of Transportation Statistics has reviewed USCG's detailed source data and classified each transportation-related reported oil spill incident by transportation mode. The data presented here are preliminary, as research on the dataset is ongoing.

Source

1. American Petroleum Institute, *Oil Spills in U.S. Navigable Waters: 1991–2000* (Washington, DC: Feb. 11, 2003).

[1] When an oil spill occurs in U.S. waters, the responsible party is required to report the spill to the U.S. Coast Guard. The Coast Guard collects data on the number, location, and source of spills, volume and type of oil spilled, and the type of operation that caused the spill.

FIGURE 77 Volume of Oil Spills Reported to the U.S. Coast Guard by Source: 1991–2000

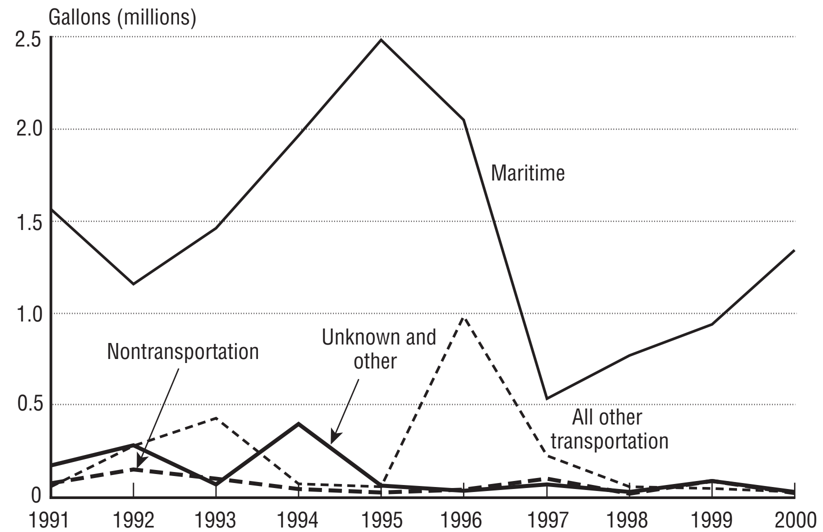
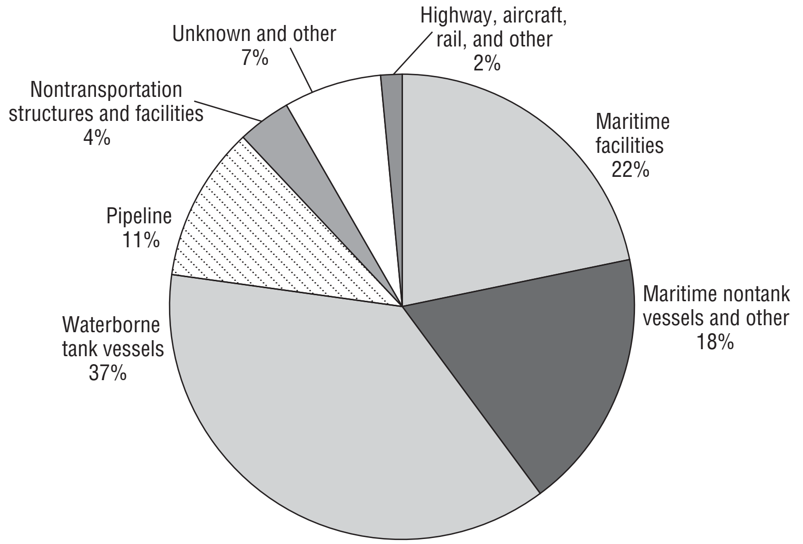


FIGURE 78 Average Volume of Oil Spills by Source: 1991–2000



NOTE: Data are preliminary.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, based on U.S. Coast Guard, *Pollution Incidents In and Around U.S. Water*s, available at http://www.uscg.mil/hq/g-m/nmc/response/stats/ac.htm, as of September 2002.

Hazardous Materials Incidents and Injuries

Transportation firms reported more than 17,700 hazardous materials incidents in 2001.[1] These incidents resulted in 7 deaths and 143 injuries, compared with annual averages of 21 deaths and 445 injuries between 1991 and 2001. During that decade, the number of reported hazardous materials incidents increased (figure 79). However, much of the increase may be attributed to improved reporting and an expansion of reporting requirements[2] (see box).

Highway vehicles transported 56 percent of the tons of hazardous materials shipped in 1997 [2]. Between 1991 and 2001, 62 percent of the injuries and 53 percent of the fatalities attributed to hazardous materials were the result of highway incidents. Fatal hazardous materials transportation incidents in other modes tend to be infrequent. After a DC-9 aircraft crashed in Florida in 1996 killing 110 people, the National Transportation Safety Board found that the crash was caused by ignited oxygen leaking from improperly stored oxygen generators [1]. With the exception of occasional spikes, injuries generally declined in the 1990s, especially from highway incidents (figure 80). Of the 926 injuries attributed to rail incidents in 1996, 787 resulted from chlorine released when a train derailed in February in Alberton, Montana [3].

[1] A reported incident is a report of any unintentional release of hazardous materials while in transportation (including loading, unloading, and temporary storage). It excludes pipeline and bulk shipments by water, which are reported separately.

[2] Incident reporting requirements were extended to intrastate motor carriers on Oct. 1, 1998, which may partly explain the subsequent increased volume of reports. Beginning in April 1993, there was a sharp improvement in reporting of incidents by small package carriers.

Hazardous Materials Reporting

The U.S. Department of Transportation's Hazardous Materials Information System (HMIS) is the primary source of national data on hazardous materials transportation safety. Hazardous materials, as defined in regulations, include nine classes of gases and liquids and other substances.[1] However, the vast majority of the hazardous materials shipped within the United States each year (81 percent in 1997) are flammable and combustible liquids, primarily petroleum products. There have been an estimated 800,000 hazardous materials shipments per day (or more than 3.1 billion tons) annually in recent years.

Source

U.S. Department of Transportation, Research and Special Programs Administration, Office of Hazardous Materials Safety, *Hazardous Materials Shipments* (Washington, DC: October 1998).

[1] The nine classes are: explosives; flammable, nonflammable, and poisonous gases; flammable and combustible liquid; flammable, spontaneously combustible, and dangerous-when-wet materials; oxidizers and organic peroxides; poisonous materials and infectious substances; radioactive materials; corrosive materials; and miscellaneous hazardous materials.

Environmental contamination can occur as the result of hazardous materials incidents, but data are not routinely collected on the extent of the damage. Their environmental impacts will depend on the concentration and type of material spilled, the location and volume of the spill, and exposure rates.

Sources

1. National Transportation Safety Board, NTSB Report AAR-97/06, Docket No. DCA96MA054.
2. U.S. Department of Transportation, Bureau of Transportation Statistics, and U.S. Department of Commerce, U.S. Census Bureau, *1997 Commodity Flow Survey, Hazardous Materials* (Washington, DC: December 1999).
3. U.S. Department of Transportation, Research and Special Programs Administration, personal communication, May 2003.

FIGURE 79 Hazardous Materials Transportation Incidents by Mode: 1991–2001

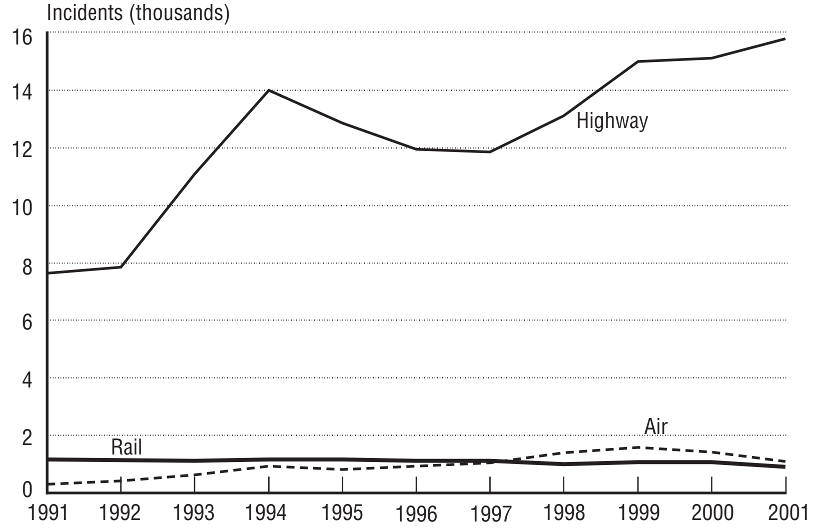
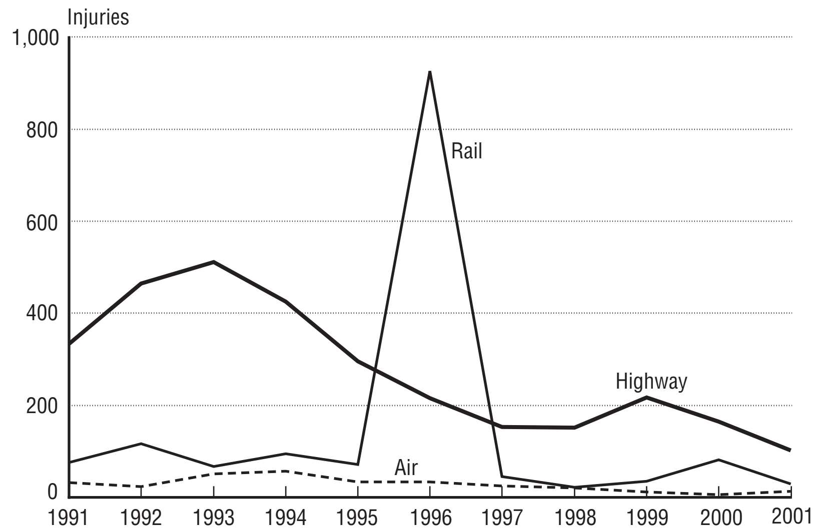


FIGURE 80 Hazardous Materials Transportation Injuries by Mode: 1991–2001



NOTES: Water data are not included. On an average annual basis, 9 incidents are reported by vessels. Two injuries were reported in 1998; none in other years. Annual data for these incidents and injuries are in table 80 in appendix B.

The 1996 spike in rail injuries resulted from 1 train derailment in which 787 people were injured by the release of chlorine gas.

SOURCE: U.S. Department of Transportation, Research and Special Programs Administration, Hazardous Materials Information System database, available at http://hazmat.dot.gov/files/hazmat/10year/10yearfrm.htm, as of January 2003.

Transportation Capital Stock

Highway-related capital stock (highway infrastructure, consumer motor vehicles, and trucking and warehousing) represented the majority of the nation's transportation capital stock, $2,166 billion in 2000 (in 1996 chained dollars[1]). Highway infrastructure constituted 57 percent of highway-related capital stock in 2000, or $1,234 billion (figure 81). Rail—at $342 billion—also represented a substantial portion of transportation capital stock; although, it was still less than one-sixth of highway-related capital stocks. The combined value of capital stocks for other modes of the transportation system, including rail, water, air, pipeline, and transit, is less than the value of consumer motor vehicles alone (figure 82).

All highway-related capital stocks increased between 1990 and 2000. In-house transportation grew substantially (81 percent). Transportation services, a component of all modes, also experienced rapid growth, with an 83 percent increase in capital stock. In fact, rail and water were the only modes that experienced a decrease in capital stock, shrinking by 6 percent and 3 percent, respectively. Pipeline capital stocks increased only modestly, growing 5 percent between 1990 and 2000.

Capital stock is a commonly used economic measure of the capacity of the transportation system. It combines the capabilities of modes, components, and owners into a single measure of capacity in dollar value. This measure takes into account both the quantity of each component (through initial investment) and its condition (through depreciation and retirements).

With the exception of highway and street data, the capital stock data presented here pertain only to that owned by the private sector. For instance, railroad companies own their own trackage. All of these data are available from the Bureau of Economic Analysis and the Bureau of Labor Statistics [1, 2]. The Bureau of Transportation Statistics is currently developing data on publicly owned capital stock, such as airports, waterways, and transit systems.

Sources

1. U.S. Department of Commerce, Bureau of Economic Analysis, Standard Fixed Asset Tables (table 7.1 and 8.1); Private Non-Residential Fixed Assets by Detailed Industry and Detailed Asset Type, Real Cost Net Stocks; National Income and Product Accounts, Quantity and Price Indexes, various tables; available at http://www.bea.gov/, as of March 2003.
2. U.S. Department of Labor, Bureau of Labor Statistics, *Consumer Producer Price Indexes*, All Urban Consumers, various series, available at http://www.bls.gov/ppi/home.htm/, as of March 2003.

[1] All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

FIGURE 81 Transportation Capital Stock for Selected Modes: 1990–2000

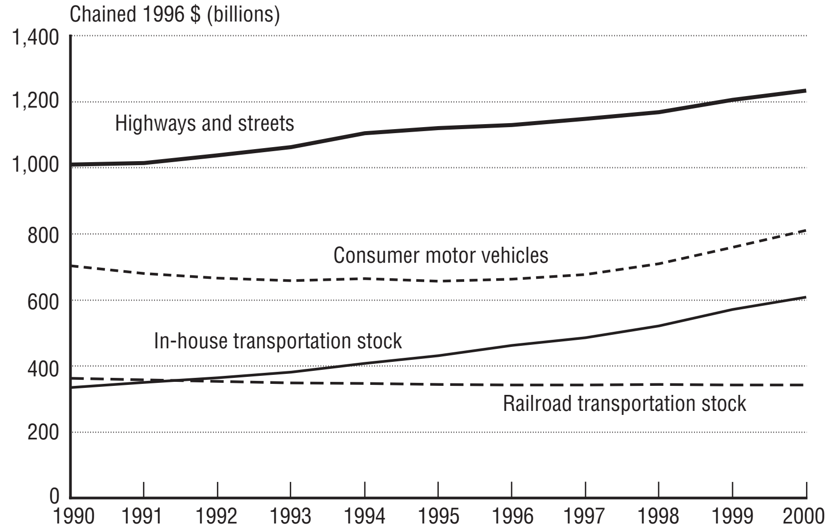
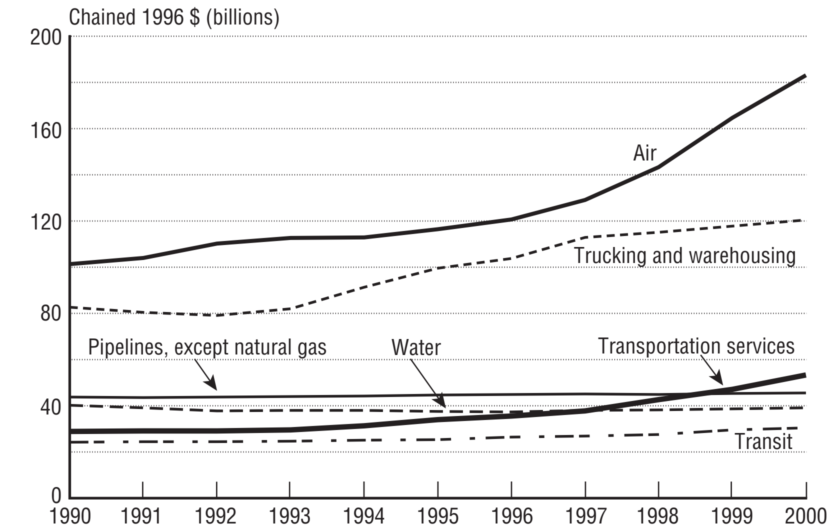


FIGURE 82 Transportation Capital Stock for Selected Modes: 1990–2000



NOTES: Data include only privately owned capital stock, except for highways and streets. Consumer motor vehicles are consumer durable goods. In-house transportation includes transportation services provided within a firm whose main business is not transportation. For example, grocery companies often use their own truck fleets to move goods from their warehouses to their retail outlets.

All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, Fixed Assets and Consumer Durable Goods in the United States, available at http://www.bea.gov, as of March 2003.

Highway Condition

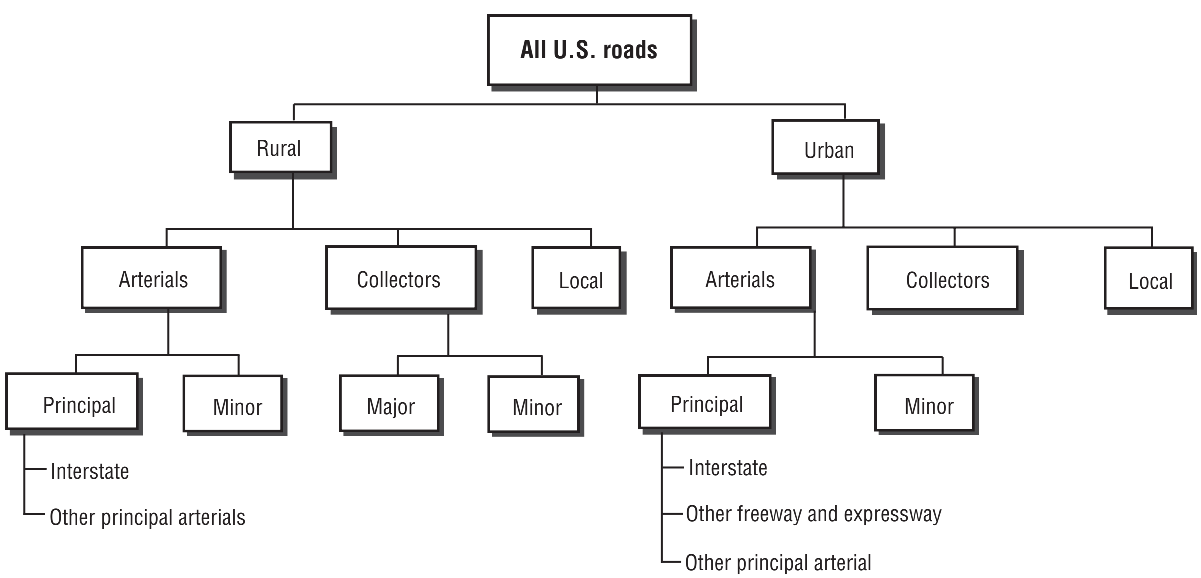
The condition of roads in the United States improved between 1993 and 2001.[1] For instance, the percentage of rural Interstate mileage in poor or mediocre condition declined from 35 percent in 1993 to 14 percent in 2001 (figure 83). Moreover, poor or mediocre urban Interstate mileage decreased from 42 to 28 percent over this period (figure 84).

Just over 40 percent of all U.S. urban and rural roads were in good or very good condition in 2001, while nearly 19 percent were in poor or mediocre condition. The rest were in fair condition.[2] In general, rural roads are in better condition than urban roads. In 2001, for instance, 28 percent of urban road-miles were classified as poor or mediocre compared with only 15 percent of rural-miles.

[1] The data presented here start at 1993; in that year the Federal Highway Administration changed to a new indicator for pavement condition. Thus, combining pre-1993 data and 1993 and later data is inappropriate.

[2] These percentages include all classes of roads except local roads or minor collector roads.

Highway Functional Classification System



SOURCES
U.S. Department of Transportation, Federal Highway Administration and Federal Transit Administration, *1999 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance* (Washington, DC: 2000).
U.S. Department of Transportation, Federal Highway Administration, *Our Nation's Highways: Selected Facts and Figures 1998* (Washington, DC: 1998).

FIGURE 83 Rural Roads in Poor or Mediocre Condition by Functional Class: 1993–2001

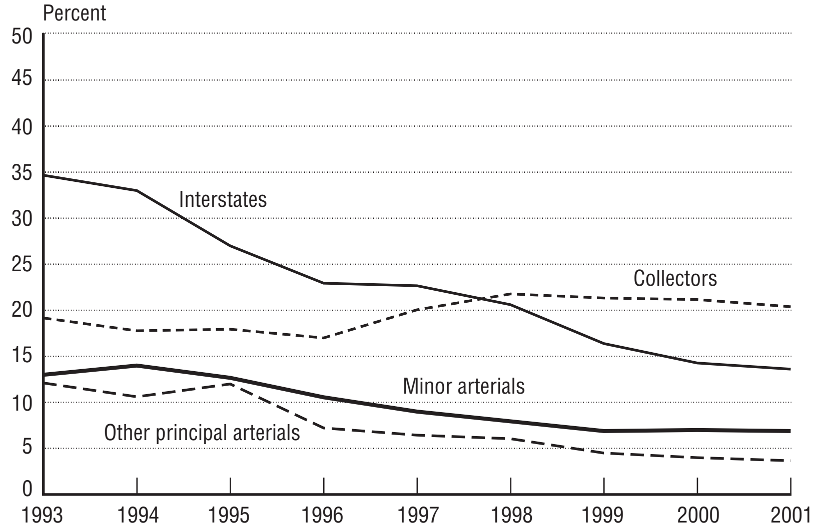
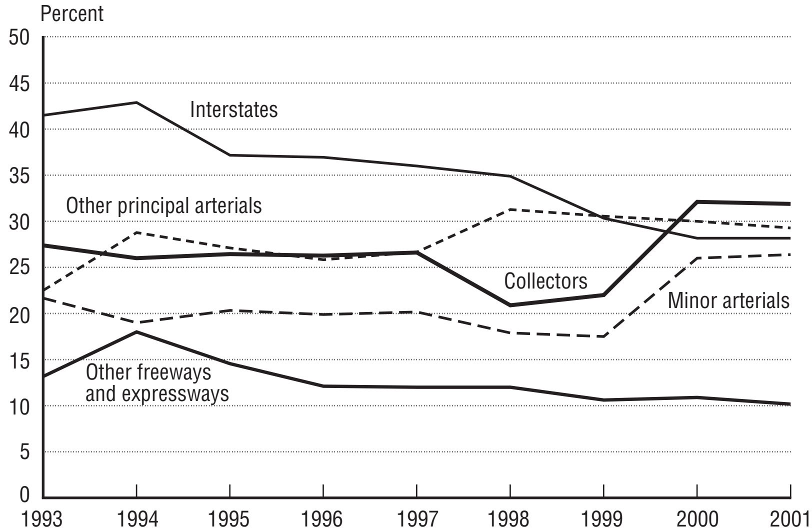


FIGURE 84 Urban Roads in Poor or Mediocre Condition by Functional Class: 1993–2001



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-26, also available at http://www.bts.gov/, as of April 2003.

Bridge Condition

The condition of bridges nationwide has improved markedly since the early 1990s. Of the nearly 600,000 roadway bridges in 2001, the Federal Highway Administration found that 14 percent were structurally deficient and 14 percent were functionally obsolete. About 40 percent of bridges were either structurally deficient or functionally obsolete in 1991 [1].

Structurally deficient bridges are those that are restricted to light vehicles, require immediate rehabilitation to remain open, or are closed. Functionally obsolete bridges are those with deck geometry (e.g., lane width), load carrying capacity, clearance, or approach roadway alignment that no longer meet the criteria for the system of which the bridge is a part.[1] In the 1990s, while the number of structurally deficient bridges steadily declined, the number of functionally obsolete bridges remained fairly constant (figure 85).

In general, bridges in rural areas suffer more from structural deficiencies than functional obsolescence (particularly on local roads), whereas the reverse is true for bridges on roads in urban areas (figures 86 and 87) [1]. A large proportion of problem bridges nationwide are those supporting local rural roads: about 71,000 of the 165,000 deficient bridges in 2001 (43 percent) are rural local bridges. Problems are much less prevalent on other parts the highway network. Nevertheless, in 2001, 20 percent of urban Interstate bridges and 12 percent of rural Interstate bridges were deficient.

Source

1. U.S. Department of Transportation, Federal Highway Administration, Office of Engineering, Bridge Division, National Bridge Inventory database, available at http://www.fhwa.dot.gov/bridge/britab.htm/, as of December 2002.

[1] Structurally deficient bridges are counted separately from functionally obsolete bridges even though most structurally deficient bridges are, by definition, functionally obsolete.

FIGURE 85 Structurally Deficient and Functionally Obsolete Bridges: All Roadways—1991–2001

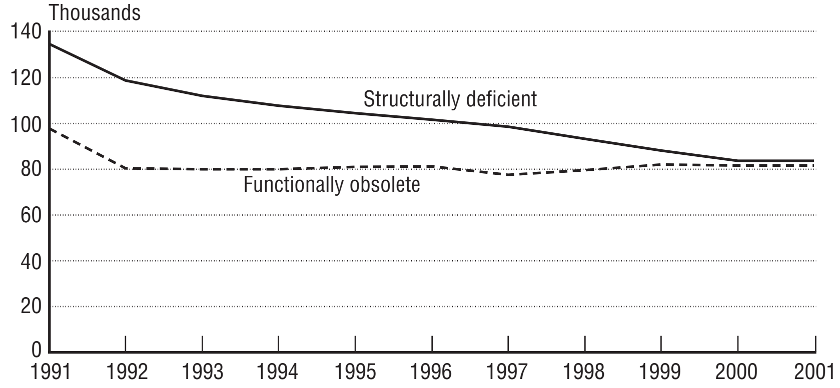


FIGURE 86 Rural Bridge Condition by Functional Class: 2001

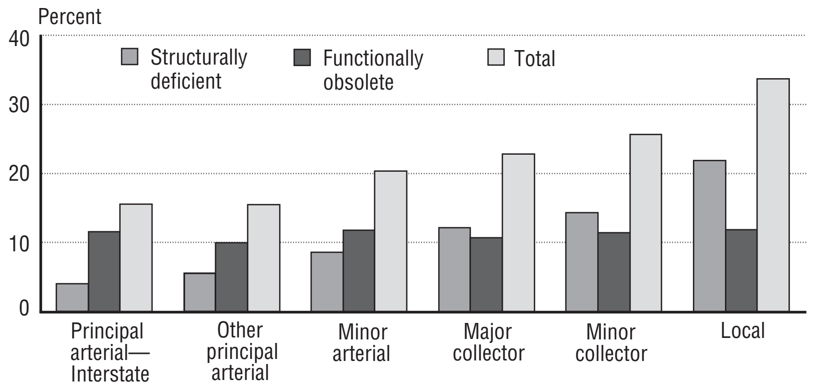
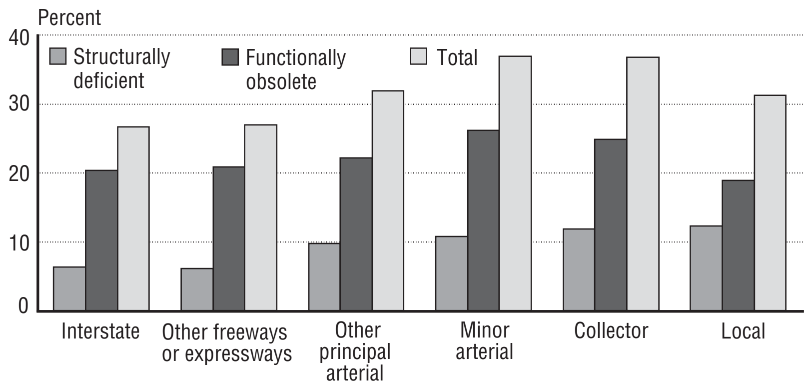


FIGURE 87 Urban Bridge Condition by Functional Class: 2001



KEY: Functionally obsolete refers to bridges that do not have the lane widths, shoulder widths, or vertical clearances adequate to serve traffic demand, or the bridge may not be able to handle occasional roadway flooding. Structurally deficient refers to bridges needing significant maintenance attention, rehabilitation, or replacement.

NOTE: Figures 86 and 87 data may not sum to 100 due to rounding.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, Office of Engineering, Bridge Division, National Bridge Inventory database, available at http://www.fhwa.dot.gov/bridge/britab.htm, as of December 2002.

Airport Runway Conditions

Airport runway conditions improved at the nation's major public-use airports between 1990 and 2001 [1]. At the nation's commercial service airports, pavement in poor condition declined from 5 percent of runways in 1990 to 2 percent in 2001 (figure 88). At the larger group of National Plan of Integrated Airport Systems (NPIAS) airports, the Federal Aviation Administration (FAA) found poor conditions on 5 percent of runways in 2001, down from 10 percent in 1990 (figure 89).

FAA inspects runways at public-use airports and classifies runway condition as good, fair, or poor. A runway is classified as good if all cracks and joints are sealed. Fair condition means there is mild surface cracking, unsealed joints, and slab edge spalling.[1] Runways are in poor condition if there are large open cracks, surface and edge spalling, and/or vegetation growing through cracks and joints [1].

Source

1. U.S. Department of Transportation, Federal Aviation Administration, *National Plan of Integrated Airport Systems (NPIAS) (2001–2005)* (Washington, DC: 2002).

[1] Spalling refers to chips, scales, or slabs breaking off of surface pavement.

Classification of Airports in the United States

As of January 2001, there were 19,306 airports[1] in the United States, with 5,314 of these open to the public and known as public-use airports. The Federal Aviation Administration includes 3,364 of the existing public-use airports in its National Plan of Integrated Airport Systems (NPIAS). The NPIAS includes both commercial and general aviation airports that are eligible to receive grants under the Air Improvement Program. Commercial service airports are defined as public airports receiving scheduled passenger service with at least 2,500 enplaned passengers per year. These airports handle the vast majority of enplanements in the United States. In 2001, there were 546 commercial service airports. FAA estimates that 67 percent of the U.S. population lives within 20 miles of at least 1 of these airports.

Source

U.S. Department of Transportation, Federal Aviation Administra-tion, *National Plan of Integrated Airport Systems (NPIAS) (2001–2005)* (Washington, DC: 2002).

[1] Includes civil and joint-use civil-military airports, heliports, STOL (short takeoff and landing) ports, and seaplane bases in the United States and its territories.

FIGURE 88 Runway Pavement Condition of 546 Commercial Service Airports: 1990–2001

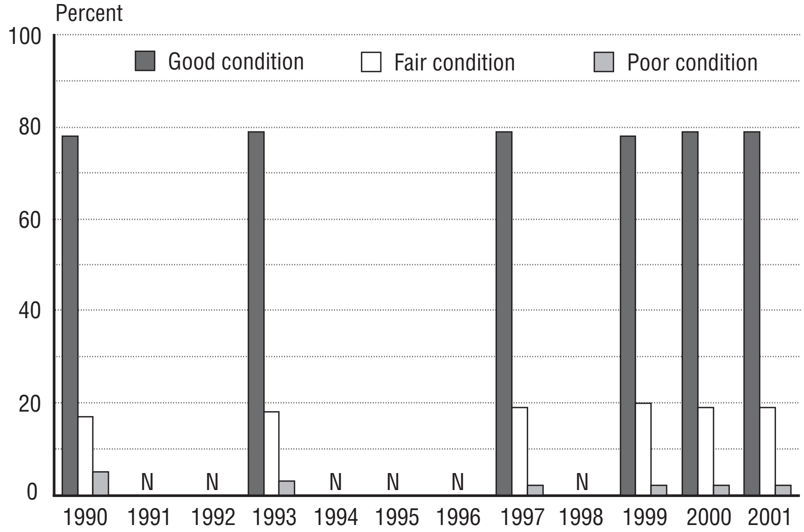
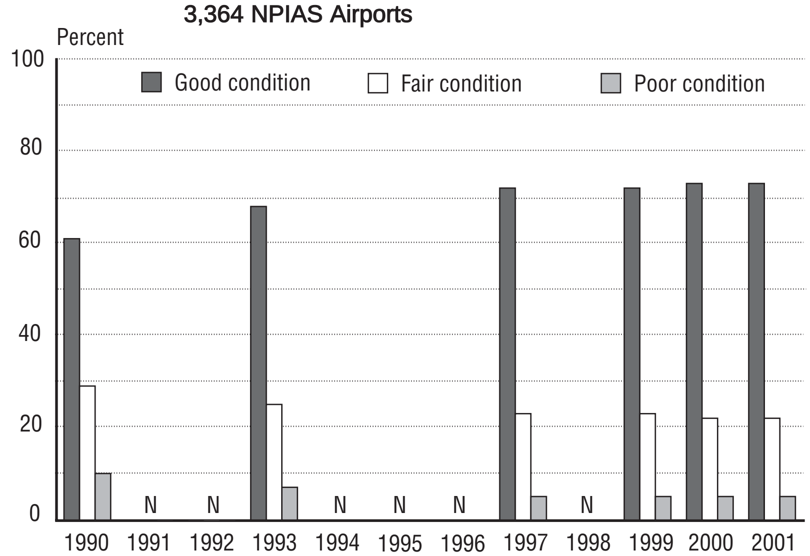


FIGURE 89 Runway Pavement Condition of 3,364 NPIAS Airports



KEY: N = data are nonexistent; NPIAS = National Plan of Integrated Airport Systems.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2003), also available at http://www.bts.gov/, as of January 2003. Based on data obtained from U.S. Department of Transportation, Federal Aviation Administration, Office of Airport Planning and Programming, National Planning Division, personal communication, 2003.

Age of Highway and Transit Fleet Vehicles

Because of improvements in the longevity of passenger cars, the median age of the automobile fleet in the United States has increased significantly, from 7.0 years in 1992 to 8.4 years in 2002. The median age of the truck fleet,[1] by contrast, began to increase in the early 1990s but has been declining since 1997 as new purchases of light trucks have increased substantially (figure 90). As a result, the truck median age of 6.8 years in 2002 is less than its 7.2 years in 1990.

The age of transit vehicle fleets varies by transit and vehicle type (figure 91). Ferryboats became substantially older between 1990 and 2000, increasing from an average of 21.7 years to 25.6 years. By contrast, the average age of full-size transit buses decreased over this period from 8.2 years to 8.1 years [1].

The age of fleets as a measure of condition is not very precise. Because of the different characteristics of vehicle fleets across the modes—some serving freight and other passenger, some owned predominantly by businesses, and others by individuals—the measure varies widely.

Source

1. U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), tables 1-25 and 1-28, also available at http://www.bts.gov/, as of June 2003.

[1] This includes all truck categories: light, heavy, and heavy-heavy.

FIGURE 90 **Median Age of Cars and Trucks: 1992–2002**

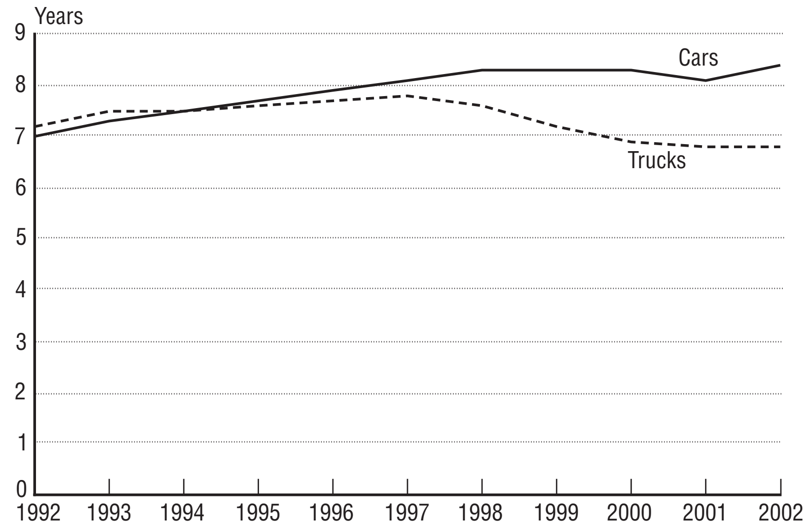
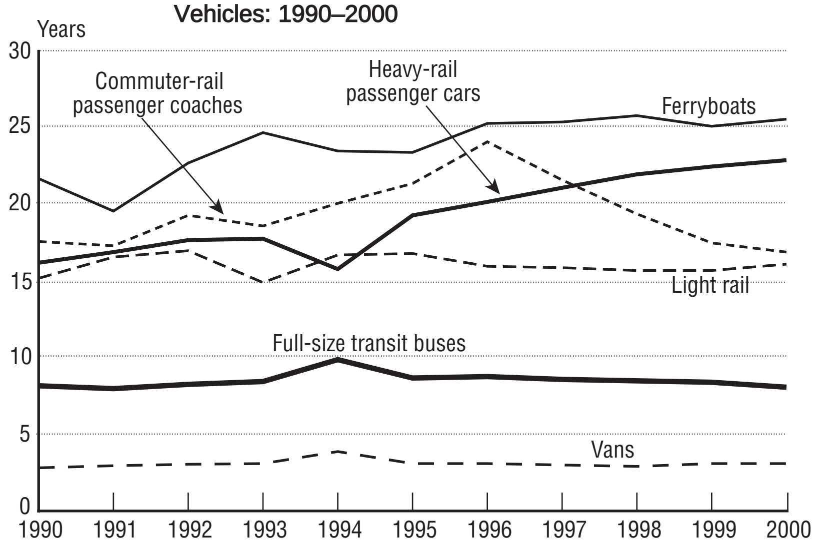


FIGURE 91 **Average Age of Selected Urban Transit Vehicles: 1990–2000**



NOTES: Figure 90—"Trucks" represents all types of trucks, including light trucks (sport utility vehicles, vans, and pickup trucks). **Figure 91**—Full-size buses have more than 35 seats.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), tables 1-25 and 1-28, also available at http://www.bts.gov/, as of April 2003. **Figure 90 (2001–2002)**—R.L. Polk & Co., "Median Age of U.S. Cars and Light Trucks Increases According to R.L. Polk & Co.," press release, Feb. 11, 2003.

Age of Amtrak, Aircraft, and Maritime Vessel Fleets

The average age of Amtrak locomotives and passenger train cars fluctuated in a narrow range for most of the 1990s (figure 92). The average age of locomotives was 11 years in 2000, down 7 percent from 12 years in 1990. Meanwhile, Amtrak railcar age dropped from 20 to 19 years over this period. Of the 20,028 Class I freight locomotives in service in 2000, 42 percent were built before 1980, 21 percent between 1980 and 1989, and 37 percent from 1990 onwards [1].

Overall, about 28 percent of the U.S. flag vessel fleet was 25 years old or more in 2000 (figure 93). This is up from 17 percent in 1990–1991.[1] Towboats are some of the oldest types of vessels plying U.S. waters, and they are getting older: about 50 percent were 25 years old or older in 2000, up from 33 percent in 1990–1991. Tank and liquid barges older than 25 years made up 43 percent of the total fleet in 2000, up from 27 percent in 1990–1991 [2].

The average age of U.S. commercial aircraft was 13 years in 2000, up from 11 years in 1991 (figure 94). Commercial airlines are air carriers providing scheduled or nonscheduled passenger or freight service, including commuter and air taxi on-demand services. Major airlines—those with $1 billion or more in annual revenues—accounted for nearly 80 percent of commercial aircraft in 2000 [3]. These aircraft were approximately one year younger on average than all commercial aircraft during the 1990s. The average age of major airlines aircraft was 12 years in 2000, up from 11 years in 1991.

Sources

1. Association of American Railroads, *Railroad Factbook 2001* (Washington, DC: 2002).
2. U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 20020, table 1-31, also available at http://www.bts.gov, as of January 2003.
3. Calculation based on U.S. Department of Transportation, Bureau of Transportation Statistics, Form 41, Schedule B-43, 1991–2000.

[1] These waterborne vessel data are normally surveyed as of December 31 each year. However, due to a system migration of the data in 1990, the annual survey was collected in June 1991, or half way between the dates when 1990 and 1991 data would otherwise have been collected.

FIGURE 92 Average Age of Amtrak Locomotive and Car Fleets: 1990–2000

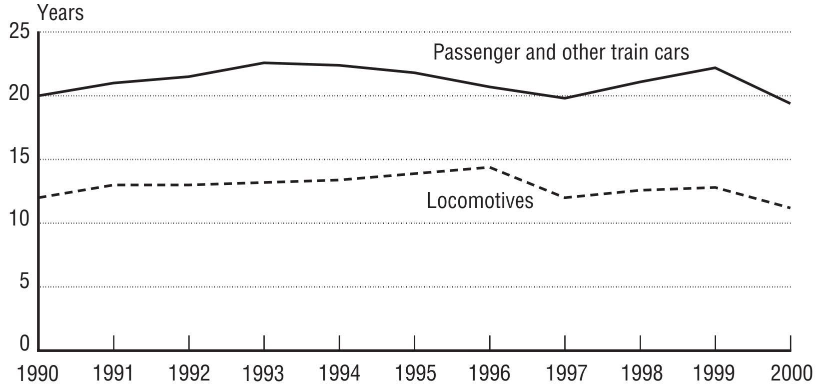


FIGURE 93 Age of U.S. Flag Vessels by Type: 2000

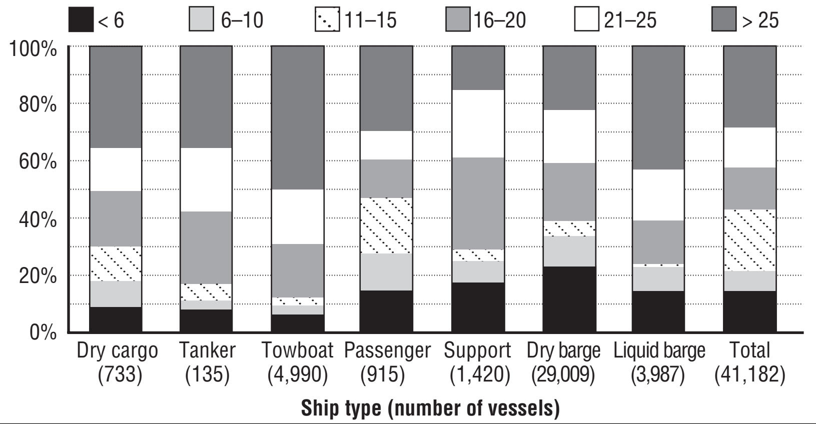
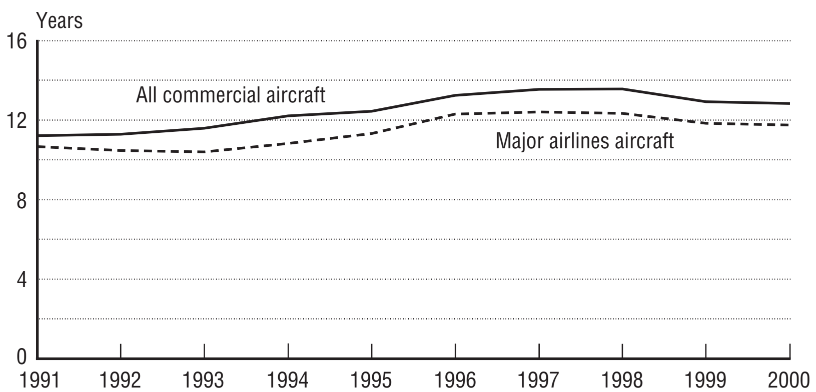


FIGURE 94 Average Age of U.S. Commercial and Major Airlines Aircraft: 1991–2000



NOTES: Figure 93—Support includes offshore support and crewboats. Liquid barge includes tank barges. **Figure 94**—Commercial airlines are air carriers providing scheduled or non-scheduled passenger or freight service, including commuter and air taxi on-demand services. Major airlines includes only commercial airlines with operating revenues greater than $1 billion in 2000. See table 94 notes in appendix B for additional information.

SOURCES: Figures 92 and 93—U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics (BTS), *National Transportation Statistics 2002* (Washington, DC: 2002), tables 1-30 and 1-31, also available at http://www.bts.gov/, as of April 2003. **Figure 94**—Calculations based on USDOT, BTS, Form 41, Schedule B-43, 1991–2000).

Relative Prices for Transportation Goods and Services

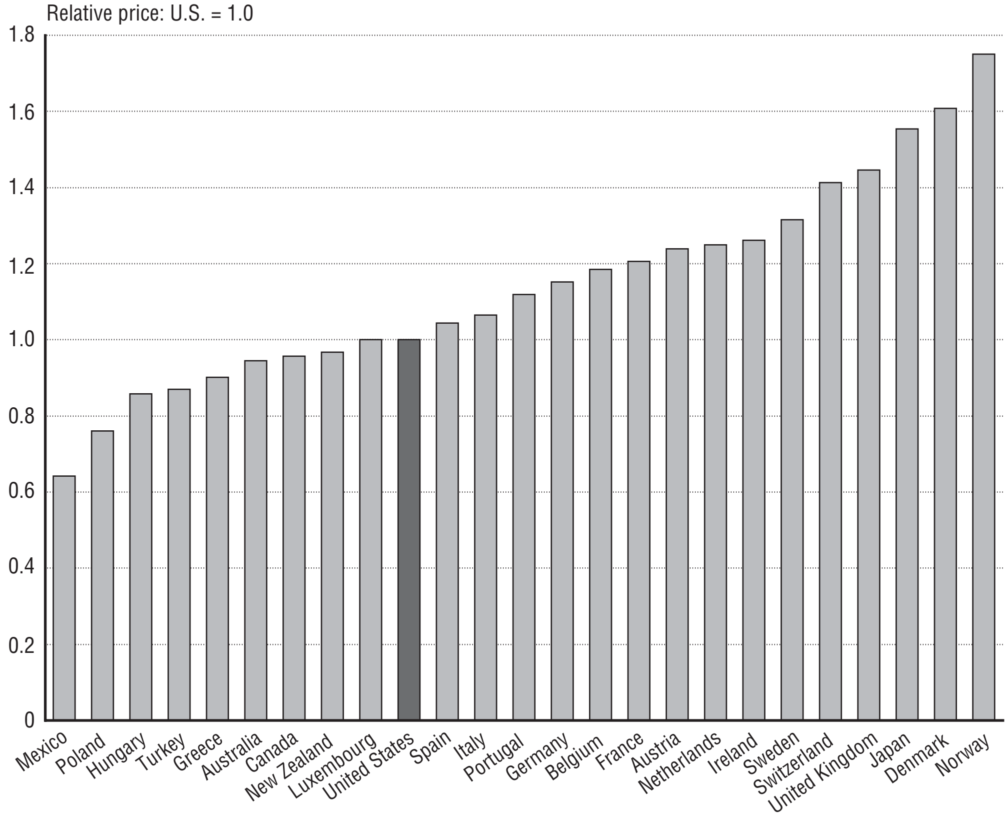
The United States had relatively lower prices for transportation goods and services in 1999[1] than did 15 out of 25 Organization for Economic Cooperation and Development (OECD) countries (figure 95). However, the nation's top two overall merchandise trade partners, Canada and Mexico, had lower relative prices in 1999 than did the United States. Prices in Japan and the United Kingdom—both major U.S. trade partners—were much higher than in the United States. Half of the OECD countries that had less expensive transportation goods and services than the United States are developing and transitional economies.

Further analytical research is needed to clarify transportation's contribution to America's global competitiveness. One theory is that Americans' incomes would go further if transportation consumer goods and services were relatively cheaper than in other countries. Since transportation goods and services are a major input of business production, relatively lower transportation prices might also result in relatively lower production costs. Furthermore, it could be expected that an inexpensive and efficient transportation system would stimulate market expansion and result in more specialization, faster distribution, and lower production costs.

The comparisons here may indicate how domestic U.S. transportation industries, goods, and services fare against their foreign counterparts. The relative price for a good or service traded between two countries is the price for that commodity in one country divided by the price for the same commodity in another country, with the prices for the goods and services in both countries expressed in a common currency. However, relative prices alone do not reveal why transportation is more expensive in one country than another. Nor do they justify making transportation relatively cheaper than it is. They also do not reveal the quality or reliability of the transportation or fully take into account differences in geospatial factors between countries.

[1] The most recent year for which comparable international data were available at the time this report was prepared.

FIGURE 95 Relative Prices for Transportation Goods and Services for the United States and Selected Major Trade Partners: 1999



NOTES: 1999 is the most recent year for which these data are available by country. For these countries, the data are unavailable for goods and services separately.

Relative prices are based on purchasing power parity for transportation-related goods and services. All dollar amounts are in current 1999 dollars.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculation based on data from Organization for Economic Cooperation and Development, *Purchasing Power Parities and Real Expenditures, 1999 Results* (Paris, France: August 2002), table 11.

U.S. International Trade in Transportation-Related Goods

The United States traded $299.6 billion worth (in current dollars[1]) of transportation-related goods (e.g., cars, trains, boats, and airplanes and their related parts) in 2002 with its partners (figure 96). Although motor vehicles and automotive parts constituted by far the largest share of U.S. international trade in transportation-related goods ($233.0 billion) in 2002, trade in aircraft, spacecraft, and parts ($61.9 billion) generated the largest single surplus of any transportation-related commodity category ($25.9 billion) [1]. This surplus was due to trade with several partners, particularly the United Kingdom. The only deficits for aircraft products were with France and Canada, countries that have large aviation manufacturing sectors (see box).

As is the case with overall international trade, the United States had a merchandise trade deficit in transportation-related exports and imports, totaling $82.1 billion in 2002 (figure 97). The deficit arose from a $108.0 billion U.S. trade deficit for motor vehicles and parts, which accounted for 23 percent of the total U.S. merchandise trade deficit of $470.3 billion. Over one-third of the motor vehicles and parts deficit involved U.S. trade with Japan, while about one-fifth was with Canada [2].

The United States had a relatively small deficit ($90 million) in trade of ships, boats, and floating structures in 2002, following a $693 million surplus in 2001 [1]. A $53 million trade surplus for railway locomotives and parts was down from $149 million in 2001. The 2002 surplus can largely be attributed to the United States supplying railcars and parts to Canada, the largest U.S. trade partner for rail products [2].

Merchandise Trade Balance Trends

Trade balances indirectly measure the U.S. competitiveness in supplying transportation-related goods globally and indicate the U.S. competitive position in the production, provision, and delivery of these goods compared with other major trading partners. Between 1990 and 2002, the United States had a growing overall trade balance deficit in all categories of transportation-related goods, due primarily to increased demand for imported motor vehicles. The U.S. trade deficit during this period in these commodity groups included trade with our top three trading partners: Canada, Mexico, and Japan.

Source

U.S. Department of Transportation, Bureau of Transportation Statistics, *U.S. International Trade and Freight Transportation Trends* (Washington, DC: 2003).

[1] All dollar amounts in this section are in current dollars. While it is important to compare trends in economic activity using constant or chained dollars to eliminate the effects of price inflation, it is not possible to do so in this instance (see note on the figure and tables 96 and 97 in appendix B).

Sources

1. U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, U.S. International Trade Commission, Interactive Tariff and Trade DataWeb, available at http://dataweb.usitc.gov/, as of February 2003.
2. _____, *U.S. International Trade and Freight Transportation Trends* (Washington, DC: 2003).

FIGURE 96 U.S. Trade in Transportation-Related Goods: 1990–2002

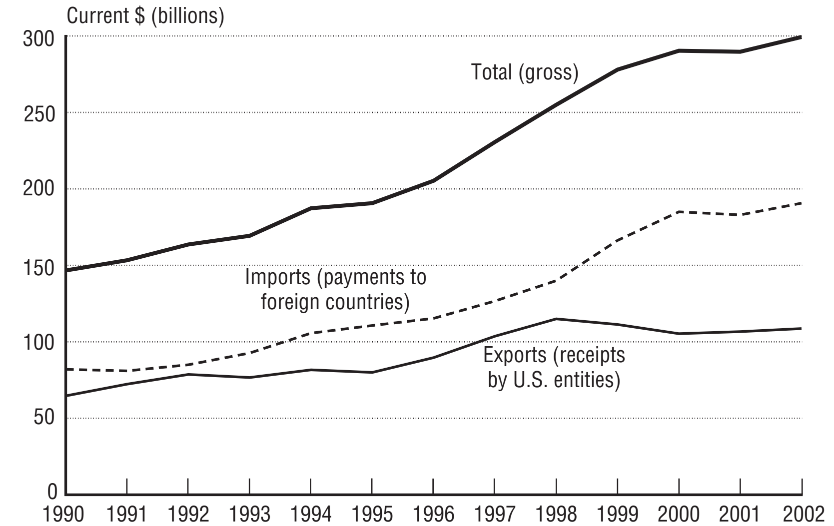
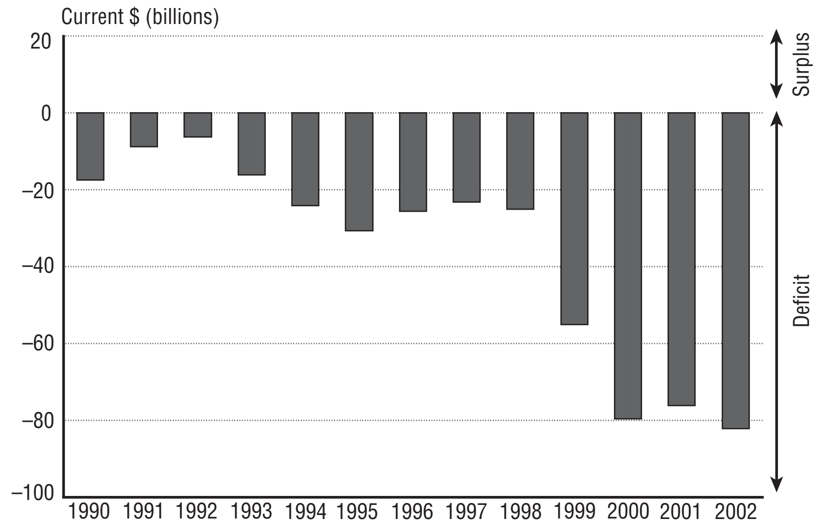


FIGURE 97 U.S. Trade Balance in Transportation-Related Goods: 1990–2002



NOTES: Transportation-related goods are motor vehicles and parts, aircraft and spacecraft and parts, railway vehicles and parts, and ships and boats.

All dollar amounts are in current dollars. These data have not been adjusted for inflation because there is no specific deflator available for transportation-related goods. In addition, it is difficult to control for trading partners' inflation rates as well as currency exchange fluctuations when adjusting the value of internationally traded goods and services for inflation.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, U.S. International Trade Commission, Interactive Tariff and Trade DataWeb, available at http://dataweb.usitc.gov/, as of February 2003.

U.S. International Trade in Transportation-Related Services

U.S. trade in transportation services in 2002 totaled $105.4 billion (in current dollars[1]), down 2 percent from $107.6 billion in 2001 (figure 98). This decline was smaller than the 8 percent drop between 2000 and 2001. Of the trade in 2001, 57 percent was for imports (payments to foreign countries) and 43 percent was for exports (receipts by U.S. entities), resulting in a $14.9 billion trade deficit for transportation services.

The United States had a surplus in transportation services from 1990 through 1997 (figure 99). The trade surplus was highest in 1992, at $3.8 billion (in current dollars), but exports exceeded imports by over $3 billion in other years prior to 1997, as well. Then, between 1997 and 1998, imports increased 7 percent while exports decreased 5 percent, resulting in a $4.6 billion deficit. The deficit continued to grow at an average annual rate of 32 percent between 1998 and 2002, when the deficit reached $13.9 billion.

The United States exports and imports transportation services, including freight services provided by carriers; port services provided by airports, seaports, and terminals; and passenger travel services provided by carriers. U.S. trade in transportation services generates substantial revenues for U.S. businesses in receipts to U.S. carriers and ports. These services also result in payments by U.S. companies to foreign freight and passenger carriers and ports. Because an efficient transportation system puts a premium on system reliability and speed, the performance of freight carriers and ports directly influences the competitiveness of U.S. businesses engaged in international trade.

Components of Service Trade

Exports of freight transportation services occur when a U.S. carrier *receives* payments from a foreign company or individual for transporting merchandise. Imports of freight transportation services occur when a U.S. company or individual *pays* a foreign carrier for transporting merchandise. Similarly, U.S. exports of port services occur when foreign carriers purchase services and goods (e.g., fuel) at U.S. airports and seaports. U.S. imports of port services occur when a U.S. carrier purchases services and goods at ports in foreign countries. For passenger travel services, exports consist of fares received by U.S. carriers from foreign residents for travel between the United States and foreign countries and between two foreign points. Imports of travel services consist of fares paid by U.S. residents to foreign carriers for travel between the United States and foreign countries.

Source

U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, November 2001.

[1] All dollar amounts in this section are in current dollars. While it is important to compare trends in economic activity using constant or chained dollars to eliminate the effects of price inflation, it is not possible to do so in this instance (see the note on the figure and tables 98 and 99 in appendix B).

FIGURE 98 U.S. International Trade in Transportation-Related Services: 1990–2002

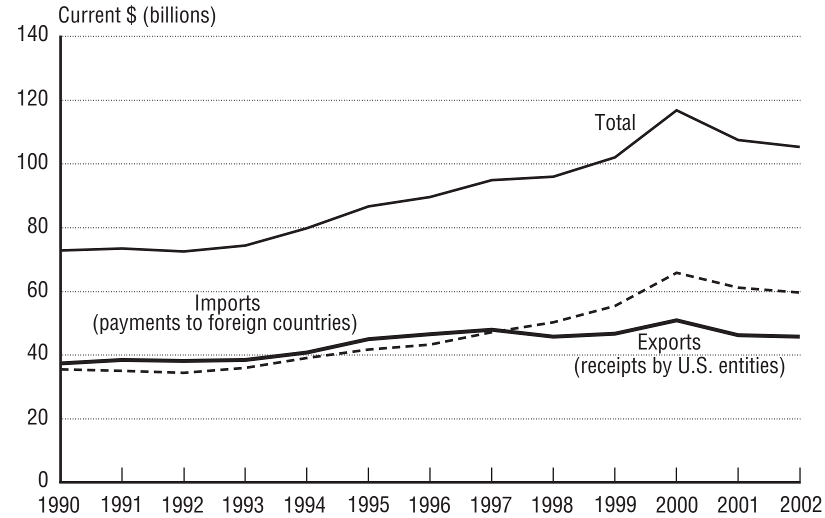
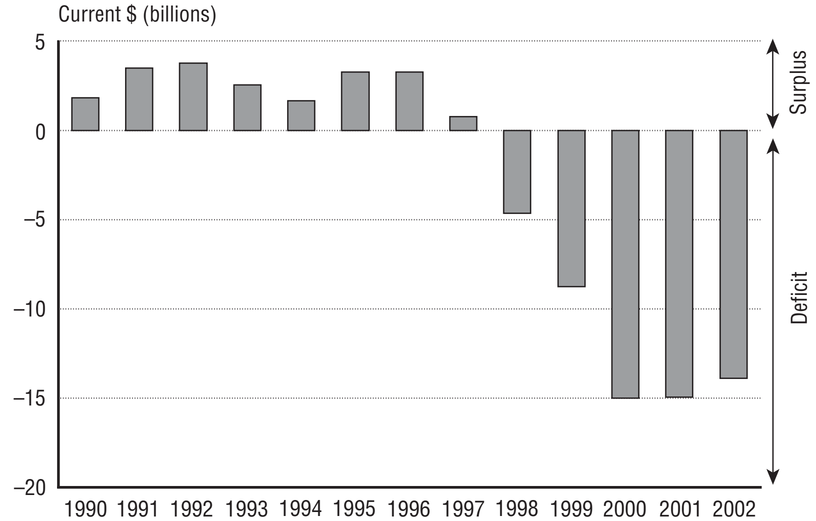


FIGURE 99 U.S. Trade Balance in Transportation-Related Services: 1990–2002



NOTES: Transportation services include passenger fares, and freight and port services. It excludes receipts and payments for travel services, which includes purchases of goods and services (e.g., food, lodging, recreation, gifts, entertainment, and any incidental expense on a foreign visit).

These data have not been adjusted for inflation, because there is no specific deflator available for transportation-related services. In addition, it is difficult to control for trading partners' inflation rates as well as currency exchange fluctuations when adjusting the value of internationally traded goods and services for inflation.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculation based on data from U.S. Department of Commerce, Bureau of Economic Analysis, International Transactions Accounts data, available at http://www.bea.doc.gov/bea/di1.htm, as of April 2003.

Transportation-Related Final Demand

Total transportation-related final demand rose by 37 percent between 1990 and 2001 (in 1996 chained dollars[1]) from $719.8 billion to $984.1 billion (figure 100). However, transportation-related final demand as a share of GDP showed little change throughout the period. This implies that transportation-related final demand grew at about the same rate as GDP. In 2001, the share of transportation-related final demand in GDP was 11 percent, the same as in 1990.

Personal consumption of transportation—which includes household purchases of motor vehicles and parts, gasoline and oil, and transportation services—is the largest component of transportation-related final demand. It amounted to $751.8 billion in 2001 and accounted for 76 percent of the total transportation-related final demand (figure 101). Government purchases used to be the second largest component of transportation-related final demand. Since the mid-1990s, however, government purchases and private investment have accounted for about the same share. Government purchases and private domestic investment in 2001 reached $167.2 billion and $168.6 billion, respectively, for shares of 17 percent each.

Net exports were a negative component of transportation-related final demand between 1990 and 2001. In other words, the United States imported more transportation-related goods and services than it exported. This gap has widened in recent years. In 1990, net exports had a –4 percent share in total transportation-related final demand, hitting a low point of –5 percent in 1995. After rising somewhat through 1997, they dropped to –11 percent in 2001. Deficits in the trade of automobiles and other vehicles and parts have been the primary component of the negative net exports of transportation-related goods and services.

Transportation-related final demand is the total value of transportation-related goods and services purchased by consumers and government and by business as part of their investments.[2] Transportation-related final demand is part of the Gross Domestic Product (GDP), and its share in GDP provides a direct measure of the importance of transportation in the economy from the demand side. The goods and services included in transportation-related final demand are diverse and extensive, ranging from automobiles and parts, fuel, maintenance, auto insurance, and so on, for user-operated transportation to various transportation services provided by for-hire transportation establishments.

Source

1. U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Account Tables, available at http://www.bea.gov, as of October 2002.

[1] All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

[2] Also included are the net exports of these goods and services because they represent spending by foreigners on transportation goods and services produced in the United States. Imports, however, are deducted because consumers, businesses, and government purchases include imported goods and services. Therefore, deducting imports ensures that total transportation-related spending reflects spending on domestic transportation goods and services.

FIGURE 100 Value of Transportation-Related Final Demand and Its Share in GDP: 1990–2001

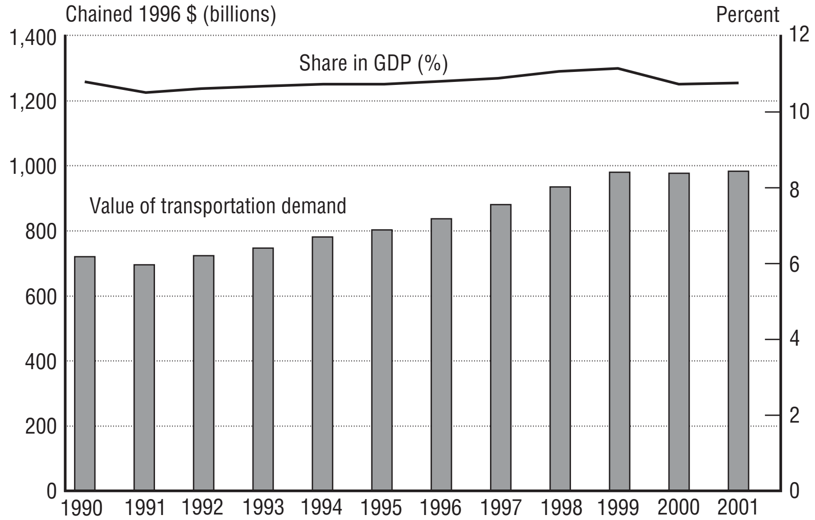
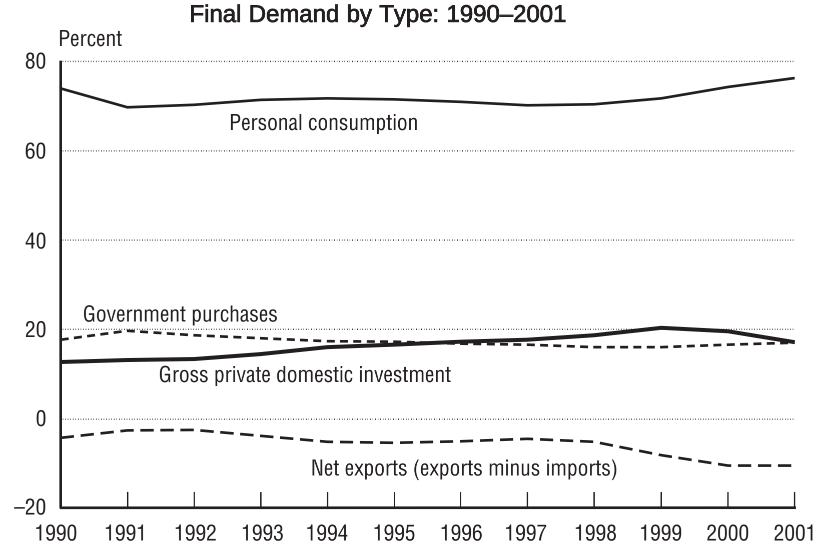


FIGURE 101 Percentage Share of Transportation-Related Final Demand by Type: 1990–2001



NOTES: Total transportation-related final demand is the sum of all consumer, private business, and government purchases of transportation-related goods and services, and net exports (i.e., transportation imports subtracted from transportation exports). Gross private domestic investment constitutes railroad and petroleum pipelines only.

All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Accounts" data, available at http://www.bea.doc.gov/, as of February 2003.

Transportation Services

The contribution of for-hire transportation industries to the U.S economy, as measured by their value-added (or net output), increased (in 1996 chained dollars[1]) from $181 billion in 1990 to $270 billion in 2001 (figure 102). In the same time period, this segment's share in Gross Domestic Product (GDP) fluctuated slightly, increasing from 2.7 percent in 1990 to 3.0 percent in 1999 before declining to 2.9 percent in 2001. The decreased share of for-hire transportation services in 2001 can largely be attributed to the decrease in output of air transportation, reflecting significant reductions in personal and business air travel after the September 11, 2001, terrorist attacks.

Among for-hire transportation industries, trucking and air contribute the largest amount to GDP (figure 103). In 2001, they contributed $99 billion and $78 billion, respectively [1]. Together, they accounted for more than two-thirds of the total for-hire transportation industries' net output. Between 1990 and 2001, local and interurban transit grew significantly, followed by trucking and transportation supporting services. Railroad and pipeline transportation showed the least growth during this period.

There are two major components of transportation services—for-hire transportation, as detailed above, and in-house transportation services. For-hire transportation services are provided by firms for a fee. In-house transportation services are provided by nontransportation establishments for their own use. For instance, when a retail store uses its own trucks to move goods from one place to another it is providing an in-house service.

Time-series data on in-house transportation services are not readily available. The Bureau of Transportation Statistics last analyzed in-house transportation services in early 2000 using 1996 data. At that time, in-house transportation contributed $142 billion (in 1996 dollars) to the economy, while for-hire transportation contributed $243 billion.[2]

Source

1. U.S. Department of Commerce, Bureau of Economic Analysis, "Gross Domestic Product by Industry and the Components of Gross Domestic Income," available at http://www.bea.doc.gov/bea/dn2.htm, as of February 2003.

[1] All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

[2] The full results of that study appear in *Transportation Statistics Annual Report 2000*, available at http://www.bts.gov/.

FIGURE 102 Value Added by For-Hire Transportation Services to U.S. GDP and Its Share in Total U.S. GDP: 1990–2001

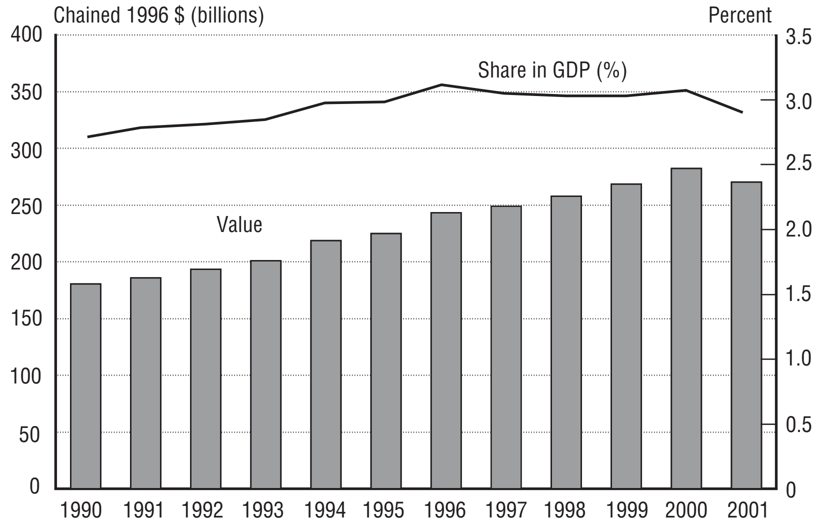
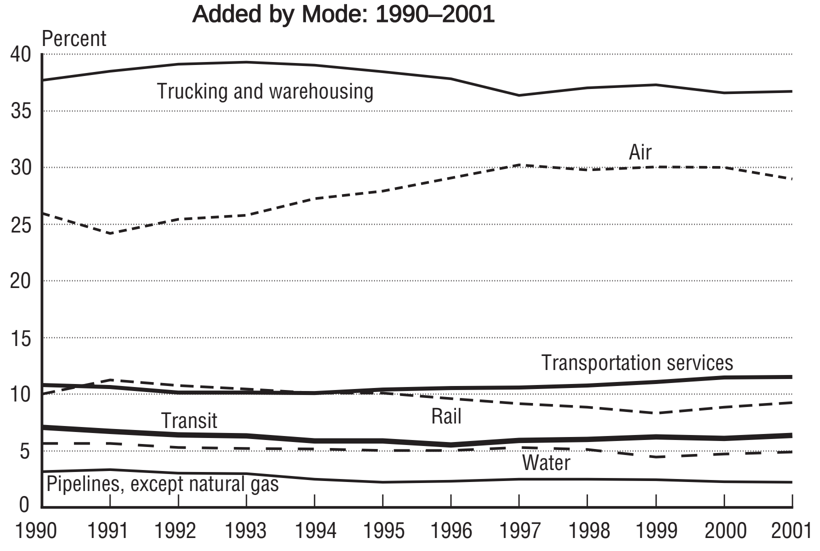


FIGURE 103 Share of For-Hire Transportation Value Added by Mode: 1990–2001



KEY: GDP = Gross Domestic Product.

NOTES: For-hire transportation services include railroad transportation, local and interurban passenger transit, trucking and warehousing, water transportation, air transportation, pipelines (except natural gas), and transportation services. Transportation services cover establishments furnishing services incidental to transportation (e.g., forwarding and packing services and the arrangement of passenger and freight transportation). All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, Bureau of Economic Analysis, "Gross Domestic Product by Industry," available at http://www.bea.gov/bea/dn2/gpo.htm, as of February 2003.

Government Transportation Revenues

Federal, state, and local government transportation revenues earmarked to finance transportation programs[1] increased from $82.2 billion in 1990 to $113.6 billion in 2000 (in 1996 chained dollars[2]) for an annual inflation-adjusted growth rate of 3 percent (figure 104). However, the share of transportation revenues in total government revenues decreased slightly from 4.4 percent to 4.2 percent in the same period [1].

The federal government share of revenues averaged 32 percent per year between 1990 and 1997 and then rose to an average share of 38 percent per year from 1998 to 2000. On the other hand, the state government share of revenues dropped from an average share of 48 percent in 1990 through 1997 to a share of 43 percent between 1998 and 2000. The rise in the federal government share after 1997 can be attributed to increased federal motor fuel taxes, the introduction of new transportation user charges, and the shift of transportation receipts from the general fund for deficit reduction to transportation trust funds [1].

Among all transportation modes, highway usage generates the largest amount of transportation revenues, accounting for $79.2 billion or 70 percent of the total in 2000 (figure 105). Air transportation produces the second largest share of transportation revenues (17 percent). Transit revenues, a combination of money paid into the Mass Transit Account of the Highway Trust Fund and proceeds from operations of the public mass transportation system, represent 10 percent of the total. With annual growth rates of 11 percent and 5 percent, respectively, pipeline and air revenues grew faster than did other modes from 1990 to 2000 [1]. Rail is not represented in revenues because fuel and property tax receipts from rail are channeled into the general fund for deficit reduction and hence do not fall under the definition of transportation revenues used by the Bureau of Transportation Statistics. Amtrak generates revenues from passenger fares, but since Amtrak is not considered a government entity, its revenues are not included.

Source

1. U.S. Department of Transportation, Bureau of Transportation Statistics, *Government Transportation Financial Statistics 2001*, available at http://www.bts.gov, as of February 2003.

[1] Money collected by government from transportation user charges and taxes, which are earmarked to finance transportation programs, are counted by the Bureau of Transportation Statistics as transportation-related revenues. The following types of receipts are excluded: 1) revenues collected from users of the transportation system that are directed to the general fund and used for nontransportation purposes, 2) nontransportation general fund revenues that are used to finance transportation programs, and 3) proceeds from borrowing.

[2] All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

FIGURE 104 Federal, State, and Local Government Transportation-Related Revenues: 1990–2000

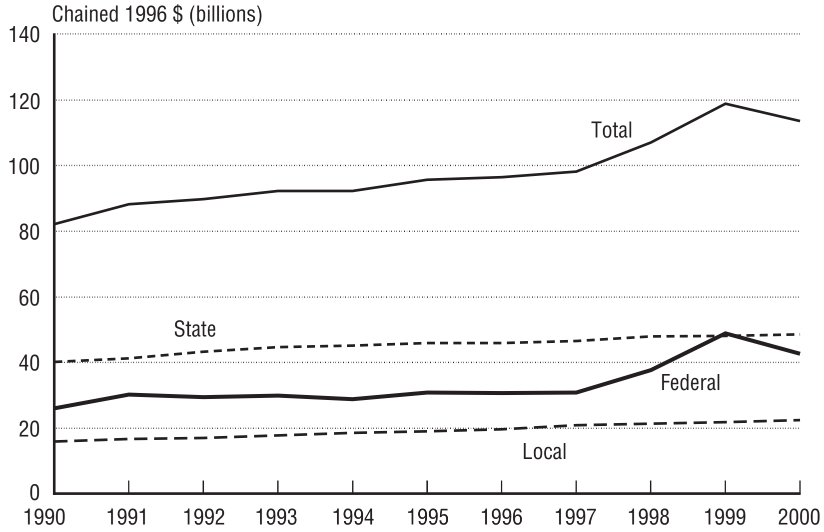
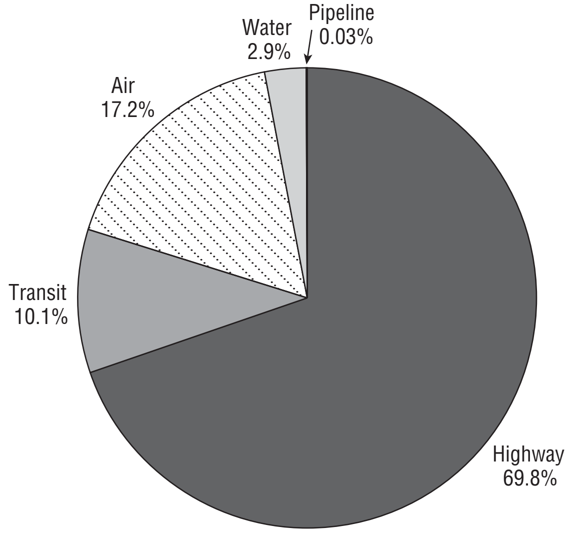


FIGURE 105 Federal, State, and Local Government Transportation-Related Revenues by Mode: 2000



SOURCES: All except as noted—U.S. Department of Transportation, Bureau of Transportation Statistics, "Government Transportation Financial Statistics Searchable Database," available at http://www.bts.gov, as of February 2003. **State and local portion for 2000**—U.S. Department of Commerce, U.S. Census Bureau, "State and Local Government Finances," available at ftp://ftp2.census.gov/pub/outgoing/govs/Finance/, as of February 2003. **Chain-type price index**—U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Accounts Tables," table 7.1, available at http://www.bea.doc.gov/bea/dn/nipaweb/, as of February 2003.

Government Transportation Expenditures

Spending on building, maintaining, operating, and administering the nation's transportation system by all levels of government totaled $149.0 billion in 2000 (in chained 1996 dollars[1]). The federal government spent 30 percent of the funds; state and local governments, 70 percent (figure 106). Between 1990 and 2000, these transportation expenditures grew faster than total government expenditures, increasing transportation's share in the total from 5.6 percent to 6.1 percent. State and local government spending grew faster (at an average annual rate of 3 percent) than the federal government's spending (at 2 percent). State and local governments also spent a higher percentage of their total expenditures on transportation than the federal government. In 2000, the respective shares were 13 percent and 3 percent [1].

[1] All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

Among all modes of transportation, highways receive the largest amount of total government transportation funds. In 2000, this amounted to $93.6 billion and accounted for nearly 63 percent of the total (figure 107). Transit and air modes accounted for 19 percent and 13 percent, respectively, while rail and pipeline modes accounted for less than 1 percent each. Between 1990 and 2000, government expenditures on highway, transit, and air transportation increased at about the same rate, leaving the overall modal distribution of government transportation expenditures almost unchanged [1].

Source

1. U.S. Department of Transportation, Bureau of Transportation Statistics, *Government Transportation Financial Statistics 2001*, available at http://www.bts.gov, as of February 2003.

FIGURE 106 Federal, State, and Local Government Transportation-Related Expenditures from Own Funds: Fiscal Years 1990–2000

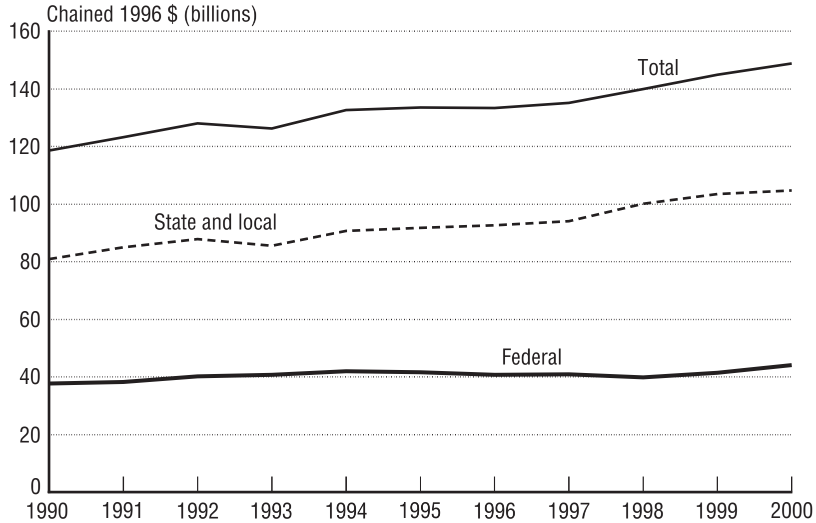
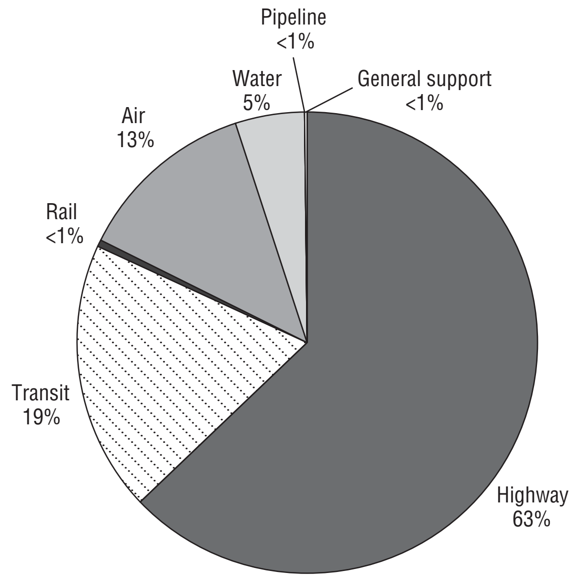


FIGURE 107 Shares of Federal, State, and Local Government Transportation-Related Expenditures by Mode from Own Funds: Fiscal Year 2000



NOTES: Federal expenditures from own funds consists of outlays of the federal government including not only direct spending but also grants to state and local governments. State and local expenditures from own funds include outlays of state and local governments from all sources of funds excluding federal grants. State and local data are reported together because disaggregated federal grants data are not available.

All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

SOURCES: Except as noted—U.S. Department of Transportation, Bureau of Transportation Statistics, "Government Transportation Financial Statistics Searchable Database," available at http://www.bts.gov, as of February 2003. **State and local portion for 2000**—U.S. Department of Commerce, U.S. Census Bureau, "State and Local Government Finances," available at ftp://ftp2.census.gov/pub/outgoing/govs/Finance/, as of February 2003.

Government Transportation Investment

Gross government transportation investment,[1] including infrastructure and vehicles, has increased steadily over the last decade. The Bureau of Transportation Statistics has estimated that total gross government transportation investment reached $76.0 billion in 2000 (in chained 1996 dollars[2]), compared with $59.0 billion in 1990, an average annual growth rate of 3 percent (figure 108). Government transportation investment grew faster than did other government investments. As a result, the share of transportation in total government investment increased from 24 percent in 1990 to 27 percent in 2000 [1, 2]. However, the share of government transportation investment in the Gross Domestic Product (GDP) changed little, remaining at almost 1 percent each year [2]. This indicates that funds allocated by government for improving and expanding transportation capital have been growing at the same pace as GDP.

State and local governments are the main investors in transportation infrastructure, but their relative role has decreased slightly over time. Direct federal infrastructure investment rose from $2.4 billion to $3.9 billion—an average annual growth rate of 5 percent between 1990 and 2000. State and local investment in transportation infrastructure grew from $49.6 billion to $63.0 billion, an average annual growth rate of 2 percent (figure 109).

Infrastructure accounted for nearly 90 percent of the total government transportation investment during the 1990s, the bulk of which (almost three-quarters of the total) was allocated to highways (figure 110). Nevertheless, the share of highway investment in total infrastructure investment has gone down, whereas that for transit and air has gone up. Air investment grew at an average annual rate of 4 percent, faster than all other modes in the 1990s.

Sources

1. U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Account Tables, available at http://www.bea.gov, as of February 2003.
2. U.S. Department of Transportation, Bureau of Transportation Statistics, "Transportation Investment: Concepts, Data and Analysis," compiled based on data from U.S. Department of Commerce, Bureau of Economic Analysis, Fixed Assets and Consumer Durables, available at http://www.bea.gov, as of July 2002.

1 Transportation investment is the purchase value of transportation equipment and the purchase or construction value of transportation facilities and structures, namely, roads, railways, airports, air control facilities, water ports, pipelines, and so forth, that have a service life of longer than one year. The total purchase or construction value of new transportation capital in a year is gross investment. While investment increases the stock of transportation capital, the existing transportation capital stock depreciates or wears out over time. Therefore, gross investment minus depreciation provides net investment.

2 All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

FIGURE 108 **Gross Government Investments in Transportation Infrastructure and Rolling Stock: 1990–2000**

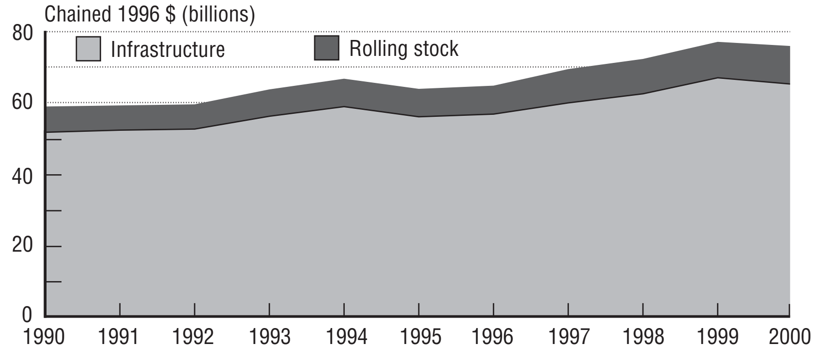


FIGURE 109 **Gross Government Investments in Transportation Infrastructure by Level of Government: 1990–2000**

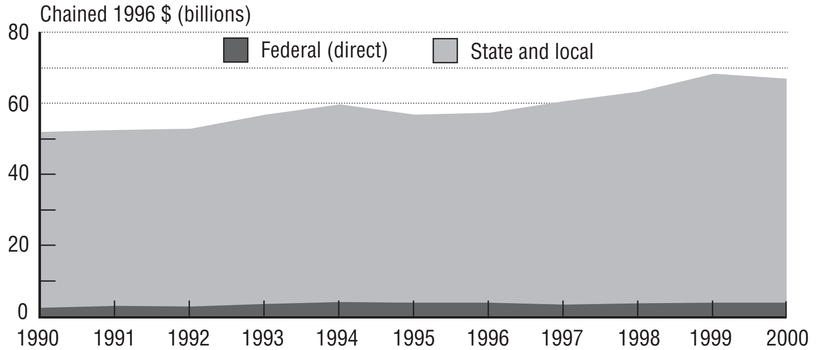
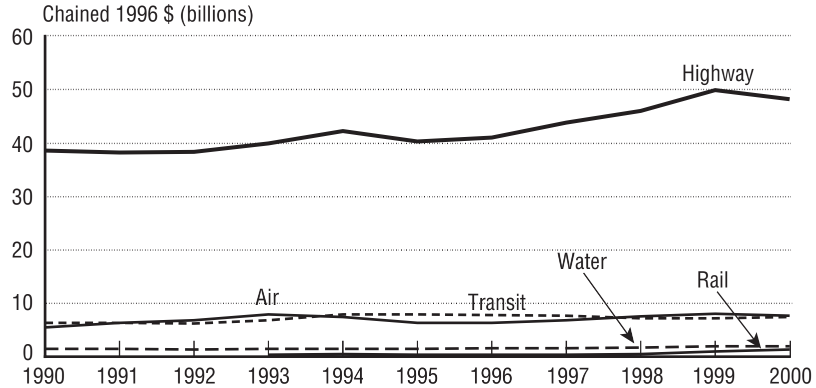


FIGURE 110 **Gross Government Investment in Transportation Infrastructure by Mode: 1990–2000**



NOTES: Investment in transportation infrastructure includes the purchase or construction value of transportation facilities and structures. Data on state and local transportation investment are not available separately. For rail infrastructure, only state and local investment from 1993 to 2000 are included. Government investment in pipeline infrastructure and federal investment spending on railroads are not covered due to lack of data. Investment in rolling stock consists of government outlays for motor vehicles only. Government spending on other rolling stocks (e.g., aircrafts, vessels, and boats) and other machinery and equipment used by federal, state, and local DOTs are not counted in the estimates due to lack of data. All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, "Transportation Investment-Concepts, Data and Analysis," draft, compiled based on data from U.S. Department of Commerce (USDOC), Bureau of Economic Analysis (BEA), "Fixed Assets and Consumer Durables," and personal communications with BEA; and USDOC, U.S. Census Bureau, "Value of Construction Put in Place Statistics," Detailed Construction Expenditure Tables, available at http://www.census.gov, as of February 2003.

Transportation Sector Energy Use

Transportation energy use grew 22 percent between 1991 and 2001, to 28 percent of the nation's total energy consumption in 2001 (figure 111) [4]. Highway vehicles consumed an estimated 81 percent of transportation sector energy [5].

Still, transportation energy use has grown more slowly than has the Gross Domestic Product (GDP) over the decade. As a result, the amount of transportation energy used per dollar of GDP declined at the average annual rate of over 1 percent between 1991 and 2001[1] [2, 3] (figure 112).

Over 96 percent of all transportation energy consumed comes from petroleum. Total U.S. petroleum usage increased 16 percent during the last decade, with transportation responsible for 83 percent of that rise [1]. In 2001, transportation consumed 67 percent of all petroleum, up from 65 percent in 1991 (figure 113). Because over half of U.S. petroleum is imported, the United States, and especially the transportation sector, may be vulnerable to supply disruptions with fuel price fluctuations having the potential to contribute to economic instability.

Sources

1. Davis, S., *Transportation Energy Data Book: Edition 22* (Oak Ridge, TN: Oak Ridge National Laboratory, September 2002), table 2.4.
2. U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Account Tables, available at http://www.bea.doc.gov/bea/dn1.htm, as of February 2003.
3. U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2001*, available at http://www.eia.doe.gov/emeu/aer/contents.html, as of February 2003.
4. _____, *Monthly Energy Review,* February 2003, available at http://www.eia.doe.gov/emeu/mer/contents.html, as of February 2003.
5. U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2003), table 4-6.

[1] GDP is in chained 1996 dollars.

FIGURE 111 U.S. Energy Consumption by Sector: 1991–2001

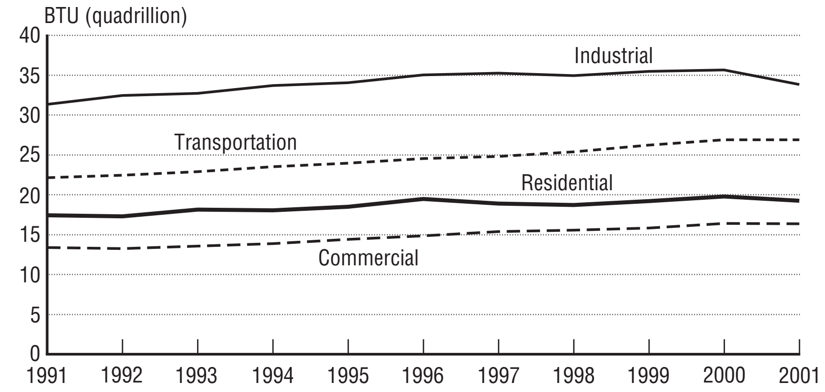


FIGURE 112 Transportation Sector Energy Use and Gross Domestic Product: 1991–2001

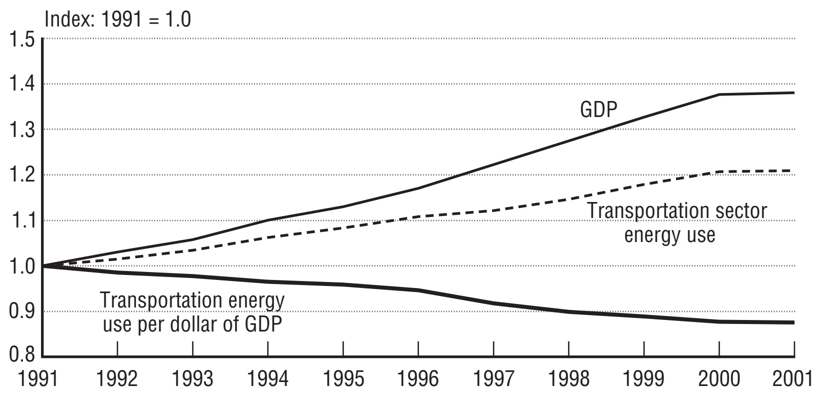
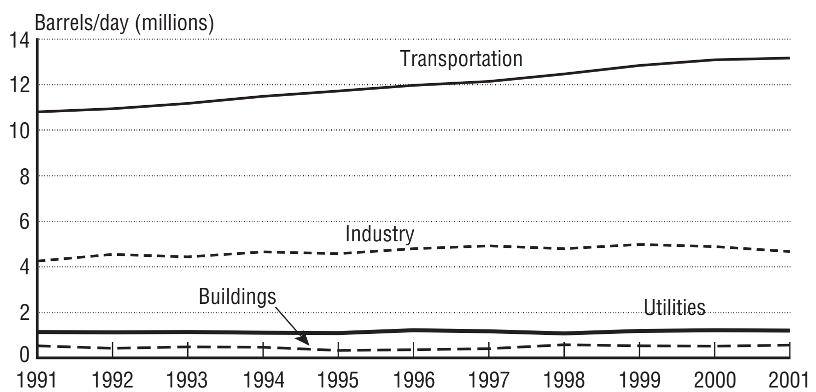


FIGURE 113 U.S. Petroleum Use by Sector: 1991–2001



KEY: BTU = British thermal units. The average heat content of motor gasoline is 129,024 BTU per gallon. One quadrillion BTU is equivalent to 7.75 billion gallons of motor gasoline. GDP = Gross Domestic Product. GDP is shown in 1996 chained dollars.

SOURCES: Figure 111—U.S. Department of Energy (DOE), Energy Information Administration (EIA), *Monthly Energy Review* (Washington, DC: August 2002), table 2.1. **Figures 112 and 113**—DOE, EIA, *Annual Energy Review 2001*, available at http://www.eia.doe.gov/emeu/aer/contents.html, as of February 2003. **GDP**—U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Account Tables," available at http://www.bea.doc.gov/bea/dn1.htm, as of February 2003.

Transportation Energy Prices

Transportation fuel prices (in chained 1996 dollars[1]) experienced short-term fluctuations between 1992 and 2002 (figure 114). The average price of motor fuel (all types of gasoline) decreased 15 percent in 1998, to $1.08 per gallon from $1.27 per gallon in 1997. Two years later, transportation fuel prices rebounded to the highest levels in more than a decade. Motor fuel prices jumped 25 percent, to $1.46 per gallon in 2000. Other fuels, such as aviation fuels and diesel used by railroads, underwent similar price fluctuations. Fuel prices decreased slightly during 2001 and 2002, so that most transportation fuels cost approximately the same amount in 2002 as in 1992. Aviation gasoline—used primarily in general aviation planes—was one exception, remaining 6 percent more expensive in 2002 than in 1992.

Transportation fuel prices are correlated with the world price of crude oil, because crude oil represents a large percentage of the final price of transportation fuel. This correlation can be seen in the price trends from 1992 to 2002 for crude oil and various transportation fuels. Crude oil prices increased 9 percent, while all other types of transportation fuel (except aviation gasoline) increased 2 percent or less [1].

While prices of transportation fuels fluctuate over time, per capita vehicle-miles traveled (vmt) for all modes of transportation have increased in almost every year. For instance, between 1991 and 2001, per capita highway vmt rose about 1 percent annually, while that of large air carriers grew 3 percent (figures 115 and 116).

Transportation fuel prices can affect overall consumer transportation prices. As measured by the Consumer Price Index, between 1991 and 2001, motor fuel prices and transportation prices increased at the same average annual rate (2 percent). This inflation rate for transportation was lower than average annual inflation for all goods and services (3 percent) [2]. In fact, transportation-related consumer prices increased less than all other major spending categories except apparel, which decreased less than 1 percent from 1991 to 2001.

Sources

1. U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* (Washington, DC: August 2002 and June 2003).
2. U.S. Department of Labor, Bureau of Labor Statistics, Consumer Price Index, available at http://www.bls.gov, as of June 2003.

[1] All dollar amounts are expressed in chained 1996 dollars, unless otherwise specified. Current dollar amounts (which are available in appendix B of this report) were adjusted to eliminate the effects of inflation over time.

FIGURE 114 Transportation Fuel Prices: 1992–2002

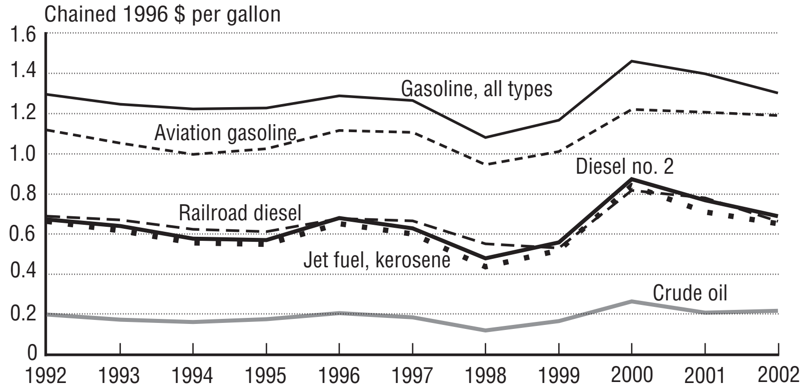


FIGURE 115 Motor Fuel Prices Compared With per Capita Motor Vehicle-Miles Traveled: 1991–2001

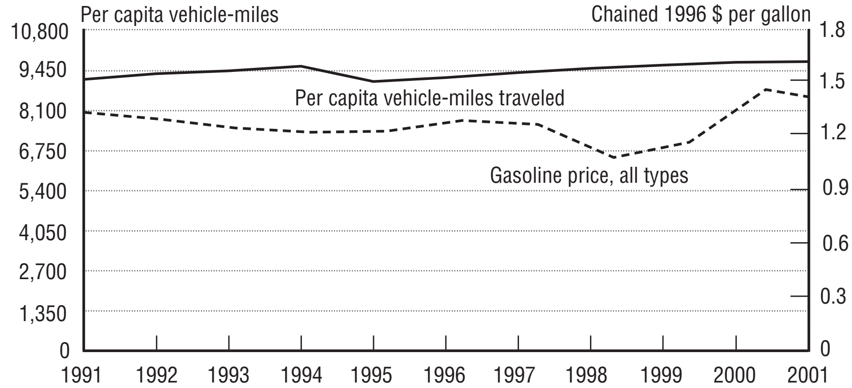
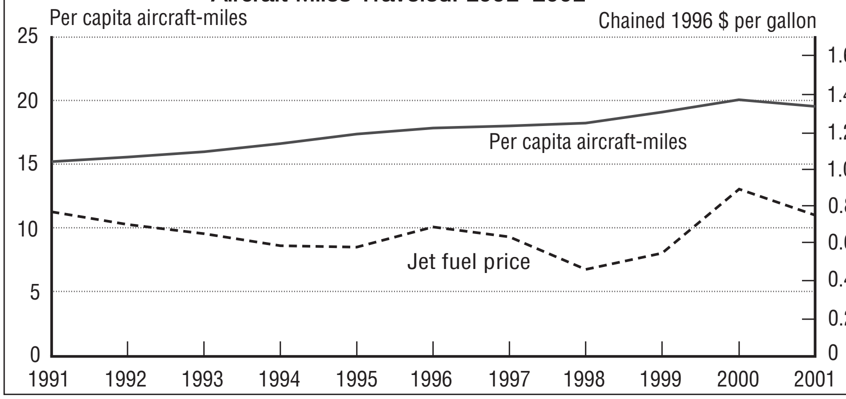


FIGURE 116 Jet Fuel Prices Compared With per Capita Aircraft-Miles Traveled: 1991–2001



NOTE: Current dollar data are available in table 114 in appendix B and were adjusted using a chain-type index to eliminate the effects of inflation over time.

SOURCE: 1991–2001 fuel prices—U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics (BTS), *National Transportation Statistics 2002* (Washington, DC: 2002), table 3-8, also available at http://www.bts.gov.

2002 fuel prices—See table 114 source. **Per capita vehicle- and aircraft-miles**—Calculations based on USDOT, BTS, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-29, also available at http:// www.bts.gov; and U.S. Department of Commerce, U.S. Census Bureau, International Database (IDB), available at http://www.census.gov/ipc/www/ idbnew.html, as of April 2003.

Transportation Energy Efficiency

Passenger travel was 5 percent more energy efficient in 2000 than in 1990 (figure 117), mainly due to gains by domestic commercial aviation. Improved aircraft fuel economy and increased passenger loads resulted in a 32 percent increase in commercial air passenger energy efficiency between 1990 and 2000 [2]. Aircraft fuel economy improved by 20 percent between 1990 and 2000. Domestic commercial air passenger-miles rose 49 percent between 1990 and 2000, while energy use grew 13 percent [1].

Highway passenger travel—by automobiles, motorcycles, and light trucks—represented 85 percent of all passenger-miles and 91 percent of passenger travel energy use in 2000. Highway travel was 2 percent more energy efficient in 2000 compared with 1990 [1]. This gain was due to a 6 percent increase in the energy efficiency of passenger cars and motorcycles, offset by a 5 percent loss in efficiency of light trucks[1] [2]. Furthermore, light truck passenger-miles grew 47 percent between 1990 and 2000, compared with 12 percent for passenger cars and 22 percent for all highway passenger vehicles.

Freight energy efficiency (ton-miles per BTU) declined 7 percent from 1990 to 2000 (figure 118). The decline in freight energy efficiency occurred as a result of 2 percent average annual growth rate in ton-miles paired with a relatively rapid average annual growth rate of 3 percent in freight energy consumption. Contributing to this trend was the decline in the energy efficiency of the freight truck and waterborne modes [2].

Terms Used and Calculations Made

The following definitions apply to the discussion here:

- Energy is measured in British thermal units (BTU).
- A passenger-mile traveled is one passenger transported one mile.
- A ton-mile is one ton transported one mile.
- Passenger energy efficiency is the ratio of passenger miles traveled to BTU (or to energy consumed).
- Freight energy efficiency is the ratio of ton-miles to BTU (or to energy consumed).
- Fuel economy is the ratio of miles per gallon of fuel.

Sources

1. U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), calculation based on tables 1-34, 1-44, 4-6, and 4-8, also available at http://www.bts.gov/, as of May 2003.
2. U.S. Department of Transportation, Bureau of Transportation Statistics, *Transportation Energy Efficiency Trends in the 1990s*, Issue Brief, available at http://www.bts.gov/, as of May 2003.

[1] Light trucks include minivans, pickup trucks, and sport utility vehicles.

FIGURE 117 **Passenger-Miles, Energy Consumption, and Energy Efficiency: 1990–2000**

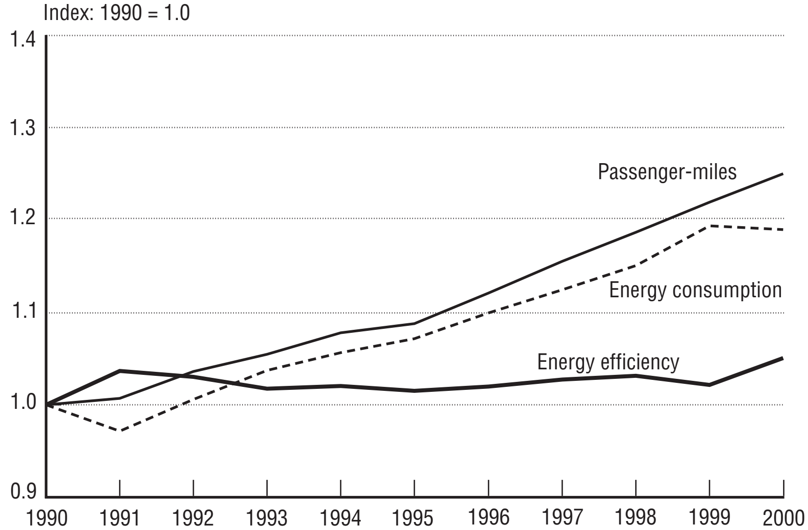
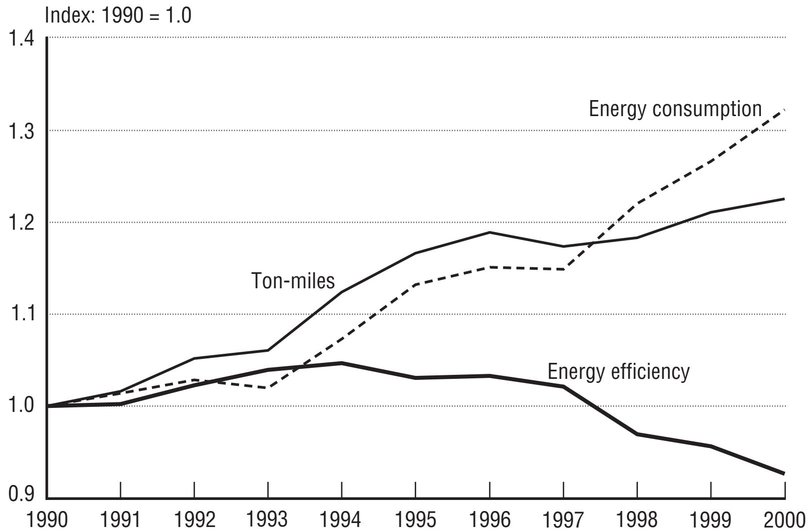


FIGURE 118 **Freight Ton-Miles, Energy Consumption, and Energy Efficiency: 1990–2000**



SOURCES: Passenger-miles, ton-miles, and energy use (unless otherwise noted)—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), tables 1-34, 1-44, 4-6, and 4-8, also available at http://www.bts.gov/, as of May 2003. **Truck ton-miles for 2000**—The Eno Transportation Foundation, Transportation in America, 19th Edition (Washington, DC: 2002), p. 45. **Transit energy use calculated from**—American Public Transportation Association, Transit Statistics, tables 30 and 33, available at http://www.apta.com, as of May 2003.

Chapter 3

State of Transportation Statistics

State of Transportation Statistics

Transportation statistics arise from an array of data systems each constructed for specific, sometimes narrow, purposes. These systems exist much like a collection of pieces from different jigsaw puzzles of the same picture. The pieces answer some questions well but leave many others unanswered or partly or poorly answered. The pieces do not constitute a whole because of a number of factors, such as incompatible definitions, diverse collection methods, data overlaps and omissions, coverage and timeliness of data collection and releases, and apparent inconsistencies. In addition, transportation statistics need to satisfy a variety of users (see table 1).

This chapter focuses on five core transportation areas: freight, passenger travel, air transportation, economic, and geospatial data. Each section provides an analysis of why these data are important, a review of existing data, and possible options for filling crucial data gaps. The challenge for the Bureau of Transportation Statistics (BTS) will be to solve, where possible, some of the more pressing data needs in these areas.

FREIGHT DATA

Changes in freight transportation reflect the dynamic nature of national and global economies and the continuing improvements and innovations in technology. Alterations in the mix of manufactured products, shifts in global production and trade patterns, and growing domestic demands from industry and consumers all affect freight transportation and related data needs.

The consensus on collected freight data is that they are often too out of date to capture current developments and, despite progress, there are many missing pieces to the freight picture. Furthermore, data are often not comparable across modes. Table 2 compares features of several freight data sources.

Some freight data needs come up consistently among data users. Major categories of data where important gaps remain include:

- freight flows (modal combinations used; tonnage, weight, ton-miles, volume, and value of shipments) at the local, state, national, and international levels;

TABLE 1 Transportation Data Users and Their Needs

Category of user	Who the users are	What the data are used for
Policymakers	Congress; officials of the U.S. Department of Transportation and other Executive Branch agencies; state and local agencies; metropolitan planning organizations; port authorities	Safety regulation, security, congestion analysis, international trade and travel, environmental issues, economic impact and cost-benefit analyses, modal choice issues (e.g., cost allocation studies and analysis of factors affecting modal choice), competition analysis (e.g., market share and effects on prices)
Planners	Transportation infrastructure planners at all levels of government; private sector officials; environmental, economic development, and emergency response planners	Forecasting regional or national freight and passenger travel demand and its effects on and need for public or private infrastructure, effects of transportation on the environment and the economy, national security issues, performance planning and budgeting
Shippers, operators, carriers, intermediaries, and transportation equipment manufacturers	Public sector authorities responsible for transit and ports; private sector businesses	Planning for infrastructure needs, tracking vehicle or cargo location, planning for service offerings or marketing initiatives, understanding market potential, understanding commodity movements and passenger flows
Transportation regulators	Government officials; private security organizations	Allocating enforcement resources; ensuring the safety and integrity of the transportation system
Researchers and consultants	Academics; private consultants	To support research in the public and private sector
News media	Reporters	Various interests of broad concern (e.g., hazardous materials spills, congestion, and infrastructure condition)
General public	Individuals and organizations	Travel planning; identifying and rectifying local, regional, and national transportation issues

- true origins and destinations of shipments (not necessarily the same as the place of record);
- commodities (type; value; whether hazardous, containerized, or bulk);
- transit times (how long it takes to ship commodities);
- shipment costs;
- intermodal connections (seaports, airports, railyards) through which freight passes; and
- infrastructure, vehicles, vessels, airplanes, and pipelines used.

In many of these categories, some of the data may be available but not on a comprehensive basis.

Existing Freight Data and Data Programs

Commodity Flow Survey (CFS)

The CFS, conducted by the U.S. Census Bureau for BTS, is the broadest, most comprehensive national survey available of multimodal freight

TABLE 2 Selected Freight Flow Data Programs of Nationwide Scope

Program/agency	Modes	Shipment variables covered	Limitations	Data-collection frequency	Data-collection methodology
Commodity Flow Survey Bureau of Transportation Statistics—(BTS)—in conjunction with the U.S. Census Bureau	All (including intermodal)	Kind of commodity and its value, weight, true origin and destination (if domestic)	Only domestic shippers surveyed; most retail, all government, and some other establishments (e.g., farms, logging) are not surveyed; most imports not covered; crude petroleum pipeline shipments not covered	Every 5 years as part of the economic census; previous data-collection years were 1993, 1997, and 2002	Survey of domestic shippers Sample size: 200,000 in 1993, 100,000 in 1997, and 50,000 in 2002
Railcar Waybill Sample Surface Transportation Board	Rail	Commodity and its weight and rail line system origin and destination	Does not reveal true origin and destination of most shipments; export traffic only picked up if rebilled at border; does not provide shipment value data	Annual	Stratified sample of rail waybill Sample rate varies from 2.5% to 50% depending on shipment size
Waterborne Commerce Data U.S. Army Corps of Engineers	Maritime	Commodity; shipment weight; origin, destination, and routing of waterborne portion of shipment Includes domestic and foreign shipments	Value data not collected for domestic shipments	Data collection continuous; some data released monthly for inland waterways; most other data issued annually	Census of companies and vessels operating in U.S. waterborne trade, both domestic and foreign
Air carrier freight data BTS	Air	Freight weight enplaned by each carrier at each airport; weight of freight carried over airport-to-airport segments; available ton-miles of capacity; revenue ton-miles flown by each carrier Covers domestic, transborder, and foreign flights of U.S. carriers.	Does not identify the commodity shipped, its value, or true origin and destination; air origin and destination points may not be identified if cargo is interchanged at an airport; very small carriers, such as air taxi, not covered Does not cover flights of foreign carriers	Monthly	U.S. air carriers file monthly reports with BTS

(Table 2 continues on the next page)

TABLE 2 Selected Freight Flow Data Programs of Nationwide Scope *(continued)*

Program/agency	Modes	Shipment variables covered	Limitations	Data-collection frequency	Data-collection methodology
U.S. foreign trade data: transport of freight into and out of the United States U.S. Customs, U.S. Census Bureau, BTS, Canadian and Mexican agencies	Truck, rail, pipeline, government mail, and certain other modes involved in trade between the United States and Canada, and the United States and Mexico	For surface modes, shipment weight (imports only), its value and commodity classification, mode of transportation when crossing border, port of entry or exit, freight charges, and whether shipment is containerized Data specify state or province of origin and destination	Transportation data derived from U.S. foreign trade data currently provide only limited information on air and water modes, even with Canada and Mexico, and do not identify intermodal combinations used in shipping cargo from its origin to its destination. Data on transportation of exports to other countries are collected, but limited in availability. Some trade records may be filed by intermediaries (e.g., a freight forwarder) that may list an administrative office located in a place other than the point of entry or exit, and can result in misreporting of the origin or destination of a shipment.	Monthly	Data derived from official U.S. international merchandise import and export trade documents and extracted from records filed with administering agencies An increasing number of these records are filed electronically

trends. Every five years, the U.S. Census Bureau surveys shippers for the CFS. Release of 2002 survey data will begin in late 2003; previously available data cover 1993 and 1997. For a sample of shipments, shippers are asked to provide information on the shipment's origin and destination, its value and weight, the mode or modes of transportation, and the commodity type (using codes from the Standard Classification of Transportable Goods—SCTG).

Uses of CFS data include:

- determination of the magnitude of freight moving over the national transportation system,
- projection of growth in freight transportation demand,
- calculation of ton-miles using origin and destination points,
- estimation of traffic routing, and
- calculation of the modal distribution of shipments by value, tonnage, and ton-miles.

While the CFS is the most extensive survey available of domestic freight activity, it does not cover all sectors of the economy. The shipments of farms, logging and fishing operations, governments, construction firms, service establishments, transportation firms, and most retail firms are not within the scope of the CFS. The distribution center or warehouse of a retail firm will be in scope, but its retail store will not. For instance, farm produce is not captured when it is transported from the farm to a grain elevator or processor but is when reshipped by the elevator or processor. Pipeline shipments of crude petroleum are also outside the scope of the CFS.

The CFS excludes imports unless the shipment is received by an importer at its establishment within the United States and then reshipped; the reshipment portion would be counted. The CFS includes the value and tonnage of exports. However, only the domestic portion of the shipment mileage is counted; the international portion is not. The CFS excludes "landbridge" cargo carried across the United States (i.e., cargo that does not originate or terminate in the United States—truck traffic from Canada to Mexico, or rail traffic carrying Pacific Rim freight from West Coast seaports to East Coast seaports for shipment to Europe).

The relatively small sample size of the CFS limits its geographic and commodity detail. The 1993 CFS had an establishment sample size of 200,000; the 1997 sample was reduced to 100,000 (covering 5 million shipments); and the 2002 sample was halved again to 50,000 (covering 2.7 million shipments). The Census Bureau designs the CFS to survey national and state-to-state flows, so data on flows to and from metropolitan areas are often not available. Planners and policymakers have indicated a strong need for greater geographic detail—at the county level—for analysis and forecasting.

Carload Waybill Sample

This specialized database provides detailed information on freight movements by rail. The Surface Transportation Board collects this stratified sample of rail waybills, with the sample rate varying from 2.5 percent to 50 percent depending on the size of the shipment. About 577,000 shipments were sampled in 2001.

Data collected include rail system origin and destination, weight, commodity (by 7-digit Standard Transportation Commodity Classification (STCC) code), and mileage. No value data are collected. The main weakness of the Carload Waybill Sample is the lack of true origin and destination data. The sample gathers no information beyond the scope of the rail system, so that the origin and destination are treated as occurring when the shipment is tendered to or delivered by the system. The true origin and destination, if it requires a connection to the rail system by truck, is not shown. Moreover, shipments interlined between two railroads are often shown as two movements, with the interchange point being listed as the destination of the first shipment and the origin of the second. Export traffic is also excluded unless it is rebilled at the border.

Waterborne Commerce Data

The Waterborne Commerce Data collected by the U.S. Army Corps of Engineers provide details on maritime freight. It is a complete census of all waterborne domestic and foreign movements and gathers data on the weight of the shipment, the origin, destination, and routing of the waterborne portion of the shipment, the waterborne distance traveled, and a code for the commodity carried (using the Corps of Engineers' own commodity coding system). No value data are collected for domestic shipments, but the Corps collects customs data on the value of foreign shipments. The foreign data lack information on routing.

Air Freight Data

BTS gathers data on air freight directly from the carriers. For each carrier, these data show the enplaned weight of freight at each airport, the weight of freight carried over airport-to-airport segments, available ton-miles of capacity, and actual revenue ton-miles flown. The data do not include information on the commodity classification of the freight carried or its value. The data also generally do not report the true origin and destination of cargo, that is, the point from which it is shipped by truck to the airport and to which it is delivered from the airport. Moreover, when the cargo is interchanged at an airport, even by the same airline, it is treated as a new shipment, so even the airborne origin and destination points are lost. The database also does not count cargo moved by the smallest carriers (i.e., air taxis).

International Data

The U.S. Census Bureau provides surface freight import data collected from the Bureau of Customs and Border Protection[1] to BTS. These data are then reported as part of BTS's Transborder Surface Freight Data. BTS also gathers data on exports from Canada and Mexico to the United States to complete the database. The data measure the weight of imports (but not exports), the value of shipments, the modes of transportation, the commodity classifications (from the 2-digit Harmonized Schedule), the ports of entry or exit, the freight charges, and codes to indicate if the shipments were containerized. Data on origin and destination show only the state or province. Similar data are not available for air and water exports and imports to and from Canada and Mexico, and the data available on exports and imports from other countries are even more limited.

The federal government plans to substantially improve the quality of international freight data using an International Trade Data System (ITDS). The ITDS, a multiple agency effort spearheaded by the Bureau of Customs and Border Protection, promises to provide comprehensive data on imports and exports, including origin and destination, mode, commodity, weight, and value.

Motor Carrier Data

Data on the number of vehicles passing through the transportation network are needed for many purposes. For instance, the number of vehicles is important for calculating the level of congestion in the transportation system. Many freight vehicles travel empty, contributing to highway congestion but not showing up in freight statistics.

The U.S. Census Bureau conducts the Vehicle Inventory and Use Survey (VIUS) every five years. The VIUS provides data on the number of trucks (including data on the size of truck fleets owned by carriers), their types, vehicle weights and lengths, fuel economy, the industries they serve, the kinds of commodities they carry, their range of operation (e.g., local, regional, or long distance) and the percentage of miles operated out-of-state, weeks operated, model years, how they are acquired, and the nature of the carriers (e.g., for-hire, private, or contract). These data do not provide any information about freight flows themselves, such as origins and destinations, but are useful in conjunction with other databases for understanding truck movements.

Options for Filling Freight Data Gaps

As the above discussion suggests, there are many important freight data gaps. Two pressing examples are the lack of good origin and destination data for truck shipments and data on intermodal shipments. While the CFS is, in principle, a comprehensive freight database, it in fact omits many sectors of the economy and reports limited details on a relatively small sample of shippers. Moreover, the sample may contain significant errors in the reported mode of transportation when the shipper often has incomplete information (e.g., the shipper that hires a trucking company to transport the shipment may not know that the trucking company contracts with a railroad to move the trailers by rail flatcar for a considerable portion of the trip). Databases on rail, air, and maritime shipments fill some of these gaps, but little data are available for truck and intermodal shipments. Moreover, other

[1] In 2003, functions of the Immigration and Naturalization Service, the U.S. Customs Service, the Animal and Plant Inspection Service, and the Border Patrol were combined into the U.S. Department of Homeland Security's Bureau of Customs and Border Protection.

databases cover only the portion of the trip handled by the mode on which they focus and do not cover intermodal connections.

The Committee on National Statistics of the National Academy of Science's Transportation Research Board (TRB) released a study on the CFS in March 2003 [8]. The committee recommended that the five-year survey be continued until an improved alternative could be established. The committee reasoned that the existing CFS provided unique and important data on domestic freight movements, despite its limitations and shortcomings. Among the limitations cited by the committee were gaps in shipment and industry coverage and a lack of geographic and commodity detail. These limitations, according to the committee, are compounded by the survey's shrinking sample size. (Recommendations from another report on freight data options—by the TRB Committee on Freight Transportation Data—A Framework for Development—were not available in time for inclusion in this report.)

A new American Freight Data Program would aim to fill in key data gaps. It could have many elements, but the extent to which gaps could be eliminated would depend on resources available. Three specific components of a new program could be:

- filling the most important gaps and making freight data more timely by changing the Commodity Flow Survey to an annual or continuous collection of data that includes specialized sample frames of construction, agricultural, retail, and services shippers;
- providing complete statistical coverage of transportation of imports and exports through the ITDS; and
- developing a mail-out survey of nonpassenger vehicles to collect data on vehicle movements and vehicle and driver characteristics.

Such approaches would build on existing data efforts. Over the longer term, new innovations and approaches may emerge as practical alternatives for gathering data. Two of these—electronic transmission of operational data from vehicles and infrastructure and possible adoption of transportation data elements as part of a universal bill of lading—are discussed in box 1.

CFS Enhancement

For the foreseeable future, a survey such as the CFS is likely to remain a central component of a national freight data program. A top priority for CFS enhancement would be to gather information from shippers currently outside the scope of the survey. The focus for sample frames for the shippers could be those that generate the most vehicle-miles of traffic (e.g., construction, services, retail trade, and agriculture).

Two other key weaknesses in the CFS are lack of timely data and a sample size that is too small for local planning. It may never be possible in a national freight flow survey to generate sufficiently detailed data to meet the needs of all local planners, but if data were collected annually they could be aggregated to provide larger sample sizes. This would allow the most recent data to be analyzed if the focus is on currency at the expense of geographical detail; it would allow data for the last five years to be analyzed if the focus is on maximum geographic or commodity detail.

BTS lacks independent authority to require responses to a survey. Previously, BTS collected freight data under an interagency agreement with the Census Bureau, which has mandatory authority under its five-year economic census. It has been demonstrated that voluntary responses are less timely, complete, and accurate than responses collected under a mandatory survey, reducing the quality of the data and increasing the cost of the survey.

BOX 1
Other Ways to Collect Freight Data

Freight data are collected from both shippers and carriers, but no record follows a shipment through its entire trip. Shippers often have only partial information on the mode and routing of the shipment. The carrier knows the routing for its portion of the trip but may have little information on other portions of the trip or even the type or value of commodities carried. No records are available to tie together the information that is known by the shipper and the various carriers.

A **universal bill of lading** could record all the needed data and be sampled to provide a comprehensive freight database. Currently, a bill of lading accompanies all shipments, but the data on it are not standardized. Surface Transportation Board regulations (49 CFR 1035) specify certain requirements for bills of lading on rail and water shipments, as do the Federal Motor Carrier Safety Administration requirements for truck shipments (49 CFR Part 373). The bills of lading list the weight of the shipment but may provide no information on the type of commodity (which may be recorded simply as "Freight All Kinds"), the true origin or destination, the routing, or the mode or modes of transportation used. The carrier with whom the shipper contracts may be shown on the bill of lading, but if the carrier subcontracts all or part of the carriage, those other carriers will not be listed.

While a universal bill of lading might be a long-term solution to the freight data problem, it would be important to develop consensus within the transportation community that costs of implementing such a concept would be justified by the benefits of the data made possible by it.

As **information technologies** advance, the potential grows to capture data collected automatically as freight passes through electronic interchanges, although many institutional barriers exist in using such data for public purposes. In theory, such a data-collection approach could replace most surveys and carrier reports. Barriers, such as the proprietary nature of this data and incompatible systems, constrain use.

Another way to provide data for local planning might be through partnerships with state and local governments willing to provide resources to increase sampling rates in geographical areas in which they have a special interest. This approach would add data to the CFS while allowing state and local governments to obtain information on their own local traffic flows, probably at a lower cost than conducting their own surveys. This is similar to the approach taken with the 2001 National Household Travel Survey.

While the CFS lacks import data, some data are available from the Bureau of Customs and Border Protection. The ITDS, while still in the planning stage, will eventually remedy this existing data gap in the CFS.

Vehicle Movement Data

Even if all the gaps in the CFS are filled, certain kinds of data will still not be available. As indicated above, the CFS only tracks movements of freight, whereas for many transportation planners and policymakers, movement of all nonpassenger vehicles is of interest, whether those vehicles carry freight or not.

There are also other important data needs that cannot be met through a freight survey alone. Safety exposure data describe the drivers operating vehicles (e.g., their age, level of experience, number of hours on duty), but more descriptive vehicle data than that provided by the VIUS are needed (e.g., tare weights, axle loadings, safety equipment), as are data on where vehicles are operating.

A number of approaches already exist for surveying vehicles. The United Kingdom uses a mail-out vehicle survey in which truck operators fill in weekly diaries on the operations of a particular vehicle for a week's period. These diaries report, for each trip during the week, information on the origin and destination of the trip, the number of miles operated full and empty, the weight of the shipment, and the type of goods carried (with a special code to note hazardous materials). While these diaries do not provide data on transit times or the vehicle's driver, this approach could be used to gather this information.

Canada uses a roadside intercept survey, in which data collectors stop trucks at 238 roadside points and ask the driver questions about origin, destination, routing, and transit time of the trip (including information on stops), the weight and commodity classification of the cargo, the nature of the truck, and information about the driver and the carrier. Data are collected on handheld computers.

The California Air Resources Board (CARB), in conjunction with the Federal Highway Administration (FHWA), conducted a one-time study in 1999 using global positioning system (GPS) technology to track vehicles in Southern California. CARB obtained usable data from 140 trucks and tracked them for 4 months. Data were collected on truck routes and stops, travel times and speeds, idling times, and times of starts and stops. This approach gives the most detailed data on the actual route used by the truck, the actual times when the truck was in operation, and the amount of time required to make a trip at particular times of the day, week, and year.

PASSENGER TRAVEL STATISTICS

A much-valued feature of American life is the ability to travel from place to place with relative ease, at a reasonable expense, and relatively quickly, whether it is across town, across country, or to a foreign destination. Americans average 1,500 daily trips annually, covering an average of 14,500 miles per person [19]. Many kinds of data are needed to evaluate this demand for passenger travel and how well the supply meets the demand. For instance, data are needed for the different modes of transportation and at various levels of detail, including geographic scale. Questions that help evaluate the needs of current and future travelers include why people travel, how and when they travel, what their origins and destinations are, how long travel takes, and how much it costs. Travel data, in combination with other types of data, can also be used to assess the costs and benefits of travel, including transportation safety and its environmental effects.

Government and private organizations need passenger travel data. Policymakers, planners, and forecasters use these data to determine infrastructure investment requirements and to measure and design strategies to influence transportation demand, particularly in the face of growing congestion. Data can also be used to identify geographic areas and groups of individuals who may be underserved by public transportation. Passenger travel data, including the number, type, and use of motor vehicles, can provide measures of exposure for safety analyses, energy efficiency, and the environmental impacts of travel. State-by-state estimates of vehicle travel are the foundation of decisions about funding, cost, and fee allocation.

Businesses and other private sector entities (e.g., consumer organizations and public interest groups) also want passenger travel data for a wide variety of reasons, and despite the cost, they frequently collect data for their own purposes. These data are often of use to others and may be available to the public. Privately collected data may be supplemented with government data; however, in many cases, government data are the only source of information available for business planning and other analyses.

Existing Passenger Travel Data and Data Programs

There are three main types of passenger travel data: survey, regulatory/administrative, and operations/industry data. Each type provides different levels of detail in terms of coverage, periodicity, and geography; and each possesses different strengths and weaknesses.

Passenger Transportation Surveys

Since the 1960s, the federal government has periodically conducted nationwide surveys of passenger travel in the United States. The most recent, the 2001 National Household Travel Survey (NHTS), combines two previous surveys: the Nationwide Personal Transportation Survey (NPTS—a survey primarily of daily travel), and the American Travel Survey (ATS—a survey of long-distance travel). BTS and FHWA conduct the NHTS.[2] The 2001 NHTS national sample surveyed 26,000 households nationwide on their daily travel and asked about the number and purpose of their trips, the mode(s) of transportation used, the distance traveled, as well as the social and demographic characteristics of the household. In addition, the survey asked household respondents to report all long-distance trips (trips of 50 miles or more one way) during a four-week period. Additional detail on purpose, mode, duration, overnight stops made to and from the farthest destination, and so on, were collected for each of these trips. In addition to the national sample, another 40,000 households were surveyed from 9 additional jurisdictions: 5 local, mostly urban, areas and 4 states [19].

The NHTS travel data along with the demographic data collected on households and individuals provide one of the few tools to analyze the travel patterns of sociodemographic groups. For instance, a recent study by TRB used data on the travel of children from the 1995 NPTS to assess their safety going to and from school [9].

Several improvements were introduced in the 2001 NHTS, including data collection on the travel of children under the age of five and better data on walking and medium-range trips (from 50 to 100 miles). These changes mean that the most recent survey data cannot always be easily compared with data from prior year surveys. An important supplement to this kind of travel survey is the upcoming time-use survey being developed by the U.S. Department of Labor [13].

Commuting behavior, which affects congestion and the scheduling of work, is captured most fully by the long form of the decennial census. Mode, origin and destination, start time, and travel time can be linked to the full range of social, economic, and demographic characteristics of the population at a very fine geographic scale. Information from the decennial census is relied on for federal policymaking and program development; for metropolitan transportation planning, including air quality analyses under the Clean Air Act; and for transit planning. The U.S. Census Bureau plans to eliminate the long form from the 2010 census and replace it with an annual American Community Survey to provide up-to-date demographic and housing data on a continuing basis. National-level journey-to-work data are also collected every two years in the American Housing Survey, conducted by the U.S. Census Bureau for the Department of Housing and Urban Development.

Some other, more specialized surveys also exist. For instance, the Office of Travel and Tourism Industries in the Department of Commerce surveys between 69,000 and 95,000 passengers per year through a Survey of International Air Travelers (In-Flight) Program, providing information on the origin and destination of foreign visitors coming to the United States by air and the foreign travel of Ameri-

[2] Prior to the 2001 NHTS, the NPTS was conducted in 1969, 1977, 1983, 1990, and 1995, and the ATS (or similar surveys) was conducted in 1963, 1967, 1972, 1977, and 1995.

cans by air [12]. This information is supplemented by arrivals and departures data from the Bureau of Customs and Border Protection. Additional information on the travel of Canadians to the United States and Americans to Canada is provided by Statistics Canada. The Federal Aviation Administration conducts the General Aviation and Air Taxi Activity Survey annually. The VIUS, discussed earlier in the Freight section, collects information on private and commercial trucks, including passenger-oriented light trucks, their use, and a host of other related variables at the state level [11]. Examples of private surveys include the Travel Industry Association of America's survey of tourist travel [10] and the American Bus Association's survey of the intercity bus industry [3].

Regulatory Data and Administrative Records

Regulatory programs that require service providers to report information to the government generate passenger travel data, as do administrative records and other data collections by states and localities. Regulatory program data include information on airlines, intercity bus travel, and transit. Administrative records and other data collected by state and local governments include the Highway Performance Monitoring System (HPMS) and fuel tax revenue data. Since deregulation of the transportation industry, beginning in the late 1970s, availability of regulatory data has declined.

The National Transit Database, the most comprehensive information on transit, contains data collected from major urban transit agencies receiving federal aid and is maintained by the Federal Transit Administration (FTA). Data cover services supplied and consumed, finances, safety, and security.

Airline data, collected by BTS's Office of Airline Information, include flight on-time data, other service quality indicators (mishandled baggage and oversales), enplanements by airport and airline, airplane- and passenger-miles, and financial data. Other airline data include the Passenger Origin and Destination Survey, a sample of 10 percent of all airline tickets used in scheduled service, as discussed later in the Air Transportation Statistics section.

FHWA, through the HPMS, collects data from states on vehicle-miles traveled by vehicle and road type, as well as information on the extent and condition of the road system. This information is available for states and urbanized areas. Among other things, HPMS data are used for federal funding apportionment and for a major annual congestion study by the Texas Transportation Institute [7]. States also report other types of information to FHWA derived from administrative records, such as fuel consumption from state fuel tax revenue records and motor vehicle registrations.

Operations and Industry Data

Public operators of the transportation system, particularly state and local departments of transportation and industry groups, collect a vast amount of data. Industry sources releasing operations data include the American Public Transportation Association (APTA) (transit), Amtrak (intercity train travel), and airline associations. APTA's transit database adds to the National Transit Database by collecting data that their members do not report to the federal government. Amtrak operations data include number of passengers served, miles traveled, and on-time performance.

Real-time monitoring of vehicle travel by roadside sensors can provide data for a number of purposes such as evaluating the impacts of intelligent transportation systems, computer model calibration, congestion monitoring, and transportation planning. For instance, an

FHWA-sponsored project is using roadside sensor data to develop indicators of congestion in 10 urban areas on a monthly basis [6]. The Texas Transportation Institute is working on a similar project [7]. Ensuring confidentiality and privacy of this type of data collection is an area that is and will continue to be important.

Operations data also exist in air travel. FAA's Air Traffic Control System Command Center monitors, in real-time, air traffic over the continental United States and provides real-time airport status information to the public.

The Bureau of Customs and Border Protection captures inbound border crossing information by vehicle type (passenger car, bus, and train) and of pedestrians [17]. The Bureau does not collect comparable data on outbound vehicles. Other sources of information include individual bridge operators, border state governments, and the Mexican and Canadian governments.

Options for Filling Passenger Travel Data Gaps

Data exist for all modes of passenger travel and related factors on a wide range of variables, but significant gaps exist. A data gap can result from deficiencies in data existence, completeness, detail, quality, timeliness, integration, and accessibility.

Timeliness and quality are virtually always issues. Options for making passenger travel surveys more timely are limited, because they tend to be conducted five or more years apart and the data usually take more than a year to publish after collection. Continuous measurement may help solve the problem of timeliness, although it has its own set of challenges [15]. Operational and administrative data also takes time to produce, compile, and publish. For instance, it takes about a year to assemble and publish a national set of annual data for the National Transit Database.

Variability in definitions, populations surveyed, reference periods and timeframes, sampling question formats, and so on also affect comparability of data collected. Sometimes a good deal of data exist on a topic from various sources, but the collection method has not been standardized so that integrating the data in a statistically valid way is difficult or impossible. Much data collected and analyzed pertains to only one mode of transportation. Only a few data sources, such as the NHTS, identify the ways in which different modes are used in combination to make a single trip. Consequently, there is little information on subjects such as wait times between different trip segments.

Data integration is also a problem for state and local users who need system data, such as infrastructure extent and condition, integrated with data on system use and surrounding characteristics such as land use. Indeed, data to assess the link between transportation and land use is typically a top concern for analysts at the local level.

Several types of important passenger travel data are not available in usable form, because, among other things, they are not publicly available or cannot be aggregated. Data gaps exist for travel cost and time. Some cost information is available for commercial modes and from the Bureau of Labor Statistics's (BLS's) Consumer Expenditure Survey, but these sources generally do not provide information on the prices consumers paid nor do they relate costs to specific trips or types of trips [16]. Using the BTS Passenger Origin and Destination Survey data, BTS is working with BLS to develop an airline price index. Travel time or on-time performance is available for air carriers and Amtrak, and the decennial census collects data on time spent commuting. In addition, the BTS/FHWA NHTS includes travel times for all trips. However, NHTS data provide national averages, making it difficult to assess highway congestion or transit reliability trends in specific areas.

Publicly available information on intercity bus and rail are limited even on a national level, not to mention corridor-specific data or use of these modes by population subgroups. Furthermore, data on these long-distance modes in the 2001 NHTS are more limited than the data that were collected in the 1995 ATS. And, despite work by FTA and the Community Transportation Association of America, rural transit data are also quite poor [20].

Publicly available information on passenger travel using commercial water transportation, such as cruise vessels, are limited although a recent congressionally mandated ferry survey by FHWA provides important information for that segment of the industry. Historically, data on the use of recreational boats (e.g., motorboats, jet skis, and sailboats) have not been collected, limiting safety analysis. However, a new National Boating Survey conducted by the U.S. Coast Guard may begin to correct this deficiency. Exposure measures for general aviation aircraft are also limited.

The U.S. Census Bureau initiated the Longitudinal Employer-Household Dynamics (LEHD) pilot program to demonstrate the potential for linking existing economic and demographic administrative and survey data. BTS is participating in this pilot to conduct research on developing detailed origin and destination tables based on residence and employment information of U.S. workers. This research effort will combine information about workers (place of residence, employment, and income) and employers (location, type of business, number of employees, and payroll). Once available, these data will illustrate the travel flow of workers to places of employment and will be made available to the transportation community, subject to confidentiality requirements. It is anticipated that the LEHD data will provide greater geographic specificity than has been available in the past and will lead to the ability to derive enhanced travel demand patterns for use by transportation researchers, planners, and engineers.

In many instances, few or no data exist on populations with special transportation needs; for example, people with disabilities and special segments of the elderly population such as the housebound, those living in special care facilities, and those living in rural areas. BTS sponsored questions about the travel of people with disabilities in the 1995 National Health Interview Survey on Disability conducted by the National Center for Health Statistics, but the survey provided very limited information. In 2002, BTS conducted its own small-scale[3] national survey about how persons with disabilities use transportation, the barriers they face, and their overall satisfaction with the transportation system [18]. A preliminary findings report will be available in late 2003.

Detail and completeness are problems with most travel datasets in even the major travel surveys. Despite its utility, the NHTS does not include origin and destination information for local trips. Data for state and local analyses are limited to the few "add-on" areas where states or locations have supported collection of additional data. The decennial census, conducted every 10 years, is limited to commuting, trips that account for only a small percentage of all trips made. To improve pedestrian data, BTS includes related questions in its bimonthly

[3] The completed survey sample consisted of 2,698 nondisabled respondents and 2,321 disabled respondents.

Omnibus Survey. In addition, BTS and the National Highway Traffic Safety Administration conducted a small national survey in 2002 on bicycling and walking to ascertain the scope and magnitude of these activities and the public's behavior and attitudes regarding them [21].

More comprehensive solutions to passenger data issues may be appropriate. In late 2001, BTS asked TRB and the Committee on National Statistics to convene a panel of experts to review the key BTS survey programs. The Expert Panel to Review BTS Survey Programs recommended the following options in their June 2002 letter report:[4]

- An enhanced NHTS. This could involve: 1) improving the sample size and representativeness, 2) increasing the overall precision of resulting estimates, 3) providing more timely data to users by changing the frequency of the data collection, 4) adding more statistical rigor in data processing and final products, and 5) expanding the use of existing and emerging technologies.
- A new, targeted data-collection program. The program would develop and implement ways to address known data gaps but be flexible enough to handle new gaps that arise.

AIR TRANSPORTATION STATISTICS

Airline traffic and financial statistics were first collected by the federal government in the 1930s for use in monitoring and promoting the fledgling air transport industry. Today, the U.S. Department of Transportation (DOT) collects traffic, operational, and financial statistics from more than 240 domestic and foreign airlines serving the United States.

Prior to deregulation of commercial airlines in 1978, traffic and financial statistics supported the federal government's responsibility to ensure universal air service through regulation of routes, airfares, and freight and mail rates. After deregulation, the federal government's responsibilities were reduced, although key data series in such areas as safety, financial, and operating statistics were retained. Air carriers have also increased their use of traffic and financial information as they monitor and adjust their competitive position and determine new route opportunities.

While scheduled service enplanements grew by 47 percent from 452 million to 665 million from 1991 to 2000, by 2001 these enplanements decreased to 622 million [14]. The decrease was due primarily to the economic downturn and to the September 11, 2001, terrorist attacks on the United States, after which the aviation system was shut down entirely for one day and then partially for several days, costing the airline industry an estimated $330 million per day [1]. Since that time, the airline industry has faced a fundamental shift in travel patterns and increased security and safety measures. Higher operational costs and narrow profit margins create economic challenges for the airlines. Financial, operational, air traffic, pricing, and safety airline statistics aid in addressing these and other issues and provide policymakers and industry stakeholders with information to understand airline travel trends.

Air transport data supports policy initiatives and international air service negotiations, monitoring of air carrier fitness, allocating airport improvement funds, ensuring the provision of essential air services, setting international and intra-Alaska mail rates, and safety and security

[4] A comprehensive final report by the Expert Panel is expected in late fall 2003. As of August 2003, three letter reports had been issued by the Committee, covering the NHTS, Omnibus, and CFS.

analyses. For instance, the Department of Labor uses aviation data in their computation of productivity and consumer price indices. The Department of Justice uses data to monitor the collection of customs service fees and for anti-trust cases.

Examples of other uses of air transport statistics include airport planning, traffic forecasting, and development of tourism initiatives by state and local governments; travel planning by the general public; planning and marketing by the travel and tourism industry; and forecasting and analysis by airlines.

Existing Air Transport Data and Data Programs

The four categories of airline statistics—financial, operational and traffic, pricing and fees, and safety—provide different levels of detail in terms of coverage, periodicity, and focus. The federal government collects the majority of publicly available aggregated airline statistics directly from air carriers. The Air Transport Association (ATA) reports member data on a quarterly and monthly basis on airfares, a cost index, and passenger and cargo traffic.[5] The International Civil Aviation Organization (ICAO) collects international air data covering 188 countries.

Financial Data

BTS, through its Office of Airline Information (OAI), collects air carrier financial data, including income data and limited carrier operating expense data. Fuel constitutes the industry's second-largest operating expense. Air carriers report to OAI monthly on the gallons and costs of fuel consumed, which allows OAI to calculate and publish the average price per gallon. BTS also collects, on a monthly basis, the weighted average number of full time employees per labor category and the maintenance costs for flight equipment for carriers by aircraft type.

ICAO reports annual data on the fleets and personnel of both international and domestic scheduled and nonscheduled carriers. The statistics cover the number and types of aircraft operated, their capacity and utilization, and the numbers of airline personnel by job category and the annual expenditures for these personnel. ICAO also collects financial data from international scheduled airlines on annual revenues and expenditures, year-end assets and liabilities, retained earnings, and summary traffic data. [5]

Operational and Traffic Data

Operational and traffic airline statistics cover information such as aircraft departures performed, delays, fleets, aircraft revenue-miles, and passenger and cargo revenue-hours. Additional data cover information, such as revenue passenger-miles, available seat-miles, revenue ton-miles (for passengers, freight, and mail), segment and market traffic and capacity by airport-pair, and enplanements by airport.

Particular OAI data collections include flight on-time data, other service quality indicators (mishandled baggage and oversales), enplanements by airport and airline, airplane- and passenger-miles, and financial data. Monthly data submitted to OAI include arrivals, departures, and aircraft revenue-miles and hours. Twelve of the largest U.S. air carriers report to OAI on scheduled and actual arrival/departure times and cancellations by flight number and day of month. Finally, information on aircraft operating expenses by aircraft type and changes in aircraft fleet inventory are also reported to OAI.

[5] ATA members are common carriers in air transportation of passengers and/or cargo that operate a minimum of 20 million revenue ton-miles annually and have done so for 1 year preceding the date of application, and operate under a valid certificate issued by the Federal Aviation Administration [2].

The Federal Aviation Administration (FAA) collects data in a variety of areas of aviation including the Operations Network database, which captures flight operations and delays; the Air Traffic Control System Command Center, which monitors air traffic in real-time over the continental United States as well as providing airport status information to the public; and the Enhanced Traffic Management System (ETMS), which contains detailed information on flights for which a flight plan has been filed. FAA uses the ETMS to strategically manage traffic flow in the National Airspace System, balancing demand and capacity to avoid congestion that eventually translates to delays.

Every year, FAA conducts the General Aviation and Air Taxi Activity Survey, which provides estimates of the number of active aircraft, hours flown, primary use, and many other characteristics by aircraft type. Additional sources of information are ATA reports on passenger and cargo traffic, as well as ICAO collections of monthly traffic data for major international airports that include international aircraft movements, number of passengers embarked and disembarked, and tons of freight and mail loaded and unloaded.

Pricing and Fees Data

OAI's Passenger Origin and Destination (O&D) Survey samples 10 percent of all airline tickets used in scheduled service and reports on the full ticket itinerary, operating and ticketing carrier on each coupon, fare basis codes, and total dollar value of the ticket. BLS publishes both a Consumer Price Index (CPI) and a Producer Price Index (PPI) for airfares. The CPI measures changes in the prices paid by consumers for domestic and international airline trips, including taxes and any distribution costs not received by the carriers (e.g., travel agents' fees). The PPI measures changes in revenues received by producers of domestic airline trips only. Monthly prices for the two programs are gathered from different data sources: CPI prices come from the SABRE system,[6] while PPI prices are gathered directly from airline pricing departments. Additional sources of this category of information are available from ATA, which reports on member passenger prices.

Safety

The National Transportation Safety Board (NTSB) investigates the causes of accidents and uses the information gathered to make safety recommendations to the transportation industry.

The National Airspace Incident Monitoring System is a repository that includes the FAA Accident/Incident Data System, the Near Mid-Air Collision System, the Pilot Deviation System, and other aviation safety-related databases. The Accident/Incident Data System contains NTSB's recommendations to FAA and FAA's responses.

The Aviation Safety Reporting System (ASRS) is a voluntary, confidential, and anonymous incident reporting system that collects information used to identify hazards and safety discrepancies in the National Airspace System. Data from the ASRS are also used to formulate policy and to strengthen the foundation of aviation human factors safety research.

Options for Filling Air Transportation Data Gaps

The discussion above illustrates the variety of air transport data currently available. However, many gaps exist. One important gap is the multimodal nature of passenger and freight air travel, that is, movement to and from airports. Passengers arrive at airports in cars (their own or taxis), by transit, by shuttle and intercity buses, and, to some extent, by rail. Nearly all

[6] A commercial system that provides users with airline schedules, availability, pricing, and other information, as well as reservations and ticketing capability.

air freight arrives by truck, but the extent of prior movement is not known. Some of these data may be captured but in data systems with different formats, definitions, and data elements, increasing the challenge to integrate the data into single trips.

One major challenge in the collection of airline statistics is air carrier concern about revealing proprietary information that could put them at a competitive disadvantage. A second challenge is that the immense volume of data that could be collected by carriers is expensive to house and analyze.

In collaboration with BLS, BTS is investigating a new method of computing price indices for air travel. The research aims to produce an airfare index series based on actual transaction prices, because the current BLS price indices for air travel do not capture the effects of special discounts (e.g., Internet specials or frequent flyer awards) on price trends. The BTS series will also provide more geographic detail; for example, estimate indices for particular cities of itinerary origin to facilitate local area economic analysis. However, greater detail is needed for the O&D data to be able to distinguish different products or services and their associated prices.

Options for improving air transportation data include:

- Traffic data on air taxis (on-demand air carriers) and corporate jets, when combined with information from NTSB, could be used to conduct exposure/risk analyses. The information would also be useful in assessing the degree to which these forms of air transportation substitute for traditional carriers.
- On-time statistics for smaller carriers and international flights could be used to calculate delays and travel time for an important segment of the U.S. aviation industry and would benefit consumers of these services.
- Flight-specific data would allow more accurate estimates of the performance of the airline industry, including the cost to passengers of flying, the time required to travel, the reliability of travel times, and the number of passengers affected by airline delays. Currently, however, BTS is unable to collect these data because of a legislative prohibition on collecting passenger data by flight number.

TRANSPORTATION ECONOMIC DATA

Transportation economics refers to industry performance on key economic measures such as prices, quantities, productivity, and externalities. It looks at not only how the industry performs directly in meeting the needs of its customers, but also how it affects the economy as a whole, based on, for example, measures of employment, output, and international competitiveness.

Existing Economic Data

Prices

Many customers focus on the price they pay for transportation as the key indicator of how well the transportation system is meeting their needs. The costs of passenger transportation rise and fall in line with prices in the overall economy but are particularly affected by energy prices and the productivity of individual modes. Good data exist on the component costs of automobile transportation, which represents the bulk of passenger movement. Reasonably good data are available on the price of passenger rail transportation and transit.

On the freight side, there are some data available on all modes of transportation, but these data often do not show the actual prices paid on

> BOX 2
> **Transportation Services Output Indices**
>
> Experimental indices of overall transportation output under development by the Bureau of Transportation Statistics show that some types of transportation tend to rise and fall in advance of corresponding changes in the overall economy. These transportation services output indices, which measure passenger, freight, and total output of services for-hire, are being studied in context with the growth cycles of the U.S. economy. The turning points of the freight measure, in particular, seem to lead the economic turning points by several months, potentially providing a useful forecasting tool.

particular routes or for particular commodities. Without this information it is difficult to determine which customers benefit from lower prices, even when average prices go down. Price data are also often not adjusted for changes in quality, such as delivery time and reliability.

Quantities

Quantities are the physical amount of transportation produced and thus measure the level of mobility that the transportation system enables. Quantities (e.g., passenger-miles or ton-miles) are essential to understanding the impacts of transportation on the economy and to making investment and other economic policy decisions.

Reasonably good data on physical movement, except for trucking, are publicly available, but details on specific routes, particular times, and vehicle types are not. Data on highway transportation of freight and passengers, which account for a substantial portion of all movement, have gaps in completeness, accuracy, and timeliness. Better data are needed for truck ton-miles and highway passenger-miles, as well as those for transit, intercity bus, and Amtrak (discussed earlier under Freight Data and Passenger Travel Statistics).

Investment

Transportation investment includes public and private infrastructure and vehicles and affects both the capacity and condition of the transportation system. Capital stock is the accumulated stock of these investments over a period of years, reflecting new investments and depreciation of existing investments. Information on capital stock is essential for measuring the productivity of the transportation system and its effect on economic growth.

Reasonably good data are available on most components of private capital stock: railroads, privately owned automobiles, trucking, airlines, waterway operators, pipelines, privately owned local transit, transportation services (e.g., travel agents and freight brokers), and the transportation-related capital stock of in-house transportation companies, as well as public highways and streets. All of these forms of transportation capital stock have increased with the growth of the economy over the last 50 years, with the exception of railroad capital stock, which declined (in inflation-adjusted terms), and privately owned local transit, which declined (in inflation-adjusted terms) until recently.

Productivity

Productivity measures how effectively economic inputs are converted into output. Labor productivity measures the output per hour of labor. Multifactor productivity, which is a more comprehensive measure, relates changes in output to changes in all inputs, including capital, labor, energy, materials, and services. If the transportation system becomes more productive, then fewer resources are needed and prices can decline.

Labor productivity data are widely available for a large number of industries. Multifactor productivity data are not as widely available for the economy as a whole and are only available for the railroad industry in the transportation sector. Railroad multifactor productivity increased more rapidly than that of either manufacturing or business over the last decade.

Externalities and Regulation

Transportation often generates negative effects such as pollution, collisions, congestion, and noise, which are known as externalities and are the driving force behind regulation and many other public policies affecting transportation. Measures of the costs of external effects of transportation (e.g., on safety, congestion, and the environment) are important in determining whether various kinds of regulation of transportation are appropriate.

The physical quantity data described earlier can be used to determine the amount of total pollution and noise emissions, but not necessarily the exact locations of these emissions or their costs. The physical quantity data also can be used to analyze the growth of congestion, although questions remain about the impacts on travel patterns of urban growth, system and demand management policies, and changes in technology. In addition, congestion tends to be very site- and time-specific, so estimates or policy decisions may need to be based on specific local data.

Historically, transportation has also been subject to economic regulation. Reduced economic regulation over the last 20 years has led to increased competition and lower prices for consumers. However, some carriers have found it difficult to stay in business in the face of increased competition. There is also considerable debate about whether transportation mergers have reversed some of the benefits of deregulation. Data on prices, quantities, investment, and productivity are crucial to understanding these trends.

Impact on the Economy

The transportation system links producers and consumers to markets. Public and private investment and other improvements to the transportation system increase capacity, reduce cost, and improve service. Improvements in freight transportation allow economies of scale in production, diversity in products available to consumers and sources available to producers, and increased competition in markets. All of these factors lower the cost of goods Americans buy and broaden the markets for the goods produced.

Similarly, passenger transportation affects several areas of the economy. Improved local commuter transportation supports broader labor markets, increasing the choice of jobs and economic efficiency. Better intercity transportation allows greater opportunity for personal travel and makes possible better management of geographically decentralized business organizations. Transportation also represents a major source of demand for many industries, both for suppliers to the transportation industry and producers of complementary services, such as the hotel and restaurant industries. Transportation thus creates efficiencies throughout the general economy, increasing incomes, providing higher paying jobs, and enhancing the international competitiveness of the economy.

Considerable debate continues, however, about appropriate means of measuring these effects. While data are available on several aspects of the overall efficiency of the transportation system (e.g., the productivity and physical flow data mentioned earlier), data are lacking on other important aspects, such as the efficiency of specific port and intermodal yard facilities and their related surface transportation links.

BTS's Transportation Satellite Accounts (TSAs) provide a broad measure of the value of transportation services to the economy, including both for-hire transportation and a large portion of in-house transportation, such as trucks owned by manufacturing companies. BTS continues to develop the TSAs as a way of measuring the more direct impacts of transportation on the economy.

Options for Filling Transportation Economic Data Gaps

Research is underway at BTS to fill some of the known gaps in economic data. One project will improve the quality of data on airline transportation prices with the development of an Airfare Index, covering both domestic and international travel. This research could eventually be extended to other modes.

Other key projects include the following:

- expansion of Transportation Satellite Accounts data to include additional modes, such as private barge, rail, and air, and updating of the household production of transportation services (e.g., local errands in a private automobile and people commuting to work) component;
- augmentation of available privately owned capital stock data by developing data on publicly owned capital stock, such as airports, waterways, and transit systems; and
- development of multifactor productivity measures for modes other than railroads to better measure transportation industry productivity in relation to the rest of the industry sector of the economy.

GEOSPATIAL DATA

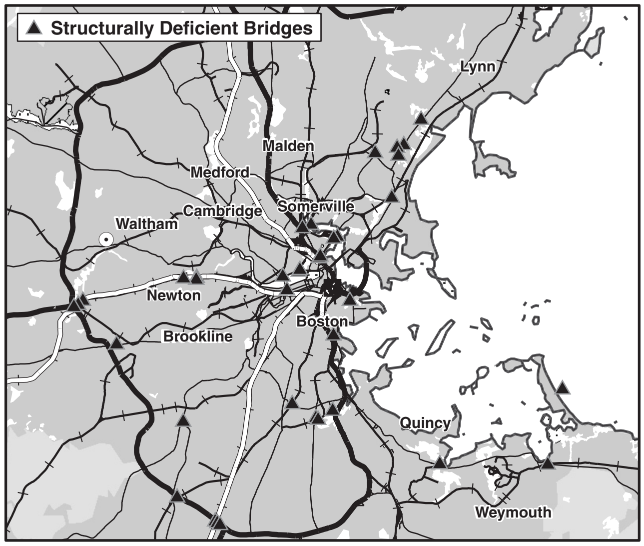
Geospatial information technologies have become increasingly useful decisionmaking tools for the transportation industry and agencies responsible for transportation planning. Previously used only by expert operators on specialized mainframe systems, they are now available for desktop systems and distributed computing services that give nontechnical users access to spatial analytical tools. One example of this technology, geographic information systems (GIS), provides desktop computer applications, Internet mapping services, and other information technology systems designed to store, display, and analyze geographically referenced information (geospatial data). This technology enables the presentation of masses of data in more useable forms (see map).

Geospatial data describe both manmade and natural features on the earth's surface, such as roads, rivers, and political boundaries. These features reference the geographic coordinates or location on the earth and also include associated characteristics that describe the features. These characteristics may define the type of road, river depth, or political boundaries. These data for use in a GIS are collected through a number of methods including the use of Global Positioning System (GPS) satellites and receivers to collect accurate geographic locations, remote sensing technology to capture earth images, and conversion of tabular data or paper maps through digitization.

As the use of geographic information technologies spreads, the range of applications expands. Today, GIS is used to track urban crime patterns, coordinate emergency response efforts, visualize data critical to national security, and support city zoning decisions. From urban planning support systems to on-board global positioning systems (GPS) and mapping technologies for public transport vehicles and automobiles, GIS tools provide a means for displaying and analyzing transportation data in real-world physical contexts. Public transportation agencies use these tools to plan system

Map Showing Part of the Supporting Data

National Bridge Inventory



BTS is geocoding FHWA's bridge condition data to help decision-makers prioritize bridge investments.

ID	Item1	Item6a				latdd
56	251	HWY RIVER RD			222220	42.08092777780
61	251	ST 57 W TRAFFIC C			00000	0.00000000000
62	251	ST 57 E TRAFFIC CI			00000	0.00000000000
63	251	HWY ACCESS RD			00000	0.00000000000
66	251	ST159 MAIN ST			888890	42.07557777780
69	251	ST159 MAIN ST			777780	42.07580277780
93	251	WATER MERRIMAC			388890	42.83580833330
94	251	HWY EVANS PLAC			000000	42.83773055560
108	251	RR BMRR BURIE			777780	42.84772500000
109	251	RR BMRR BURIE			555560	42.84788611110
193	251	OTHER PED / TUNN			00000	0.00000000000
251	251	WATER LAKE ROHL			00000	0.00000000000
453	251	WATER SWIFT RIVE			055560	42.27375277780
572	251	WATER NEPONSET			611110	42.27083611110
576	251	US 3 NB CHARLES			00000	0.00000000000
584	251	WATER CHARLES R			00000	0.00000000000
586	251	WATER CHARLES R			00000	0.00000000000
595	251	HWY CHELSEA LO			888890	42.38006944440
598	251	OTHER RELIEF			00000	0.00000000000
600	251	US 1 NB TOLL PLA			055560	42.38359444440
608	251	WATER NEPONSET			444440	42.27765833330
613	251	WATER MYSTIC RI			500000	42.38963055560
616	251	WATER DORCHEST			00000	0.00000000000
617	251	WATER RESERVE C			888890	42.34365000000
675	251	HWY BROOKS ST			055560	42.35751111110
676	251	HWY BROOKS ST			888890	42.35766944440
680	251	RR MBTA & BMR			611110	42.38626111110
739	251	RR MBTA & CSX			888890	42.28102500000
752	251	WATER CHARLES R			944440	42.27067222220
761	251	ST 1 A MT VERNON			944440	42.32140000000
784	251	RR PARKING & R			0000	0.00000000000
803	251	I 90 & AMTRAK	I93 ONRP NB @B-WAY	500 FT S OF JCT I93&I90	0.00000000000	0.00000000000
806	251	HWY SUFACE RD	I93 S.ABUT.-BT.60	.2 MI N OF DEW SQ TUN	0.00000000000	0.00000000000
807	251	HWY E BERKLEY B-WAY	I 93 BNT 22-9	.6 MI S OF DEWEY SQ TUN	0.00000000000	0.00000000000
809	251	HWY SURFACE RD	I 93 BENT 60-56	.2 MI N OF DEWEY SQ TUN	0.00000000000	0.00000000000
810	251	COMB I 90 & CSX& AMTRK	I 93 BENT9-N ABUT	.4 MI S OF DEWEY SQ TUN	0.00000000000	0.00000000000
811	251	HWY CITY STREETS	I-93 BT.48-56 N.&S	.4 MI N OF DEWEY SQ TUN	0.00000000000	0.00000000000
812	251	HWY SURFACE RD	I-93 BT.41-48 N&S.	.4 MI N OF DEWEY SQ TUN	0.00000000000	0.00000000000
814	251	HWY CITY STREETS	I 93 BENT 41-31	.5 MI N OF JCT USI	0.00000000000	0.00000000000
820	251	I 93 SB BENT A3-2	I 93 NB BNT A3-2	.1 MI S JCT I93&US1	-71.06126666670	42.36728055560
822	251	WATER CHARLES RIVER	I 93 SB BENT A3-2	JCT I93 & US1	-71.06270833330	42.36932777780
838	251	ST 2 COMM AVE	ST 2A MASS AVE	JUST S CHARLES RIV	-71.08864722220	42.34910833330
841	251	HWY GARDNER ST	HWY SUL SQ OP NB	1 MI N OF N WSHNGTON ST	0.00000000000	0.00000000000
842	251	COMB.SULL.SQ.RR & RTE 99	HWY SUL SQ OVERP	1.6 KM N OF N WSHNGTON ST	0.00000000000	0.00000000000
872	251	I 93 SB BENT 61 TO B5	I 93 NB	.5 MI N OF JCT 193&US1	0.00000000000	0.00000000000
884	251	I 93 SB BENT 28 TO 38	I 93 NB	.6 MI N OF JCT I93&US1	0.00000000000	0.00000000000
886	251	COMB CSX & I-93 SB	I 93 NB B5-B10	.8 MI N OF RAMP I93&US1	0.00000000000	0.00000000000
893	251	I 93SB CMBRG AMTRAK MBTA	I 93 NB B16 - NB4	1.1 MI N OF JCT I93&US1	0.00000000000	0.00000000000
894	251	HWY WATERST & CANA RAMPS	I 93 SB BTSA3TO9	.1 MI N OF JCT I93&US1	0.00000000000	0.00000000000
917	251	HWY CHARLESGATE INT	HWY STOR DR EB	AT CHARLESGATE	0.00000000000	0.00000000000
928	251	I 93	I 90 EB RAMP OFF	OVER FITZGERALD XPWY S76	0.00000000000	0.00000000000
930	251	I 90 EB RAMPS ABP	I 93 NB RAMP OFF	.1MIW.FORT POINT CHNL S78	0.00000000000	0.00000000000
932	251	I 90 EB RAMPS ABP	"I 90 RAMPS C,R"	.1MIW.FORT POINT CHNL S79	0.00000000000	0.00000000000
933	251	I 90 WB RAMP ON	I 93 NB RAMP OF	.1MIW.FORT POINT CHNL S81	0.00000000000	0.00000000000
946	251	ST 3 A N HANCK ST NB RR	ST 3 A MOR BLVD	.2 MI E OF I 93	0.00000000000	0.00000000000
964	251	US 1 NB STORROW DR	US 1 SB STORROW D	.1 N OF BEACON ST	0.00000000000	0.00000000000
968	251	OTHER TUNNEL TO RTE1	HWY BERKELEY ST	AT TUNNEL	0.00000000000	0.00000000000
1059	251	WATER TAUNTON RIVER	ST 18 BEDFORD ST	0.5 M N OF PLYMOUTH ST	-70.96564166670	41.93672500000
1184	251	CAPE COD CANAL	MA ROUTE 3	JUNCTION MA RTES 3 & 6	0.00000000000	0.00000000000
1216	251	US 3 MEMORIAL DRIVE	ST 2 A MASS AVE	N END HARVARD BR	-71.09262222220	42.35721111110
1217	251	HWY BROOKLINE STREET	US 3 MEM DR	.2 MI FROM CITY LINE	0.00000000000	0.00000000000
1219	251	WATER CHARLES RIVER	ST 3 SB MEM DRIVE	JUST S OF LONGFELLOW BR	-71.07917777780	42.36123333330
1220	251	WATER CHARLES RIVER	ST 3 NB MEM DRIVE	JUST S OF LONGFELLOW BR	-71.07855833330	42.36148055560
1221	251	WATER BROAD CANAL	ST 3 LAND BLVD	.1 MI N OF LONGFELLOW BR	0.00000000000	0.00000000000
1232	251	WATER NEPONSET RIVER	I 95 NB & ST128 NB	I 95 AT DEDHAM T.L.	0.00000000000	0.00000000000
1233	251	WATER NEPONSET RIVER	I 95 SB &ST128 SB	I 95 AT DEDHAM T.L.	-71.14457777780	42.20994722220
1599	251	WATER WATERS RIVER	ST128	.4 MI N ST114	-70.93666666670	42.54724166670
1601	251	RR MBTA	ST128	1.3 MI N ST114	-70.93019722220	42.55707777780
1603	251	WATER PORTER RIVER	ST128	1.6 MI N ST114	-70.92658888890	42.56022222220
1649	251	HWY HARRIS ST.	US 1	.08 KM. NO. OF ST135	0.00000000000	0.00000000000
1660	251	"COMB MBTA,AMTRAK & PARK"	I 95 NB & ST128	.51 KM. SE OF US 1	-71.14658888890	42.21138055560
1661	251	"COMB MBTA,AMTRAK & PARK"	I 95 SB & ST128SB	.51 KM. SE OF US 1	-71.14670833330	42.21116388890
1672	251	COMB DFLD R & STLLWTR RD	I 91 NB	OVER DEERFIELD RIVER	0.00000000000	0.00000000000

services and expansion, as well as maintain maps and analyze service areas. Geographic information technology enables freight and passenger carriers to warehouse data on operating resources and model the flow of goods and passengers across the transportation system.

Existing Geospatial Data and Data Programs

BTS creates, maintains, and distributes geospatial data through the National Transportation Atlas Database (NTAD) Program. These data are obtained from multiple sources and include the National Highway Planning Network, a national rail network, public-use airports and runways, and Amtrak stations. In addition, the NTAD includes state, county, congressional district, and metropolitan statistical area boundary files to provide a geographic reference for transportation features.

Geospatial information depicting transportation infrastructure can be stored and managed in a GIS for development and maintenance planning. For instance, the National Bridge Inventory maintained by FHWA contains information on structurally deficient bridges. Information describing the location and bridge conditions can be displayed cartographically and analyzed. Geographically accurate maps can be produced using a variety of data tables or layers placed one on top of the other to show geographic relationships (see map).

BTS in partnership with the DOT Office of Intermodalism and FHWA developed GeoFreight: The Intermodal Freight Display Tool. GeoFreight calculates and measures the intensity of infrastructure use for intermodal facilities (e.g., airports, seaports, and truck-rail interchanges). The information is displayed on regional or national maps. A CD-ROM version of GeoFreight is expected to be issued in late 2003.

New transportation applications for GIS continue to be developed, such as emergency response planning for crisis management. New applications place a premium not only on timely development of geospatial data but also on commonly agreed-on standards for data quality, content, and technology. As GIS becomes a more mainstream information technology tool, issues of open access to geographic data and software interoperability will grow in importance.

Organizations such as the Federal Geographic Data Committee (FGDC) and the Open GIS Consortium work to facilitate the wide availability and implementation of standardized geospatial data and technologies. FGDC is an interagency committee of representatives from the Executive Office of the President and cabinet-level and independent agencies. FGDC, in cooperation with state, local, and tribal governments, the academic community, and the private sector, is developing the National Spatial Data Infrastructure (NSDI). The NSDI is composed of geospatial data themes of national significance; documentation describing the data, standards (metadata), and partnerships; and the National Spatial Data Clearinghouse, which provides access to documented geospatial data and metadata from a variety of publicly available data sources [4].

The Geospatial One-Stop, a federal e-government initiative that extends the goals of the NSDI, facilitates public and private access to geographic data, with particular reference to the framework themes of the NSDI. In keeping with the trend toward development of data standards, Internet GIS applications, and online data warehousing, the Geospatial One-Stop effort will result in the creation of an online portal through which users can freely access geospatial data from the federal government and other sources, as well as gather information on spatial analytical tools and data standards. The Departments of the Interior, Commerce, and Transportation are the federal agencies with lead responsibilities for coordinating the national coverage and stewardship of specific NSDI framework data themes. The Bureau of Transportation Statistics (BTS) is the operating administration within DOT responsible for coordinating the development of the NSDI transportation standards.

Options for Filling Geospatial Data Gaps

Geospatial information technologies and geospatial data have become permanent fixtures in the information technology landscape, and the variety of Internet GIS applications and data available to the public and private sector will continue to develop and expand. Key areas for future geospatial data and standards development critical for transportation analysis include land-use planning, employee-based travel pattern analysis, and fine-grained data on infrastructure and operations critical to transportation safety and security analysis. Specific areas include:

- integration of bridge, tunnel, and transit data into the National Transportation Atlas Database;
- development of a North American Transportation Atlas Database covering the United States, Mexico, and Canada;
- expansion of the current web-based mapping center to enable customers to generate interactive maps and spatial analysis to support their projects and requirements; and
- provision of technical assistance/training workshops on geospatial data to state DOTs and metropolitan planning organizations.

CONCLUSION

A focused yet comprehensive transportation statistics program can be concentrated in five key areas: freight, passenger travel, air transportation, transportation economics, and geospatial information. The preceding review shows that, while a wealth of data exist to inform stakeholders about the state of transportation, much work remains to be done. Data need to be collected or collected differently, relevant linkages among datasets need to be established, and data need to be analyzed and offered in ways useful for stakeholders at all levels of government and the private sector.

Sources

1. Air Transport Association, *Airlines in Crisis: The Perfect Economic Storm*, available at http://www.airlines.org/public/industry/bin Airlines InCrisis.pdf, as of July 2003.
2. ______, data available at http://www.airlines.org/public/home/default1.asp, as of March 2003.
3. American Bus Association, *Motorcoach Census 2000* (Washington, DC: 2000), available at http://www,buses.org/industry/ABA-RL BanksReport.pdf, as of February 2003.
4. Federal Geographic Data Committee, available at http://www.fgdc.gov, as of March 2003.
5. International Civil Aviation Organization, data available at http://www.icao.org, as of March 2003.
6. Jung, S., J. Larkin, A. Toppen, and K. Wunderlich, "Urban Congestion Reporting," draft report prepared by Mitretek for the U.S. Department of Transportation, Federal Highway Administration, January 2003.
7. Texas Transportation Institute, *2002 Urban Mobility Study* (College Station, TX: 2002).
8. Transportation Research Board, "Letter Report to the Bureau of Transportation Statistics," Mar. 20, 2003.
9. ______, *The Relative Risks of School Travel* (Washington, DC: 2002).
10. Travel Industry Association of America, *TravelScope Survey* (Washington, DC: 2003), also available at http://www.tia.org/Travel/, as of February 2003.

11. U.S. Department of Commerce, U.S. Census Bureau, *1997 Economic Census: Vehicle Inventory and Use Survey* (Washington, DC: 1999).
12. U.S. Department of Commerce, Office of Travel and Tourism Industries, *Survey of International Air Travelers*, available at http://tinet.ita.doc.gov/, as of February 2003.
13. U.S. Department of Labor, American Time Use Survey, available at http://www.bls.gov/tus/#docs, as of March 2003.
14. U.S. Department of Transportation, Bureau of Transportation Statistics, *Annual Historical Air Traffic Statistics, 1981–2001*, available at http://www.bts.gov/oai/, as of March 2003.
15. ______, *Implications of Continuous Measurement for the Uses of Census Data in Transportation Planning* (Washington, DC: 1996).
16. ______, *Transportation Statistics Beyond ISTEA: Critical Gaps and Strategic Responses* (Washington, DC: January 1998).
17. ______, Border Crossing Data, available at http://www.bts.gov/itt/cross/, as of February 2003.
18. ______, *National Transportation Availability and Use Survey for Persons with Disabilities, 2002*, information on the survey available at http://www.bts.gov/omnibus/, as of April 2003.
19. U.S. Department of Transportation, Federal Highway Administration and Bureau of Transportation Statistics, *2001 National Household Travel Survey,* Preliminary Data Release Version 1, available at http://nhts.ornl.gov/2001/index.shtml, as of February 2003.
20. U.S. Department of Transportation, Federal Transit Administration and Community Transportation Association of America, *Status of Rural Public Transportation: 2000* (Washington, DC: April 2001).
21. U.S. Department of Transportation, National Highway Traffic Safety Administration and Bureau of Transportation Statistics, *National Survey of Pedestrian & Bicyclist Attitudes and Behaviors, Highlights Report* (Washington, DC: nd).

Appendices

Appendix A: List of Acronyms and Glossary

AADT	average annual daily traffic
ADA	Americans with Disabilities Act
AFV	alternative fuel vehicle
BAC	blood alcohol concentration
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
BTS	Bureau of Transportation Statistics
Btu	British thermal unit
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy
CFR	Code of Federal Regulations
CFS	Commodity Flow Survey
CO	carbon monoxide
CO_2	carbon dioxide
CRAF	Civil Reserve Air Fleet
DGPS	Differential Global Positioning System
DOC	U.S. Department of Commerce
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOL	U.S. Department of Labor
DOT	U.S. Department of Transportation
dwt	deadweight tons
EDS	Explosive Detection Systems
EIA	Energy Information Administration
EJ	environmental justice
EPA	U.S. Environmental Protection Agency
ETC	electronic toll collection
ETMS	Enhanced Traffic Management System
FAA	Federal Aviation Administration
FAF	Freight Analysis Framework
FARs	Federal Aviation Regulations
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration

FY	fiscal year
GA	general aviation
GAO	General Accounting Office
GDD	Gross Domestic Demand
GDP	Gross Domestic Product
GHG	greenhouse gas
GIS	geographic information systems
GPRA	Government Performance and Results Act
GPS	Global Positioning System
HAPs	hazardous air pollutants
HELP	Heavy Vehicle Electronic License Plate
HMIS	Hazardous Materials Information System
HPMS	Highway Performance Monitoring System
HSR	high-speed rail
HTF	Highway Trust Fund
IBET	Intermodal Bottleneck Evaluation Tool
INS	Immigration and Naturalization Service
IPCC	Intergovernmental Panel on Climate Change
ISTEA	Intermodal Surface Transportation Efficiency Act
IT	information technology
ITS	intelligent transportation system
LNG	liquefied natural gas
LPG	liquefied petroleum gas
LTV	light trucks and vans
MARAD	Maritime Administration
MMLD	Merchant Mariner Licensing Documentation
mmtc	million metric tons of carbon
mpg	miles per gallon
mph	miles per hour
MPO	metropolitan planning organization
MSATs	mobile source air toxics
MSP	Maritime Security Programs
MSW	municipal solid waste
MTBE	methyl-tertiary-butyl-ether
NAFTA	North American Free Trade Agreement
NAS	National Airspace System plan
NASS GES	National Automotive Sampling System General Estimates System
NDRF	National Defense Reserve Fleet
NHTS	National Household Travel Survey
NHTSA	National Highway Traffic Safety Administration
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NPIAS	National Plan of Integrated Airport Systems
NPL	National Priorities List
NPTS	Nationwide Personal Transportation Survey
NTL	National Transportation Library

NTSB	National Transportation Safety Board
OMB	Office of Management and Budget
OPEC	Organization of Petroleum Exporting Countries
OPS	Office of Pipeline Safety
OSRA	Ocean Shipping Reform Act
PFD	personal flotation device
PM-2.5	particulate matter of 2.5 microns in diameter or smaller
PM-10	particulate matter of 10 microns in diameter or smaller
pmt	passenger-miles of travel
PSC	Port State Control
PSR	Present Serviceability Rating
PTC	positive train control
PUV	personal-use vehicle
quads	quadrillion
RFG	reformulated gasoline
ROR	run-off-the-road
RRF	Ready Reserve Fleet
RSPA	Research and Special Programs Administration
SCTG	Standard Classification of Transported Goods
SO_2	sulfur dioxide
STRAHNET	Strategic Highway Network
SUV	sport utility vehicle
TEA-21	Transportation Equity Act for the 21st Century
TEU	20-foot equivalent container unit
TICSA	Transportation Infrastructure Capital Stock Account
TTI	Texas Transportation Institute
UNFCC	United Nations Framework Convention on Climate Change
USCG	U.S. Coast Guard
USGS	U.S. Geological Survey
UST	underground storage tank
vmt	vehicle-miles of travel
VOC	volatile organic compounds

Glossary

14 CFR 121 (air): *Code of Federal Regulations,* Title 14, part 121. Prescribes rules governing the operation of domestic, flag, and supplemental air carriers and commercial operators of large aircraft.

14 CFR 135 (air): *Code of Federal Regulations,* Title 14, part 135. Prescribes rules governing the operations of commuter air carriers (scheduled) and on-demand air taxi (unscheduled).

ACCIDENT (aircraft): As defined by the National Transportation Safety Board, an occurrence incidental to flight in which, as a result of the operation of an aircraft, any person (occupant or nonoccupant) receives fatal or serious injury or any aircraft receives substantial damage.

ACCIDENT (automobile): See Crash (highway).

ACCIDENT (gas): 1) An event that involves the release of gas from a pipeline or of liquefied natural gas (LNG) or other gas from an LNG facility resulting in personal injury necessitating in-patient hospitalization or a death; or estimated property damage of $50,000 or more to the operator or others, or both, including the value of the gas that escaped during the accident; 2) an event that results in an emergency shutdown of an LNG facility; or 3) an event that is significant in the judgment of the operator even though it did not meet the criteria of (1) or (2).

ACCIDENT (hazardous liquid or gas): Release of hazardous liquid or carbon dioxide while being transported, resulting in any of the following: 1) an explosion or fire not intentionally set by the operator; 2) loss of 50 or more barrels of hazardous liquid or carbon dioxide; 3) release to the atmosphere of more than 5 barrels a day of highly volatile liquids; 4) death of any person; 5) bodily harm resulting in one or more of the following—a) the loss of consciousness, b) the necessity of carrying a person from the scene, c) the necessity for medical treatment, d) disability that prevents the discharge of normal duties, and 6) estimated damage to the property of the operators and/or others exceeding $50,000.

ACCIDENT (highway-rail grade-crossing): An impact between on-track railroad equipment and an automobile, bus, truck, motorcycle, bicycle, farm vehicle, or pedestrian or other highway user at a designated crossing site. Sidewalks, pathways, shoulders, and ditches associated with the crossing are considered to be part of the crossing site.

ACCIDENT (rail): A collision, derailment, fire, explosion, act of God, or other event involving operation of railroad on-track equipment (standing or moving) that results in railroad damage exceeding an established dollar threshold.

ACCIDENT (recreational boating): An occurrence involving a vessel or its equipment that results in 1) a death; 2) an injury that requires medical treatment beyond first aid; 3) damage to a vessel and other property, totaling more than $500 or resulting in the complete loss of a vessel; or 4) the disappearance of the vessel under circumstances that indicate death or injury. Federal regulations (33 CFR 173–4) require the operator of any vessel that is numbered or used for recreational purposes to submit an accident report.

ACCIDENT (transit): An incident involving a moving vehicle, including another vehicle, an object, or person (except suicides), or a derailment/left roadway.

AIR CARRIER: The commercial system of air transportation comprising large certificated air carriers, small certificated air carriers, commuter air carriers, on-demand air taxis, supplemental air carriers, and air travel clubs.

AIR TAXI: An aircraft operator who conducts operations for hire or compensation in accordance with 14 CFR 135 (for safety purposes) or FAR Part 135 (for economic regulations or reporting purposes) in an aircraft with 30 or fewer passenger seats and a payload capacity of 7,500 pounds or less. An air taxi operates on an on-demand basis and does not meet the flight schedule qualifications of a commuter air carrier (see below).

AIRPORT: A landing area regularly used by aircraft for receiving or discharging passengers or cargo.

ALTERNATIVE FUELS: The Energy Policy Act of 1992 defines alternative fuels as methanol, denatured ethanol, and other alcohol; mixtures containing 85 percent or more (but not less than 70 percent as determined by the Secretary of Energy by rule to provide for requirements relating to cold start, safety, or vehicle functions) by volume of methanol, denatured ethanol, and other alcohols with gasoline or other fuels. Includes compressed natural gas, liquid petroleum gas, hydrogen, coal-derived liquid fuels, fuels other than alcohols derived from biological materials, electricity, or any other fuel the Secretary of Energy determines by rule is substantially not petroleum and would yield substantial energy security and environmental benefits.

AMTRAK: Operated by the National Railroad Passenger Corporation, this rail system was created by the Rail Passenger Service Act of 1970 (Public Law 91-518, 84 Stat. 1327) and given the responsibility for the operation of intercity, as distinct from suburban, passenger trains between points designated by the Secretary of Transportation.

ARTERIAL HIGHWAY: A major highway used primarily for through traffic.

ASPHALT: A dark brown to black cement-like material containing bitumen as the predominant constituent. The definition includes crude asphalt and finished products such as cements, fluxes, the asphalt content of emulsions, and petroleum distillates blended with asphalt to make cutback asphalt. Asphalt is obtained by petroleum processing.

AVAILABLE SEAT-MILES (air carrier): The aircraft-miles flown in each interairport hop multiplied by the number of seats available on that hop for revenue passenger service.

AVERAGE HAUL: The average distance, in miles, one ton is carried. It is computed by dividing ton-miles by tons of freight originated.

AVERAGE PASSENGER TRIP LENGTH (bus/rail): Calculated by dividing revenue passenger-miles by the number of revenue passengers.

AVIATION GASOLINE (general aviation): All special grades of gasoline used in aviation reciprocating engines, as specified by American Society of Testing Materials Specification D910 and Military Specification MIL-G5572. Includes refinery products within the gasoline range marketed as or blended to constitute aviation gasoline.

BARREL (oil): A unit of volume equal to 42 U.S. gallons.

BLOOD ALCOHOL CONCENTRATION (highway): A measurement of the percentage of alcohol in the blood by grams per deciliter.

BRITISH THERMAL UNIT (Btu): The quantity of heat needed to raise the temperature of 1 pound (approximately 1 pint) of water by 1 °F at or near 39.2 °F.

BULK CARRIER (water): A ship with specialized holds for carrying dry or liquid commodities, such as oil, grain, ore, and coal, in unpackaged bulk form. Bulk carriers may be designed to carry a single bulk product (crude oil tanker) or accommodate several bulk product types (ore/bulk/oil carrier) on the same voyage or on a subsequent voyage after holds are cleaned.

BUS: Large motor vehicle used to carry more than 10 passengers, including school buses, intercity buses, and transit buses.

CAFE STANDARDS: See Corporate Average Fuel Economy Standards.

CAR-MILE (rail): The movement of a railroad car a distance of one mile. An empty or loaded car-mile refers to a mile run by a freight car with or without a load. In the case of intermodal movements, the designation of empty or loaded refers to whether the trailers or containers are moved with or without a waybill.

CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY (air carrier): A certificate issued by the U.S. Department of Transportation to an air carrier under Section 401 of the Federal Aviation Act authorizing the carrier to engage in air transportation.

CERTIFICATED AIR CARRIER: An air carrier holding a Certificate of Public Convenience and Necessity issued by the U.S. Department of Transportation to conduct scheduled services interstate. These carriers may also conduct nonscheduled or charter operations. Certificated air carriers operate large aircraft (30 seats or more or a maximum load of 7,500 pounds or more) in accordance with FAR Part 121. See also Large Certificated Air Carrier.

CERTIFICATED AIRPORTS: Airports that service air carrier operations with aircraft seating more than 30 passengers.

CHAINED DOLLARS: A measure used to express real prices, defined as prices that are adjusted to remove the effect of changes in the purchasing power of the dollar. Real prices usually reflect buying power relative to a reference year. The "chained-dollar" measure is based on the average weights of goods and services in successive pairs of years. It is "chained" because the second year in each pair, with its weights, becomes the first year of the next pair. Prior to 1996, real prices were expressed in constant dollars, a weighted measure of goods and services in a single year. See also Constant Dollars and Current Dollars.

CLASS I RAILROAD: A carrier that has an annual operating revenue of $250 million or more after applying the railroad revenue deflator formula, which is based on the Railroad Freight Price Index developed by the U.S. Department of Labor, Bureau of Labor Statistics. The formula is the current year's revenues multiplied by the 1991 average index or current year's average index.

COASTWISE TRAFFIC (water): Domestic traffic receiving a carriage over the ocean or the Gulf of Mexico (e.g., between New Orleans and Baltimore, New York and Puerto Rico, San Francisco and Hawaii, Alaska and Hawaii). Traffic between Great Lakes ports and seacoast ports, when having a carriage over the ocean, is also considered coastwise.

COLLECTOR (highway): In rural areas, routes that serve intracounty rather than statewide travel. In urban areas, streets that provide direct access to neighborhoods and arterials.

COMBINATION TRUCK: A power unit (truck tractor) and one or more trailing units (a semitrailer or trailer).

COMMERCIAL BUS: Any bus used to carry passengers at rates specified in tariffs; charges may be computed per passenger (as in regular route service) or per vehicle (as in charter service).

COMMERCIAL SERVICE AIRPORT: Airport receiving scheduled passenger service and having 2,500 or more enplaned passengers per year.

COMMUTER AIR CARRIER: Different definitions are used for safety purposes and for economic regulations and reporting. For safety analysis, commuter carriers are defined as air carriers operating under 14 CFR 135 that carry passengers for hire or compensation on at least five round trips per week on at least one route between two or more points according to published flight schedules, which specify the times, days of the week, and points of service. On March 20, 1997, the size of the aircraft subject to 14 CFR 135 was reduced from 30 to fewer than 10 passenger seats. (Larger aircraft are subject to the more stringent regulations of 14 CFR 121.) Helicopters carrying passengers or cargo for hire, however, are regulated under CFR 135 whatever their size. Although, in practice, most commuter air carriers operate aircraft that are regulated for safety purposes under 14 CFR 135 and most aircraft that are regulated under 14 CFR 135 are operated by commuter air carriers, this is not necessarily the case.

For economic regulations and reporting requirements, commuter air carriers are those carriers that operate aircraft of 60 or fewer seats or a maximum payload capacity of 18,000 pounds or less. These carriers hold a certificate issued under section 298C of the Federal Aviation Act of 1958, as amended.

COMMUTER RAIL (transit): Urban passenger train service for short-distance travel between a central city and adjacent suburb. Does not include rapid rail transit or light rail service.

COMPRESSED NATURAL GAS: Natural gas compressed to a volume and density that is practical as a portable fuel supply. It is used as a fuel for natural gas-powered vehicles.

CONSTANT DOLLARS: Dollar value adjusted for changes in the average price level by dividing a current dollar amount by a price index. See also Chained Dollars and Current Dollars.

CORPORATE AVERAGE FUEL ECONOMY STANDARDS (CAFE): Originally established by Congress for new automobiles and later for light trucks. This law requires automobile manufacturers to produce vehicle fleets with a composite sales-weighted fuel economy not lower than the CAFE standards in a given year. For every vehicle that does not meet the standard, a fine is paid for every one-tenth of a mile per gallon that vehicle falls below the standard.

CRASH (highway): An event that produces injury and/or property damage, involves a motor vehicle in transport, and occurs on a trafficway or while the vehicle is still in motion after running off the trafficway.

CRUDE OIL: A mixture of hydrocarbons that exists in the liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface-separating facilities.

CURRENT DOLLARS: Dollar value of a good or service in terms of prices current at the time the good or service is sold. See also Chained Dollars and Current Dollars.

DEADWEIGHT TONNAGE (water): The carrying capacity of a vessel in long tons (2,240 pounds). It is the difference between the number of tons of water a vessel displaces "light" and the number of tons it displaces when submerged to the "load line."

DEMAND RESPONSIVE VEHICLE (transit): A nonfixed-route, nonfixed-schedule vehicle that operates in response to calls from passengers or their agents to the transit operator or dispatcher.

DIESEL FUEL: A complex mixture of hydrocarbons with a boiling range between approximately 350 and 650 °F. Diesel fuel is composed primarily of paraffins and naphthenic compounds that auto-ignite from the heat of compression in a diesel engine. Diesel is used primarily by heavy-duty road vehicles, construction equipment, locomotives, and by marine and stationary engines.

DISTILLATE FUEL OIL: A general classification for one of the petroleum fractions produced in conventional distillation operations. Included are No. 1, No. 2, and No. 4 fuel oils and No. 1, No. 2, and No. 4 diesel fuels. Distillate fuel oil is used primarily for space heating, on- and off-highway diesel engine fuel (including railroad engine fuel and fuel for agricultural machinery), and electric power generation.

DOMESTIC FREIGHT (water): All waterborne commercial movement between points in the United States, Puerto Rico, and the Virgin Islands, excluding traffic with the Panama Canal Zone. Cargo moved for the military in commercial vessels is reported as ordinary commercial cargo; military cargo moved in military vessels is omitted.

DOMESTIC OPERATIONS (air carrier): All air carrier operations having destinations within the 50 United States, the District of Columbia, the Commonwealth of Puerto Rico, and the U.S. Virgin Islands.

DOMESTIC PASSENGER (water): Any person traveling on a public conveyance by water between points in the United States, Puerto Rico, and the Virgin Islands.

DRY CARGO BARGES (water): Large flat-bottomed, nonself-propelled vessels used to transport dry-bulk materials such as coal and ore.

ENERGY EFFICIENCY: The ratio of energy inputs to outputs from a process, for example, miles traveled per gallon of fuel (mpg).

ENPLANED PASSENGERS (air carrier): See Revenue Passenger Enplanements.

ETHANOL: A clear, colorless, flammable oxygenated hydrocarbon with a boiling point of 78.5 °C in the anhydrous state. It is used in the United States as a gasoline octane enhancer and oxygenate (10 percent concentration). Ethanol can be used in high concentrations in vehicles optimized for its use. Otherwise known as ethyl alcohol, alcohol, or grain-spirit.

FATAL CRASH (highway): A police-reported crash involving a motor vehicle in transport on a trafficway in which at least 1 person dies within 30 days of the crash as a result of that crash.

FATAL INJURY (air): Any injury that results in death within 30 days of the accident.

FATALITY: For purposes of statistical reporting on transportation safety, a fatality is considered a death due to injuries in a transportation crash, accident, or incident that occurs within 30 days of that occurrence.

FATALITY (rail): 1) Death of any person from an injury within 30 days of the accident or incident (may include nontrain accidents or incidents); or 2) death of a railroad employee from an occupational illness within 365 days after the occupational illness was diagnosed by a physician.

FATALITY (recreational boating): All deaths (other than deaths by natural causes) and missing persons resulting from an occurrence that involves a vessel or its equipment.

FATALITY (transit): A transit-caused death confirmed within 30 days of a transit incident. Incidents include collisions, derailments, personal casualties, and fires associated with transit agency revenue vehicles, transit facilities on transit property, service vehicles, maintenance areas, and rights-of-way.

FATALITY (water): All deaths and missing persons resulting from a vessel casualty.

FEDERAL ENERGY REGULATORY COMMISSION (FERC): The federal agency with jurisdiction over, among other things, gas pricing, oil pipeline rates, and gas pipeline certification.

FERRYBOAT (transit): Vessels that carry passengers and/or vehicles over a body of water. Generally steam or diesel-powered, ferryboats may also be hovercraft, hydrofoil, and other high-speed vessels. The vessel is limited in its use to the carriage of deck passengers or vehicles or both, operates on a short run on a frequent schedule between two points over the most direct water routes other than in ocean or coastwise service, and is offered as a public service of a type normally attributed to a bridge or tunnel.

FOSSIL FUELS: Any naturally occurring organic fuel formed in the Earth's crust, such as petroleum, coal, and natural gas.

FREIGHT REVENUE (rail): Revenue from the transportation of freight and from the exercise of transit, stopoff, diversion, and reconsignment privileges as provided for in tariffs.

FREIGHTERS (water): General cargo carriers, full containerships, partial containerships, roll-on/rolloff ships, and barge carriers.

GAS TRANSMISSION PIPELINES: Pipelines installed for the purpose of transmitting gas from a source or sources of supply to one or more distribution centers, or to one or more large volume customers; or a pipeline installed to interconnect sources of supply. Typically, transmission lines differ from gas mains in that they operate at higher pressures and the distance between connections is greater.

GASOHOL: A blend of finished motor gasoline (leaded or unleaded) and alcohol (generally ethanol but sometimes methanol) limited to 10 percent by volume of alcohol.

GASOLINE: A complex mixture of relatively volatile hydrocarbons, with or without small quantities of additives that have been blended to produce a fuel suitable for use in spark ignition engines. Motor gasoline includes both leaded or unleaded grades of finished motor gasoline, blending components, and gasohol. Leaded gasoline is no longer used in highway motor vehicles in the United States.

GENERAL AVIATION: 1) All civil aviation operations other than scheduled air services and nonscheduled air transport operations for taxis, commuter air carriers, and air travel clubs that do not hold Certificates of Public Convenience and Necessity. 2) All civil aviation activity except that of air carriers certificated in accordance with Federal Aviation Regulations, Parts 121, 123, 127, and 135. The types of aircraft used in general aviation range from corporate multi-engine jet aircraft piloted by professional crews to amateur-built single-engine piston-driven acrobatic planes to balloons and dirigibles.

GENERAL ESTIMATES SYSTEM (highway): A data-collection system that uses a nationally representative probability sample selected from all police-reported highway crashes. It began operation in 1988.

GROSS DOMESTIC PRODUCT (U.S.): The total output of goods and services produced by labor and property located in the United States, valued at market prices. As long as the labor and property are located in the United States, the suppliers (workers and owners) may be either U.S. residents or residents of foreign countries.

GROSS VEHICLE WEIGHT RATING (truck): The maximum rated capacity of a vehicle, including the weight of the base vehicle, all added equipment, driver and passengers, and all cargo.

HAZARDOUS MATERIAL: Any toxic substance or explosive, corrosive, combustible, poisonous, or radioactive material that poses a risk to the public's health, safety, or property, particularly when transported in commerce.

HEAVY RAIL (transit): An electric railway with the capacity to transport a heavy volume of passenger traffic and characterized by exclusive rights-of-way, multicar trains, high speed, rapid acceleration, sophisticated signaling, and high-platform loading. Also known as "subway," "elevated (railway)," or "metropolitan railway (metro)."

HIGHWAY-RAIL GRADE CROSSING (rail): A location where one or more railroad tracks are crossed by a public highway, road, street, or a private roadway at grade, including sidewalks and pathways at or associated with the crossing.

HIGHWAY TRUST FUND: A grant-in-aid type fund administered by the U.S. Department of Transportation, Federal Highway Administration. Most funds for highway improvements are apportioned to states according to formulas that give weight to population, area, and mileage.

HIGHWAY-USER TAX: A charge levied on persons or organizations based on their use of public roads. Funds collected are usually applied toward highway construction, reconstruction, and maintenance.

INCIDENT (hazardous materials): Any unintentional release of hazardous material while in transit or storage.

INCIDENT (train): Any event involving the movement of a train or railcars on track equipment that results in a death, a reportable injury, or illness, but in which railroad property damage does not exceed the reporting threshold.

INCIDENT (transit): Collisions, derailments, personal casualties, fires, and property damage in excess of $1,000 associated with transit agency revenue vehicles; all other facilities on the transit property; and service vehicles, maintenance areas, and rights-of-way.

INJURY (air): See Serious Injury (air carrier/general aviation).

INJURY (gas): Described in U.S. Department of Transportation Forms 7100.1 or 7100.2 as an injury requiring "in-patient hospitalization" (admission and confinement in a hospital beyond treatment administered in an emergency room or out-patient clinic in which confinement does not occur).

INJURY (hazardous liquid pipeline): An injury resulting from a hazardous liquid pipeline accident that results in one or more of the following: 1) loss of consciousness, 2) a need to be carried from the scene, 3) a need for medical treatment, and/or 4) a disability that prevents the discharge of normal duties or the pursuit of normal duties beyond the day of the accident.

INJURY (highway): Police-reported highway injuries are classified as follows:

Incapacitating Injury: Any injury, other than a fatal injury, that prevents the injured person from walking, driving, or normally continuing the activities the person was capable of performing before the injury occurred. Includes severe lacerations, broken or distorted limbs, skull or chest injuries, abdominal injuries, unconsciousness at or when taken from the accident scene, and inability to leave the accident scene without assistance. Exclusions include momentary unconsciousness.

Nonincapacitating Evident Injury: Any injury, other than a fatal injury or an incapacitating injury, evident to observers at the scene of the accident. Includes lumps on head, abrasions, bruises, minor lacerations, and others. Excludes limping.

Possible Injury: Any injury reported or claimed that is not evident. Includes, among others, momentary unconsciousness, claim of injuries not obvious, limping, complaint of pain, nausea, and hysteria.

INJURY (highway-rail grade crossing): 1) An injury to one or more persons other than railroad employees that requires medical treatment; 2) an injury to one or more employees that requires medical treatment or that results in restriction of work or motion for one or more days, or one or more lost work days, transfer to another job, termination of employment, or loss of consciousness; 3) any occupational illness affecting one or more railroad employees that is diagnosed by a physician.

INJURY (rail): 1) Injury to any person other than a railroad employee that requires medical treatment, or 2) injury to a railroad employee that requires medical treatment or results in restriction of work or motion for one or more workdays, one or more lost workdays, termination of employment, transfer to another job, loss of consciousness, or any occupational illness of a railroad employee diagnosed by a physician.

INJURY (recreational boating): Injury requiring medical treatment beyond first aid as a result of an occurrence that involves a vessel or its equipment.

INJURY (transit): Any physical damage or harm to a person requiring medical treatment or any physical damage or harm to a person reported at the time and place of occurrence. For employees, an injury includes incidents resulting in time lost from duty or any definition consistent with a transit agency's current employee injury reporting practice.

INJURY (water): All personal injuries resulting from a vessel casualty that require medical treatment beyond first aid.

INLAND AND COASTAL CHANNELS: Includes the Atlantic Coast Waterways, the Atlantic Intracoastal Waterway, the New York State Barge Canal System, the Gulf Coast Waterways, the Gulf Intracoastal Waterway, the Mississippi River System (including the Illinois Waterway), the Pacific Coast Waterways, the Great Lakes, and all other channels (waterways) of the United States, exclusive of Alaska, that are usable for commercial navigation.

INTERCITY CLASS I BUS: As defined by the Bureau of Transportation Statistics, an interstate motor carrier of passengers with an average annual gross revenue of at least $1 million.

INTERCITY TRUCK: A truck that carries freight beyond local areas and commercial zones.

INTERNAL TRAFFIC (water): Vessel movements (origin and destination) that take place solely on inland waterways located within the boundaries of the contiguous 48 states or within the state of Alaska. Internal traffic also applies to carriage on both inland waterways and the water on the Great Lakes; carriage between offshore areas and inland waterways; and carriage occurring within the Delaware Bay, Chesapeake Bay, Puget Sound, and the San Francisco Bay, which are considered internal bodies of water rather than arms of the ocean.

INTERSTATE HIGHWAY: Limited access, divided highway of at least four lanes designated by the Federal Highway Administration as part of the Interstate System.

JET FUEL: Includes kerosene-type jet fuel (used primarily for commercial turbojet and turboprop aircraft engines) and naphtha-type jet fuel (used primarily for military turbojet and turboprop aircraft engines).

LAKEWISE OR GREAT LAKES TRAFFIC: Waterborne traffic between U.S. ports on the Great Lakes system. The Great Lakes system is treated as a separate waterways system rather than as a part of the inland system.

LARGE CERTIFICATED AIR CARRIERS: An air carrier holding a certificate issued under section 401 of the Federal Aviation Act of 1958, as amended, that: 1) operates aircraft designed to have a maximum passenger capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds, or 2) conducts operations where one or both terminals of a flight stage are outside the 50 states of the United States, the District of Columbia, the Commonwealth of Puerto Rico, and the U.S. Virgin Islands. Large certificated air carriers are grouped by annual operating revenues: 1) majors (more than $1 billion in annual operating revenues), 2) nationals (between $100 million and $1 billion in annual operating revenues), 3) large regionals (between $20 million and $99,999,999 in annual operating revenues), and 4) medium regionals (less than $20 million in annual operating revenues).

LARGE REGIONALS (air): Air carrier groups with annual operating revenues between $20 million and $99,999,999.

LARGE TRUCK: Trucks over 10,000 pounds gross vehicle weight rating, including single-unit trucks and truck tractors.

LEASE CONDENSATE: A mixture consisting primarily of pentanes and heavier hydrocarbons, which are recovered as a liquid from natural gas in lease or field separation facilities. This category excludes natural gas liquids, such as butane and propane, which are recovered at natural gas processing plants or facilities.

LIGHT-DUTY VEHICLE: A vehicle category that combines light automobiles and trucks.

LIGHT RAIL: A streetcar-type vehicle operated on city streets, semi-exclusive rights-of-way, or exclusive rights-of-way. Service may be provided by step-entry vehicles or by level boarding.

LIGHT TRUCK: Trucks of 10,000 pounds gross vehicle weight rating or less, including pickups, vans, truck-based station wagons, and sport utility vehicles.

LIQUEFIED NATURAL GAS (LNG): Natural gas, primarily methane, that has been liquefied by reducing its temperature to –260 °F at atmospheric pressure.

LIQUEFIED PETROLEUM GAS (LPG): Propane, propylene, normal butane, butylene, isobutane, and isobutylene produced at refineries or natural gas processing plants, including plants that fractionate new natural gas plant liquids.

LOCOMOTIVE: Railroad vehicle equipped with flanged wheels for use on railroad tracks, powered directly by electricity, steam, or fossil fuel, and used to move other railroad rolling equipment.

LOCOMOTIVE-MILE: The movement of a locomotive unit, under its own power, the distance of 1 mile.

MAINS (gas): A network of pipelines that serves as a common source of supply for more than one gas service line.

MAJORS (air): Air carrier groups with annual operating revenues exceeding $1 billion.

MEDIUM REGIONALS (air): Air carrier groups with annual operating revenues less than $20 million.

MERCHANDISE TRADE EXPORTS: Merchandise transported out of the United States to foreign countries whether such merchandise is exported from within the U.S. Customs Service territory, from a U.S. Customs bonded warehouse, or from a U.S. Foreign Trade Zone. (Foreign Trade Zones are areas, operated as public utilities, under the control of U.S. Customs with facilities for handling, storing, manipulating, manufacturing, and exhibiting goods.)

MERCHANDISE TRADE IMPORTS: Commodities of foreign origin entering the United States, as well as goods of domestic origin returned to the United States with no change in condition or after having been processed and/or assembled in other countries. Puerto Rico is a Customs district within the U.S. Customs territory, and its trade with foreign countries is included in U.S. import statistics. U.S. import statistics also include merchandise trade between the U. S. Virgin Islands and foreign countries even though the Islands are not officially a part of the U.S. Customs territory.

METHANOL: A light, volatile alcohol produced commercially by the catalyzed reaction of hydrogen and carbon monoxide. Methanol is blended with gasoline to improve its operational efficiency.

METHYL-TERTIARY-BUTYL-ETHER (MTBE): A colorless, flammable, liquid oxygenated hydrocarbon that contains 18.15 percent oxygen. It is a fuel oxygenate produced by reacting methanol with isobutylene.

MINOR ARTERIALS (highway): Roads linking cities and larger towns in rural areas. In urban areas, roads that link but do not penetrate neighborhoods within a community.

MOTORBUS (transit): A rubber-tired, self-propelled, manually steered bus with a fuel supply onboard the vehicle. Motorbus types include intercity, school, and transit.

MOTORCYCLE: A two- or three-wheeled motor vehicle designed to transport one or two people, including motor scooters, minibikes, and mopeds.

NATIONALS (air): Air carrier groups with annual operating revenues between $100 million and $1 billion.

NATURAL GAS: A naturally occurring mixture of hydrocarbon and nonhydrocarbon gases found in porous geologic formations beneath the Earth's surface, often in association with petroleum. The principal constituent is methane.

NATURAL GAS PLANT LIQUIDS: Liquids recovered from natural gas in processing plants or field facilities, or extracted by fractionators. They include ethane, propane, normal butane, isobutane, pentanes plus, and other products, such as finished motor gasoline, finished aviation gasoline, special naphthas, kerosene, and distillate fuel oil produced at natural gas processing plants.

NEAR MIDAIR COLLISION (air): An incident in which the possibility of a collision occurred as a result of aircraft flying with less than 500 feet of separation, or a report received from a pilot or flight crew member stating that a collision hazard existed between two or more aircraft.

NONOCCUPANT (Automobile): Any person who is not an occupant of a motor vehicle in transport (e.g., bystanders, pedestrians, pedalcyclists, or an occupant of a parked motor vehicle).

NONSCHEDULED SERVICE (air): Revenue flights not operated as regular scheduled service, such as charter flights, and all nonrevenue flights incident to such flights.

NONSELF-PROPELLED VESSEL (water): A vessel without the means for self-propulsion. Includes dry cargo barges and tanker barges.

NONTRAIN INCIDENT: An event that results in a reportable casualty, but does not involve the movement of ontrack equipment and does not cause reportable damage above the threshold established for train accidents.

NONTRESPASSERS (rail): A person lawfully on any part of railroad property used in railroad operations or a person adjacent to railroad premises when injured as the result of railroad operations.

NONVESSEL-CASUALTY-RELATED DEATH (water): A death that occurs onboard a commercial vessel but not as a result of a vessel casualty, such as a collision, fire, or explosion.

OCCUPANT (highway): Any person in or on a motor vehicle in transport. Includes the driver, passengers, and persons riding on the exterior of a motor vehicle (e.g., a skateboard rider holding onto a moving vehicle). Excludes occupants of parked cars unless they are double parked or motionless on the roadway.

OCCUPATIONAL FATALITY: Death resulting from a job-related injury.

OPERATING EXPENSES (air): Expenses incurred in the performance of air transportation, based on overall operating revenues and expenses. Does not include nonoperating income and expenses, nonrecurring items, or income taxes.

OPERATING EXPENSES (rail): Expenses of furnishing transportation services, including maintenance and depreciation of the plant used in the service.

OPERATING EXPENSES (transit): The total of all expenses associated with operation of an individual mode by a given operator. Includes distributions of "joint expenses" to individual modes and excludes "reconciling items," such as interest expenses and depreciation. Should not be confused with "vehicle operating expenses."

OPERATING EXPENSES (truck): Includes expenditures for equipment maintenance, supervision, wages, fuel, equipment rental, terminal operations, insurance, safety, and administrative and general functions.

OPERATING REVENUES (air): Revenues from the performance of air transportation and related incidental services. Includes l) transportation revenues from the carriage of all classes of traffic in scheduled and nonscheduled services, and 2) nontransportation revenues consisting of federal subsidies (where applicable) and services related to air transportation.

OTHER FREEWAYS AND EXPRESSWAYS (highway): All urban principal arterials with limited access but not part of the Interstate system.

OTHER PRINCIPAL ARTERIALS (highway): Major streets or highways, many of multi-lane or freeway design, serving high-volume traffic corridor movements that connect major generators of travel.

OTHER RAIL REVENUE: Includes revenues from miscellaneous operations (i.e., dining- and bar-car services), income from the lease of road and equipment, miscellaneous rental income, income from nonoperating property, profit from separately operated properties, dividend income, interest income, income from sinking and other reserve funds, release or premium on funded debt, contributions from other companies, and other miscellaneous income.

OTHER REVENUE VEHICLES (transit): Other revenue-generating modes of transit service, such as cable cars, personal rapid transit systems, monorail vehicles, inclined and railway cars, not covered otherwise.

OTHER 2-AXLE 4-TIRE VEHICLES (truck): Includes vans, pickup trucks, and sport utility vehicles.

OXYGENATES: Any substance that when added to motor gasoline increases the amount of oxygen in that gasoline blend. Includes oxygen-bearing compounds such as ethanol, methanol, and methyl-tertiary-butyl-ether. Oxygenated fuel tends to give a more complete combustion of carbon into carbon dioxide (rather than monoxide), thereby reducing air pollution from exhaust emissions.

PASSENGER CAR: A motor vehicle designed primarily for carrying passengers on ordinary roads, includes convertibles, sedans, and stations wagons.

PASSENGER-MILE: 1) Air: One passenger transported 1 mile; passenger-miles for 1 interairport flight are calculated by multiplying aircraft-miles flown by the number of passengers carried on the flight. The total passenger-miles for all flights is the sum of passenger-miles for all interairport flights. 2) Auto: One passenger traveling 1 mile; e.g., 1 car transporting 2 passengers 4 miles results in 8 passenger-miles. 3) Transit: The total number of miles traveled by transit passengers; e.g., 1 bus transporting 5 passengers 3 miles results in 15 passenger-miles.

PASSENGER REVENUE: 1) Rail: Revenue from the sale of tickets. 2) Air: Revenues from the transport of passengers by air. 3) Transit: Fares, transfer, zone, and park-and-ride parking charges paid by transit passengers. Prior to 1984, fare revenues collected by contractors operating transit services were not included.

PASSENGER VESSELS (water): A vessel designed for the commercial transport of passengers.

PEDALCYCLIST: A person on a vehicle that is powered solely by pedals.

PEDESTRIAN: Any person not in or on a motor vehicle or other vehicle. Excludes people in buildings or sitting at a sidewalk cafe. The National Highway Traffic Safety Administration also uses an "other pedestrian" category to refer to pedestrians using conveyances and people in buildings. Examples of pedestrian conveyances include skateboards, nonmotorized wheelchairs, rollerskates, sleds, and transport devices used as equipment.

PERSON-MILES: An estimate of the aggregate distances traveled by all persons on a given trip based on the estimated transportation-network-miles traveled on that trip.

PERSON TRIP: A trip taken by an individual. For example, if three persons from the same household travel together, the trip is counted as one household trip and three person trips.

PERSONAL CASUALTY (transit): 1) An incident in which a person is hurt while getting on or off a transit vehicle (e.g., falls or door incidents), but not as a result of a collision, derailment/left roadway, or fire. 2) An incident in which a person is hurt while using a lift to get on or off a transit vehicle, but not as a result of a collision, derailment/left roadway, or fire. 3) An incident in which a person is injured on a transit vehicle, but not as a result of a collision, derailment/left roadway, or fire. 4) An incident in which a person is hurt while using a transit facility. This includes anyone on transit property (e.g., patrons, transit employees, trespassers), but does not include incidents resulting from illness or criminal activity.

PETROLEUM (oil): A generic term applied to oil and oil products in all forms, such as crude oil, lease condensate, unfinished oils, petroleum products, natural gas plant liquids, and nonhydrocarbon compounds blended into finished petroleum products.

PROPERTY DAMAGE (transit): The dollar amount required to repair or replace transit property (including stations, right-of-way, bus stops, and maintenance facilities) damaged during an incident.

PUBLIC ROAD: Any road under the jurisdiction of and maintained by a public authority (federal, state, county, town or township, local government, or instrumentality thereof) and open to public travel.

RAPID RAIL TRANSIT: Transit service using railcars driven by electricity usually drawn from a third rail, configured for passenger traffic, and usually operated on exclusive rights-of-way. It generally uses longer trains and has longer station spacing than light rail.

REFORMULATED GASOLINE: Gasoline whose composition has been changed to meet performance specifications regarding ozone-forming tendencies and release of toxic substances into the air from both evaporation and tailpipe emissions. Reformulated gasoline includes oxygenates and, compared with gasoline sold in 1990, has a lower content of olefins, aromatics, volatile components, and heavy hydrocarbons.

RESIDUAL FUEL OIL: The heavier oils that remain after the distillate fuel oils and lighter hydrocarbons are distilled away in refinery operations and that conform to American Society for Testing and Materials Specifications D396 and 976. Includes, among others, Navy Special oil used in steam-powered vessels in government service and No. 6 oil used to power ships. Imports of residual fuel oil include imported crude oil burned as fuel.

REVENUE: Remuneration received by carriers for transportation activities.

REVENUE PASSENGER: 1) Air: Person receiving air transportation from an air carrier for which remuneration is received by the carrier. Air carrier employees or others, except ministers of religion, elderly individuals, and handicapped individuals, receiving reduced rate charges (less than the applicable tariff) are considered nonrevenue passengers. Infants, for whom a token fare is charged, are not counted as passengers. 2) Transit: Single-vehicle transit rides by initial-board (first-ride) transit passengers only. Excludes all transfer rides and all nonrevenue rides. 3) Rail: Number of one-way trips made by persons holding tickets.

REVENUE PASSENGER ENPLANEMENTS (air): The total number of passengers boarding aircraft. Includes both originating and connecting passengers.

REVENUE PASSENGER LOAD FACTOR (air): Revenue passenger-miles as a percentage of available seat-miles in revenue passenger services. The term is used to represent the proportion of aircraft seating capacity that is actually sold and utilized.

REVENUE PASSENGER-MILE: One revenue passenger transported one mile.

REVENUE PASSENGER TON-MILE (air): One ton of revenue passenger weight (including all baggage) transported one mile. The passenger weight standard for both domestic and international operations is 200 pounds.

REVENUE TON-MILE: One short ton of freight transported one mile.

REVENUE VEHICLE-MILES (transit): One vehicle (bus, trolley bus, or streetcar) traveling one mile, while revenue passengers are on board, generates one revenue vehicle-mile. Revenue vehicle-miles reported represent the total mileage traveled by vehicles in scheduled or unscheduled revenue-producing services.

ROAD OIL: Any heavy petroleum oil, including residual asphaltic oil, that is used as a dust palliative and surface treatment on roads and highways. It is generally produced in six grades from zero, the most liquid, to five, the most viscous.

ROLL ON/ROLL OFF VESSEL (water): Ships that are designed to carry wheeled containers or other wheeled cargo and use the roll on/roll off method for loading and unloading.

RURAL HIGHWAY: Any highway, road, or street that is not an urban highway.

RURAL MILEAGE (highway): Roads outside city, municipal district, or urban boundaries.

SCHEDULED SERVICE (air): Transport service operated on published flight schedules.

SCHOOL BUS: A passenger motor vehicle that is designed or used to carry more than 10 passengers, in addition to the driver, and, as determined by the Secretary of Transportation, is likely to be significantly used for the purpose of transporting pre-primary, primary, or secondary school students between home and school.

SCHOOL BUS-RELATED CRASH: Any crash in which a vehicle, regardless of body design and used as a school bus, is directly or indirectly involved, such as a crash involving school children alighting from a vehicle.

SCOW (water): Any flat-bottomed, nonself-propelled, rectangular vessel with sloping ends. Large scows are used to transport sand, gravel, or refuse.

SELF-PROPELLED VESSEL: A vessel that has its own means of propulsion. Includes tankers, containerships, dry bulk cargo ships, and general cargo vessels.

SERIOUS INJURY (air carrier/general aviation): An injury that requires hospitalization for more than 48 hours, commencing within 7 days from the date when the injury was received; results in a bone fracture (except simple fractures of fingers, toes, or nose); involves lacerations that cause severe hemorrhages, or nerve, muscle, or tendon damage; involves injury to any internal organ; or involves second- or third-degree burns or any burns affecting more than 5 percent of the body surface.

SMALL CERTIFICATED AIR CARRIER: An air carrier holding a certificate issued under section 401 of the Federal Aviation Act of 1958, as amended, that operates aircraft designed to have a maximum seating capacity of 60 seats or fewer or a maximum payload of 18,000 pounds or less.

STATE AND LOCAL HIGHWAY EXPENDITURES: Disbursements for capital outlays, maintenance and traffic surfaces, administration and research, highway law enforcement and safety, and interest on debt.

STREETCARS: Relatively lightweight passenger railcars operating singly or in short trains, or on fixed rails in rights-of-way that are not always separated from other traffic. Streetcars do not necessarily have the right-of-way at grade crossings with other traffic.

SUPPLEMENTAL AIR CARRIER: An air carrier authorized to perform passenger and cargo charter services.

TANKER: An oceangoing ship designed to haul liquid bulk cargo in world trade.

TON-MILE (truck): The movement of one ton of cargo the distance of one mile. Ton-miles are calculated by multiplying the weight in tons of each shipment transported by the miles hauled.

TON-MILE (water): The movement of one ton of cargo the distance of one statute mile. Domestic ton-miles are calculated by multiplying tons moved by the number of statute miles moved on the water (e.g., 50 short tons moving 200 miles on a waterway would yield 10,000 ton-miles for that waterway). Ton-miles are not computed for ports. For coastwise traffic, the shortest route that safe navigation permits between the port of origin and destination is used to calculate ton-miles.

TRAFFICWAY (highway): Any right-of-way open to the public as a matter of right or custom for moving persons or property from one place to another, including the entire width between property lines or other boundaries.

TRAIN LINE MILEAGE: The aggregate length of all line-haul railroads. It does not include the mileage of yard tracks or sidings, nor does it reflect the fact that a mile of railroad may include two or more parallel tracks. Jointly-used track is counted only once.

TRAIN-MILE: The movement of a train, which can consist of many cars, the distance of one mile. A train-mile differs from a vehicle-mile, which is the movement of one car (vehicle) the distance of one mile. A 10-car (vehicle) train traveling 1 mile is measured as 1 train-mile and 10 vehicle-miles. Caution should be used when comparing train-miles to vehicle-miles.

TRANSIT VEHICLE: Includes light, heavy, and commuter rail; motorbus; trolley bus; van pools; automated guideway; and demand responsive vehicles.

TRANSSHIPMENTS: Shipments that enter or exit the United States by way of a U.S. Customs port on the northern or southern border, but whose origin or destination is a country other than Canada or Mexico.

TRESPASSER (rail): Any person whose presence on railroad property used in railroad operations is prohibited, forbidden, or unlawful.

TROLLEY BUS: Rubber-tired electric transit vehicle, manually steered and propelled by a motor drawing current, normally through overhead wires, from a central power source.

TRUST FUNDS: Accounts that are designated by law to carry out specific purposes and programs. Trust Funds are usually financed with earmarked tax collections.

TUG BOAT: A powered vessel designed for towing or pushing ships, dumb barges, pushed-towed barges, and rafts, but not for the carriage of goods.

U.S.-FLAG CARRIER OR AMERICAN FLAG CARRIER (air): One of a class of air carriers holding a Certificate of Public Convenience and Necessity, issued by the U.S. Department of Transportation and approved by the President, authorizing scheduled operations over specified routes between the United States (and/or its territories) and one or more foreign countries.

UNLEADED GASOLINE: See Gasoline.

UNLINKED PASSENGER TRIPS (transit): The number of passengers boarding public transportation vehicles. A passenger is counted each time he/she boards a vehicle even if the boarding is part of the same journey from origin to destination.

URBAN HIGHWAY: Any road or street within the boundaries of an urban area. An urban area is an area including and adjacent to a municipality or urban place with a population of 5,000 or more. The boundaries of urban areas are fixed by state highway departments, subject to the approval of the Federal Highway Administration, for purposes of the Federal-Aid Highway Program.

VANPOOL (transit): Public-sponsored commuter service operating under prearranged schedules for previously formed groups of riders in 8- to 18-seat vehicles. Drivers are also commuters who receive little or no compensation besides the free ride.

VEHICLE MAINTENANCE (transit): All activities associated with revenue and nonrevenue (service) vehicle maintenance, including administration, inspection and maintenance, and servicing (e.g., cleaning and fueling) vehicles. In addition, it includes repairs due to vandalism or to revenue vehicle accidents.

VEHICLE-MILES (highway): Miles of travel by all types of motor vehicles as determined by the states on the basis of actual traffic counts and established estimating procedures.

VEHICLE-MILES (transit): The total number of miles traveled by transit vehicles. Commuter rail, heavy rail, and light rail report individual car-miles, rather than train-miles for vehicle-miles.

VEHICLE OPERATIONS (transit): All activities associated with transportation administration, including the control of revenue vehicle movements, scheduling, ticketing and fare collection, system security, and revenue vehicle operation.

VESSEL CASUALTY (water): An occurrence involving commercial vessels that results in 1) actual physical damage to property in excess of $25,000; 2) material damage affecting the seaworthiness or efficiency of a vessel; 3) stranding or grounding; 4) loss of life; or 5) injury causing any person to remain incapacitated for a period in excess of 72 hours, except injury to harbor workers not resulting in death and not resulting from vessel casualty or vessel equipment casualty.

VESSEL-CASUALTY-RELATED DEATH (water): Fatality that occurs as a result of an incident that involves a vessel or its equipment, such as a collision, fire, or explosion. Includes drowning deaths.

WATERBORNE TRANSPORTATION: Transport of freight and/or people by commercial vessels under U.S. Coast Guard jurisdiction.

WAYBILL: A document that lists goods and shipping instructions relative to a shipment.

Appendix B: Tables

TABLE 1 Labor Productivity of Major Sectors: 1990–2000
Output per hour
Index: 1990 =100

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Transportation	100.0	103.5	108.8	112.1	115.2	115.3	119.1	121.1	117.4	120.5	119.7
Manufacturing	100.0	102.3	107.6	109.7	113.0	117.3	121.4	126.6	132.7	139.6	145.2
Business	100.0	101.2	105.0	105.6	107.0	107.8	110.7	113.2	116.2	119.2	122.8

NOTES: Labor productivity for transportation is calculated by dividing an index of output by an index of employee hours. Transportation output index is a weighted average of output indexes of railroad, trucking, air, bus and pipeline transportation. The shares of each mode in total transportation value added (GDP) are used as annual weighting factors. Index of transportation employee hours is computed by weighting the employee hour indexes of each mode by its share in total transportation employees. The modal output and employee hour indexes were initially estimated by the Bureau of Labor Statistics using 1987 as the base year. Raw data are not available from the sources.

SOURCES: Transportation—U.S. Department of Transportation, Bureau of Transportation Statistics, calculated based on data from U.S. Department of Labor, Bureau of Labor Statistics, Office of Productivity and Technology, "Industry Productivity Database," available at http://www.bls.gov, as of February 2003; and U.S. Department of Commerce, Bureau of Economic Analysis, "Gross Domestic Product by Industry," available at http://www.bea.gov, as of March 2003. **Manufacturing and business**—U.S. Department of Labor, Bureau of Labor Statistics, Office of Productivity and Technology, "Industry Productivity Database," available at http://www.bls.gov, as of February 2003.

TABLE 2 Labor Productivity of the For-Hire Transportation Industries: 1990–2000
Index: 1990 = 100

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Railroad	100.0	107.8	117.8	122.7	126.8	131.8	140.9	143.3	146.2	154.0	165.2
Trucking, except local	100.0	105.2	111.1	114.0	116.6	112.9	117.8	119.2	116.9	118.5	118.1
Local trucking	100.0	104.9	120.7	123.4	129.0	134.8	138.0	141.6	154.6	163.0	165.3
Bus carriers, Class I	100.0	107.5	109.5	113.5	103.2	114.0	110.3	129.5	109.3	139.9	116.2
Air	100.0	99.6	104.3	107.9	113.8	116.9	119.6	120.1	116.7	117.4	119.2
Pipeline	100.0	96.6	97.8	101.9	105.5	113.3	127.5	131.1	134.0	141.9	137.7

NOTES: Labor productivity for transportation measures quality-adjusted ton- and passenger-miles per hour. Quality-adjustment corrects for differences in services and handling, e.g., the difference between flying first class and coach or differences in the handling requirements and revenue generation of high- and low-value commodities. Pipeline labor productivity is measured by output per employee. No data are available for water transportation. Raw data are not available from the sources.
Local trucking includes establishments that generally provide trucking services within a single municipality, contiguous municipalities, or a municipality and its suburban areas. Trucking, except local, includes common or contract carriers that generally provide trucking service beyond a single municipality, contiguous municipalities, or a municipality and its suburban areas.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, calculation based on data from U.S. Department of Labor, Bureau of Labor Statistics' Office of Productivity and Technology, "Industry Productivity Database," available at http://www.bls.gov, as of February 2003; and U.S. Department of Commerce, Bureau of Economic Analysis, "Gross Domestic Product by Industry," available at http://www.bea.gov, as of March 2003.

TABLE 3 Multifactor Productivity: 1990–2001
Index: 1990 =100

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Railroad industry	100.0	103.3	109.9	113.5	115.9	122.8	127.4	127.4	126.1	130.1		
Business sector (all industries)	100.0	98.9	101.2	101.7	102.8	103.0	104.7	105.9	107.3	108.3	109.9	108.8

NOTE: Rail productivity data are only available through 1999. Source data are indexes with base years of 1987 (rail) and 1996 (business). They have been reindexed so that 1990 = 100.

SOURCES: U.S. Department of Labor Statistics, available at http://www.bls.gov, as of February 2003. **Business sector**—"Multifactor Productivity Trends," table 1. **Rail**—"Industry Multifactor Productivity Data Table by Industry, 1987–1999."

TABLE 4 Passenger-Miles by Mode: 2000
Million passenger-miles

	2000
Air carrier	516,129
General aviation	14,000
Passenger car	2,544,457
Light truck	1,467,664
Motorcycle	11,516
Bus	160,919
Transit, excluding bus	26,425
Amtrak	5,498

NOTES: Transit includes motor bus, heavy rail, commuter rail, light rail, ferryboat, trolley bus, demand responsive, and others. Motor bus and demand responsive figures are also included in the bus figure for highway.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-34, available at http://www.bts.gov/, as of April 2003.

TABLE 5a Change in Passenger-Miles by Selected Mode
Index 1990 = 1.00

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Air carrier	1.00	0.98	1.03	1.05	1.12	1.17	1.26	1.30	1.34	1.41	1.49
Passenger car	1.00	0.96	0.97	0.97	0.99	1.00	1.02	1.05	1.08	1.09	1.12
Light truck	1.00	1.12	1.20	1.25	1.27	1.26	1.30	1.35	1.38	1.43	1.47
Bus	1.00	1.00	1.01	1.07	1.12	1.12	1.15	1.19	1.22	1.34	1.33
Transit	1.00	0.99	0.98	0.96	0.96	0.97	1.01	1.03	1.07	1.11	1.16
Amtrak	1.00	1.04	1.01	1.02	0.98	0.92	0.83	0.85	0.88	0.88	0.91

NOTES: Transit includes motor bus, heavy rail, commuter rail, light rail, ferryboat, trolley bus, demand responsive, and others. Motor bus and demand responsive figures are also included in the bus figure for highway.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-34, available at http://www.bts.gov/, as of April 2003.

TABLE 5b Passenger-Miles by Selected Mode
Million passenger-miles

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Air carrier	358,873	350,185	365,564	372,130	398,199	414,688	446,652	463,112	476,362	501,857	530,129
Passenger car	2,281,391	2,200,260	2,208,226	2,213,281	2,249,742	2,286,887	2,337,068	2,389,065	2,463,828	2,494,870	2,544,457
Light truck	999,754	1,116,958	1,201,667	1,252,860	1,269,292	1,256,146	1,298,299	1,352,675	1,380,557	1,432,625	1,467,664
Bus	121,398	121,906	122,496	129,852	135,871	136,104	139,136	145,060	148,558	162,445	160,919
Transit	41,143	40,703	40,241	39,384	39,585	39,808	41,378	42,339	44,128	45,857	47,666
Amtrak	6,057	6,273	6,091	6,199	5,921	5,545	5,050	5,166	5,304	5,330	5,498

NOTES: Transit includes motor bus, heavy rail, commuter rail, light rail, ferryboat, trolley bus, demand-responsive, and others. Motor bus and demand-responsive figures are also included in the bus figure for highway.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-34, available at http://www.bts.gov/, as of April 2003.

TABLE 6a Total U.S. Population and Gross Domestic Product: 1990–2000
Index 1990 = 1.00

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Gross domestic product (GDP)	1.00	1.00	1.03	1.05	1.10	1.12	1.16	1.22	1.27	1.32	1.37
Total U.S. population	1.00	1.01	1.03	1.04	1.05	1.07	1.08	1.09	1.11	1.12	1.13
GDP per capita	1.00	0.98	1.00	1.01	1.04	1.05	1.08	1.11	1.15	1.18	1.22

SOURCES: Gross Domestic Product—Based on chained 1996 dollar data from U.S. Department of Commerce, Bureau of Economic Analysis, *National Income and Product Accounts*, summary GDP table, available at http://www.bea.doc.gov/bea/dn1.htm, as of May 2003. **Population**—U.S. Department of Commerce, U.S. Census Bureau, National Intercensal Estimates 1990–2000, available at http://eire.census.gov/popest/data/national/tables/intercensal/US-EST90INT-01.php, as of May 2003.

TABLE 6b Total U.S. Population and Gross Domestic Product: 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Gross domestic product (GDP) (Billions of chained 1996 dollars)	6,708	6,676	6,880	7,063	7,348	7,544	7,813	8,160	8,509	8,859	9,191
Total resident U.S. population (Thousands)	249,623	252,981	256,514	259,919	263,126	266,278	269,394	272,647	275,854	279,040	282,125
GDP per capita	26,872	26,391	26,821	27,172	27,925	28,331	29,003	29,927	30,846	31,748	32,579

SOURCES: Gross Domestic Product—Based on chained 1996 dollar data from U.S. Department of Commerce, Bureau of Economic Analysis, *National Income and Product Accounts*, summary GDP table, available at http://www.bea.doc.gov/bea/dn1.htm, as of May 2003. **Population**—U.S. Department of Commerce, U.S. Census Bureau, National Intercensal Estimates 1990–2000, available at http://eire.census.gov/popest/data/national/tables/intercensal/US-EST90INT-01.php, as of May 2003.

TABLE 7a Change in Domestic Freight Ton-Miles by Mode: 1990–2000
Index 1990 = 1.00

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Air	1.00	0.98	1.08	1.18	1.30	1.38	1.42	1.50	1.53	1.57	1.63
Truck	1.00	1.02	1.05	1.09	1.16	1.22	1.25	1.31	1.34	1.39	1.41
Railroad	1.00	0.98	1.03	1.07	1.15	1.24	1.29	1.31	1.36	1.41	1.45
Water	1.00	1.02	1.03	0.95	0.98	0.97	0.92	0.85	0.81	0.79	0.77
Oil pipeline	1.00	0.99	1.01	1.02	1.01	1.03	1.06	1.06	1.06	1.06	1.06
TOTAL	1.00	1.00	1.03	1.03	1.09	1.13	1.15	1.15	1.17	1.19	1.20

TABLE 7b Domestic Freight Ton-Miles by Mode: 1990–2000
Billions

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Air	9	9	10	11	12	13	13	14	14	14	15
Truck	848	867	889	927	987	1,033	1,060	1,109	1,138	1,175	1,193
Railroad	1,064	1,042	1,098	1,135	1,221	1,317	1,377	1,391	1,448	1,504	1,546
Water	834	848	857	790	815	808	765	707	673	656	646
Oil pipeline	584	579	589	593	591	601	619	617	620	618	617
TOTAL	3,339	3,345	3,443	3,456	3,626	3,772	3,834	3,838	3,893	3,967	4,017

SOURCES: Air, pipeline, and water—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-44. **Truck**—BTS calculation based on U.S. Department of Transportation, Bureau of Transportation Statistics, *Transportation Statistics Annual Report 2000* (Washington, DC: 2001), page 124; and U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2001* (Washington, DC: 2002), table VM-1. **Rail**—BTS calculation based on Surface Transportation Board, Carload Waybill Sample; Transport Canada, *Transportation In Canada* (Annual Report), table 12-1; American Association of Railroads, *Railroad Facts* (Washington, DC: 1991–2001 issues), page 36.

TABLE 8 Modal Shares of Domestic Freight Ton-Miles: 2000

	2000
Air	0.4
Truck	29.7
Railroad	38.5
Water	16.1
Oil pipeline	15.4

SOURCES: Air, pipeline, and water—U.S. Department of Transportation, Bureau of Transportation Statistics, National Transportation Statistics 2002 (Washington, DC: 2002), table 1-44. **Truck**—BTS calculation based on U.S. Department of Transportation, Bureau of Transportation Statistics, *Transportation Statistics Annual Report 2000* (Washington, DC: 2001), page 124; and U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2001* (Washington, DC: 2002), table VM-1. **Rail**—BTS calculation based on Surface Transportation Board, Carload Waybill Sample; Transport Canada, *Transportation In Canada* (Annual Report), table 12-1; American Association of Railroads, *Railroad Facts* (Washington, DC: 1991–2001 issues), page 36.

[NOTE: Figures 9, 10, and 11 are truck, rail, and water freight flow maps, respectively, and corresponding tables are not included here.]

TABLE 12 Changes in Average City-Pair Schedule Time: February 1995 and February 2002
Number of city-pairs

	Increased schedule time	Decreased or unchanged schedule time
Air	177	84
Rail	154	92
Bus	115	135

NOTE: Air data cover non-stop service only. Bus and rail data include direct and connecting service.

SOURCES: National Passenger Railroad Coporations (Amtrak), National, Northeast and Schedule Change Timetables (Washington, DC: 1994/1995 and 2001/2002 issues); Russell's Guides, Official National Motor Coach Guides (Cedar Rapids, IA: January 1995 and January 2002 editions); Greyhound Lines, System Timetable (Dallas, TX: January 1995).

TABLE 13/14 Travel Time Index and Change by Metro Area Population for 75 Metro Areas: 1990 and 2000

Urban areas	Population (000) 2000	Travel Time Index 1990	Travel Time Index 2000	Change 1990–2000
New York NY-Northeastern NJ	17,090	1.31	1.41	0.10
Los Angeles CA	12,680	1.91	1.90	–0.01
Chicago IL-Northwestern IN	8,090	1.37	1.47	0.10
Philadelphia PA-NJ	4,590	1.18	1.28	0.10
San Francisco-Oakland CA	4,030	1.50	1.59	0.09
Detroit MI	4,025	1.28	1.34	0.06
Dallas-Fort Worth TX	3,800	1.18	1.33	0.15
Washington DC-MD-VA	3,560	1.34	1.46	0.12
Houston TX	3,375	1.31	1.38	0.07
Boston MA	3,025	1.27	1.45	0.18
Atlanta GA	2,975	1.14	1.36	0.22
San Diego CA	2,710	1.25	1.37	0.12
Phoenix AZ	2,600	1.21	1.40	0.19
Minneapolis-St. Paul MN	2,475	1.12	1.38	0.26
Miami-Hialeah FL	2,270	1.32	1.45	0.13
Baltimore MD	2,170	1.21	1.29	0.08
St. Louis MO-IL	2,040	1.11	1.23	0.12
Seattle-Everett WA	2,000	1.34	1.45	0.11
Tampa-St Petersburg-Clearwater FL	1,950	1.26	1.29	0.03
Denver CO	1,910	1.17	1.42	0.25
Cleveland OH	1,885	1.06	1.13	0.07
Pittsburgh PA	1,790	1.10	1.10	0.00
San Jose CA	1,675	1.44	1.42	–0.02
Ft. Lauderdale-Hollywood-Pompano Bch FL	1,560	1.14	1.37	0.23
Norfolk-Newport News-Virginia Beach VA	1,500	1.15	1.18	0.03
Portland-Vancouver OR-WA	1,500	1.16	1.40	0.24
Kansas City MO-KS	1,420	1.03	1.10	0.07
San Bernardino-Riverside CA	1,410	1.24	1.34	0.10
Sacramento CA	1,395	1.20	1.31	0.11
Milwaukee WI	1,365	1.12	1.26	0.14
Cincinnati OH-KY	1,285	1.12	1.26	0.14
San Antonio TX	1,250	1.08	1.23	0.15
Las Vegas NV	1,200	1.23	1.35	0.12
Orlando FL	1,200	1.16	1.29	0.13
Buffalo-Niagara Falls NY	1,110	1.04	1.08	0.04
New Orleans LA	1,105	1.16	1.18	0.02
Oklahoma City OK	1,080	1.03	1.09	0.06
Columbus OH	1,040	1.10	1.19	0.09
W Palm Bch-Boca Raton-Delray Bch FL	1,030	1.12	1.25	0.13
Indianapolis IN	1,020	1.06	1.24	0.18

TABLE 13/14 Travel Time Index and Change by Metro Area Population for 75 Metro Areas: 1990 and 2000 *(continued)*

Urban areas	Population (000) 2000	Travel Time Index 1990	Travel Time Index 2000	Change 1990-2000
Memphis TN-AR-MS	975	1.09	1.21	0.12
Providence-Pawtucket RI-MA	915	1.12	1.21	0.09
Salt Lake City UT	900	1.08	1.17	0.09
Jacksonville FL	865	1.11	1.15	0.04
Louisville KY-IN	840	1.08	1.24	0.16
Tulsa OK	800	1.05	1.12	0.07
Austin TX	730	1.12	1.27	0.15
Nashville TN	700	1.10	1.18	0.08
Honolulu HI	695	1.22	1.20	–0.02
Tucson AZ	680	1.11	1.20	0.09
Birmingham AL	670	1.06	1.17	0.11
El Paso TX-NM	655	1.04	1.17	0.13
Rochester NY	650	1.03	1.06	0.03
Charlotte NC	645	1.16	1.27	0.11
Hartford-Middletown CT	645	1.09	1.12	0.03
Richmond VA	640	1.05	1.10	0.05
Omaha NE-IA	625	1.09	1.15	0.06
Tacoma WA	605	1.11	1.23	0.12
Albuquerque NM	595	1.10	1.26	0.16
Fresno CA	555	1.13	1.20	0.07
Albany-Schenectady-Troy NY	515	1.04	1.06	0.02
Colorado Springs CO	465	1.04	1.20	0.16
Charleston SC	455	1.15	1.19	0.04
Bakersfield CA	405	1.03	1.06	0.03
Spokane WA	330	1.04	1.08	0.04
Corpus Christi TX	315	1.03	1.04	0.01
Pensacola FL	305	1.08	1.14	0.06
Fort Myers-Cape Coral FL	290	1.09	1.15	0.06
Anchorage AK	260	1.05	1.04	–0.01
Eugene-Springfield OR	220	1.04	1.12	0.08
Salem OR	195	1.04	1.10	0.06
Laredo TX	185	1.03	1.06	0.03
Brownsville TX	155	1.04	1.08	0.04
Beaumont TX	145	1.03	1.05	0.02
Boulder CO	110	1.03	1.09	0.06

NOTE: The Travel Time Index is the ratio of peak period travel time to free-flow travel time. The Travel Time Index expresses the average amount of extra time it takes to travel in the peak relative to free-flow travel.

SOURCE: Texas A&M University, Texas Transportation Institutue, *2002 Urban Mobility Report* (College Station, TX: 2002), available at http://tti.tamu.edu/, as of May 2003.

TABLE 15 U.S. Air Carrier On-Time Performance: 1996–2002
Number of flights

	1996	1997	1998	1999	2000	2001	2002
On-time flights	3,989,281	4,218,165	4,156,980	4,207,293	4,130,185	4,619,234	4,329,635
Late arrivals	1,220,045	1,083,834	1,070,071	1,152,725	1,356,450	1,104,439	868,225
Diverted flights	14,121	12,081	13,161	13,555	14,254	12,909	8,356
Canceled flights	128,536	97,763	144,509	154,311	187,599	231,198	65,143

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Airline On-Time Performance Database, personal communication, November 2000 and November 2002.

TABLE 16 Amtrak On-Time Performance: 1993–2002
Percent

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
System on-time performance	72	72	76	71	74	79	79	78	75	77
Short distance (<400 mi)	79	78	81	76	79	81	80	81	NA[1]	NA[1]
Long distance (>=400 mi)	47	49	57	49	53	59	61	56	NA[1]	NA[1]

[1] As of 2001, Amtrak no longer reports short- and long-haul data separately.

KEY: NA = not applicable.

NOTE: Amtrak on-time performance data is provided as a percentage. Raw data are not readily available.

SOURCES: 1993–1999—Amtrak, National Railroad Passenger Corporation, *Annual Reports* (Washington, DC: 2000 and 2001 issues). **2000–2002**—Amtrak, personal communication, Mar. 3, 2003.

TABLE 17 Amtrak Hours of Delay by Cause: 1990–1999

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Amtrak[1]	3,565	5,915	6,433	8,488	8,538	5,527	5,193	5,310	4,796	4,891
Freight[2]	4,244	7,743	8,229	12,827	14,319	11,224	11,438	12,904	14,202	16,158
Other[3]	4,316	7,426	8,185	11,675	11,871	8,497	8,425	7,611	8,291	8,203
Total	12,125	21,084	22,847	32,991	34,729	25,248	25,056	25,825	27,289	29,252

[1] Includes equipment malfunctions, train servicing in stations, and passenger-related delays.
[2] Includes delays for track repairs/track conditions, freight train interference, and signal delays.
[3] Includes passenger train interference, waiting for connections, running time, weather-related delays, and miscellaneous.

NOTE: Amtrak changed its method for reporting delays in 2000. Therefore, data after 1999 are not comparable to prior years and are not presented here.

SOURCE: 1993–1999—National Railroad Passenger Corporation (Amtrak), *Annual Report* (Washington, DC: 2000 and 2001 issues).

TABLE 18 Number of Trucks by Vehicle Weight: 1992 and 1997

	Thousands of trucks	
	1992	**1997**
Light trucks (< 6,001 lb)	50,545.7	62,798.4
Medium trucks (6,001 to 19,500 lb)	5,906.5	6,737.1
Light-heavy trucks (19,501 to 26,000 lb)	732.0	729.3
Heavy trucks (> 26,000 lb)	3,074.5	3,986.9

KEY: lb = pound.

NOTES: Weight is the empty weight of the vehicle plus the average vehicle load.
Excludes vehicles owned by federal, state, or local governments; ambulances; buses; motor homes; farm tractors; unpowered trailer units; and trucks reported to have been sold, junked, or wrecked prior to July 1 of the year preceding the survey.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, National Transportation Statistics 2002 (Washington, DC: 2002), table 1-21, also available at http://www.bts.gov/, as of April 2003.
The original source of these data are the U.S. Census Bureau's *Vehicle Inventory and Use Survey* (VIUS). The truck categories in *National Transportation Statistics 2002* and this report differ from those in the VIUS, which has the following categories: light trucks—10,000 lbs or less; medium trucks—10,001 lbs–19,500 lbs; light-heavy trucks—19,501 lbs–26,000 lbs; and heavy-heavy trucks—26,001 lbs or more.

TABLE 19/20 Share of Loadings on Interstate Highways: 2001
Percent

Location	Passenger cars, buses, and light trucks	Heavy single-unit trucks	3- and 4-axle combination trucks	5-axle or more combination trucks
Rural	2	6	4	89
Urban	3	14	5	77

NOTES: Based on data from the Truck Weight Study which are collected by the States for varying time periods each year and are not adjusted to typify annual averages. Loadings are based on equivalent single axle loads (ESALs), a standard unit of pavement damage based on the amount of force applied to pavement by an 18,000-pound axle, which is roughly equivalent to a standard truck axle. Raw data are not available.

SOURCE: U.S. Department of Transportation, Federal Highway Adminstration, *Highway Statistics 2001* (Washington, DC: 2002), table TC-3.

Table 21 Average Capacity of Vessels Calling at U.S. Ports: 1998–2001
Deadweight tons

	1998	1999	2000	2001
Tanker	78,534	78,027	78,782	79,004
Dry bulk	40,930	41,211	41,031	41,072
Containership	35,671	36,580	37,814	38,922
Ro-Ro	19,848	18,734	18,402	19,104
Chemical tankers	27,303	27,499	27,750	27,544
Gas carriers	30,435	30,973	31,339	33,898
Other	29,364	32,151	33,790	33,895
Total	44,519	44,951	45,467	46,238

KEY: Ro-Ro = roll-on, roll-off vessels, which are especially designed to carry wheeled containers trailers, or other wheeled cargo, and use the roll-on/roll-off method for loading and unloading.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculation based on U.S. Department of Transportation, Maritime Administration, *Vessel Calls at U.S. Ports* (Washington, DC: Annual issues), tables H-6 and H-8.

TABLE 22 Measures of U.S. Railroad Freight Volume: 1991–2001
Millions

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Tons	1,383	1,399	1,397	1,470	1,550	1,611	1,585	1,649	1,717	1,738	1,742
Carloads	21	21	22	23	24	24	25	26	27	28	27

SOURCE: Association of American of Railroads, *Railroad Facts 2001* and *2002* (Washington, DC: 2001 and 2002 issues).

TABLE 23 Average Loaded U.S. Railcar Weight: 1991–2001

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Tons per carload	66	66	64	63	65	67	63	64	63	63	64

NOTE: Average railcar weight is total tons transported divided by total carloads transported.

SOURCE: Association of American of Railroads, *Railroad Facts 2001* and *2002* (Washington, DC: 2001 and 2002 issues).

TABLE 24 Average Loaded U.S. Railcar Weight for Selected Commodities: 1991 and 2001

	Tons per car	
	1991	2001
Farm products	90	94
Coal	99	110
Nonmetallic minerals	92	96
Food and kindred products	63	68
Chemicals and allied products	81	84
Transportation equipment	21	21
Miscellaneous mixed shipments	17	15

NOTES: Miscellaneous mixed shipments is mostly intermodal traffic. Some intermodal traffic is included in commodity-specific categories instead.

SOURCES: Association of American of Railroads, *Railroad Facts 2001* and *2002* (Washington, DC: 2001 and 2002 issues). **1991 data**—U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on Association of American of Railroads, *Railroad Ten-Year Trends 1990–1999* (Washington, DC: 2000).

TABLE 25 Miles Traveled Per Day: 2001

Person miles for all modes	40
Person miles in personal vehicles	35

NOTE: Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1, available at http://nhts.ornl.gov, as of January 2003.

TABLE 26 Trips Completed Per Day: 2001

Person trips for all modes	4.1
Person trips in personal vehicles	3.5

NOTE: Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1, available at http://nhts.ornl.gov, as of January 2003.

TABLE 27 Average Trip Distance by Purpose: 2001
Miles

Purpose	Average trip length
Vacation (includes rest and relaxation)	37
Work-related business	29
Visit friends/relatives	14
To/from work	12
Medical/dental	10
Total reported	10
Other social/recreational	8
Other family/personal	7
Shopping	7
School/church	6

NOTES: The 2001 National Household Travel Survey defined a trip as each time a person went from one address to another. "Commute" trips were defined as those trips made for the purpose of going to or returning from work. However, given the definition of a trip, those reported as commuting trips were not necessarily anchored by the home or workplace (for return commutes). Therefore, care should be taken in analyzing work trips, recognizing that the distance for these trips is often, but not always, the distance from home to work. Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1 (day trip data only), available at http://nhts.ornl.gov/, as of January 2003.

TABLE 28 Person Trips by Purpose: 2001

Trip purpose	Total person trips (millions)	Percent
To/from work	60,893	14.9
Work-related business	11,717	2.9
Shopping	79,715	19.5
Other family/personal business	94,886	23.2
Medical/dental	8,863	2.2
School/church	40,220	9.8
Vacation (includes rest and relaxation)	2,675	0.7
Visit friends/relatives	32,269	7.9
Other social/recreational	75,779	18.5
Other	2,250	0.6
All reported	409,267	100.0

NOTES: The 2001 National Household Travel Survey defined a trip as each time a person went from one address to another. “Commute” trips were defined as those trips made for the purpose of going to or returning from work. However, given the definition of a trip, those reported as commuting trips were not necessarily anchored by the home or workplace (for return commutes). Therefore, care should be taken in analyzing to/from work trips, recognizing that the distance for these trips is often, but not always, the distance from home to work. Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here. Excluded from work-related business trips are trips made by people who are directly providing the transportation of passengers or goods, such as bus or truck drivers, delivery persons, etc.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1 (day trip data only), available at http://nhts.ornl.gov/, as of January 2003.

TABLE 29a Modal Share of Person Trips: 2001

	Number (millions)	Percentage of total
Personal vehicle	355,260	86.5
Air	405	0.1
Transit	6,455	1.6
School bus	6,986	1.7
Bicycle/walk	38,848	9.5
Other	2,748	0.7
Total	410,702	100.0

NOTE: Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1, available at http://nhts.ornl.gov/, as of January 2003.

TABLE 29b Person Trips by Personal Vehicle: 2001

Transportation mode	Number (millions)	Percent
Personal vehicle (including motorcycle)	355,260	100.0
Car	208,875	58.8
Van	50,116	14.1
SUV	46,265	13.0
Pickup truck	46,990	13.2
Other truck, RV, motorcycle	3,014	0.8

KEY: RV = recreational vehicle; SUV = sport utility vehicle.

NOTES: Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1, available at http://nhts.orgnhts.ornl.gov/, as of January 2003.

TABLE 29c Person Trips by Transit: 2001

Transportation mode	Number (millions)	Percent
Transit	6,455	100.0
Bus	4,295	66.5
Subway/elevated rail	1,643	25.5
Street car/trolley	101	1.6
Commuter train	370	5.7
Passenger line/ferry	46	0.7

NOTES: Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1, available at http://nhts.ornl.gov/, as of January 2003.

TABLE 30a Modal Share of Person-Miles: 2001

	Miles (millions)	Percent of total
Personal vehicle	3,531,205	88.1
Air	322,801	8.1
Transit	44,890	1.1
School bus	45,431	1.1
Bicycle/walk	32,397	0.8
Other	32,821	0.8
Total reported	4,009,545	100.0

NOTES: Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1, available at http://nhts.ornl.gov/, as of January 2003.

TABLE 30b Person-Miles by Personal Vehicle

Transportation mode	Miles (millions)	Percent
Personal vehicle (including motorcycle)	3,531,205	100.0
Car	1,949,100	55.2
Van	477,915	13.5
SUV	468,598	13.3
Pickup truck	544,411	15.4
Other truck, RV, motorcycle	91,181	2.6

KEY: RV = recreational vehicle; SUV = sport utility vehicle.

NOTES: Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1, available at http://nhts.ornl.gov/, as of January 2003.

TABLE 30c Person-Miles by Transit: 2001

Transportation mode	Miles (millions)	Percent
Transit	44,890	100.00
Bus	23,649	52.7
Subway/elevated rail	11,488	25.6
Street car/trolley	615	1.4
Commuter train	8,191	18.2
Passenger line/ferry	947	2.1

NOTES: Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1, available at http://nhts.ornl.gov/, as of January 2003.

TABLE 31a U.S. Households by Number of Vehicles: 2001

Number of vehicles	Millions	Percent
None	8.5	7.9
1	33.7	31.4
2	39.9	37.1
3	16.2	15.1
4	6.0	5.6
5 or more	3.2	3.0
All	107.4	100.0

NOTES: Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included herected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1, available at http://nhts.ornl.gov/, as of January 2003.

TABLE 31b Person Trips by Mode by Households: 2001

Households without vehicles			Households with one or more vehicles		
Transportation mode	Person trips (millions)	Person trips (percent)	Transportation mode	Person trips (millions)	Person trips (percent)
Personal vehicle	5,008	35.6	Personal vehicle	349,672	88.2
Motorcycle	0	0.0	Motorcycle	579	0.1
Air	21	0.2	Air	384	0.1
Transit	2,859	20.3	Transit	3,597	0.9
Bus	2,033	14.5	Bus	2,262	0.6
Subway/elevated rail	754	5.4	Subway/elevated rail	890	0.2
Street car/trolley	34	0.2	Street car/trolley	67	0.0
Commuter train	38	0.3	Commuter train	333	0.1
Passenger line/ferry	0	0.0	Passenger line/ferry	45	0.0
Charter/tour/intercity bus	109	0.8	Charter/tour/intercity bus	349	0.1
School bus	298	2.1	School bus	6,689	1.7
Taxi, limo, shuttle bus	148	1.1	Taxi, limo, shuttle bus	573	0.1
Intercity train	6	0.0	Intercity train	107	0.0
Bicycle	307	2.2	Bicycle	3,214	0.8
Walk	5,155	36.7	Walk	30,170	7.6
Other	150	1.1	Other	1,306	0.3
Total reported	14,061	100.0	Total reported	396,640	100.0

NOTES: Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1, available at http://nhts.ornl.gov/, as of January 2003.

TABLE 32a Proportion of Households Without Vehicles by Household Type: 2001

	Percent
Household income 25K or more	2.3
Household income less than 25K	20.3
Residence is owned/other	3.1
Residence is rented	17.7
Residence is not a condo/apt.	4.0
Residence is a condo/apt.	21.9
Multi-person household	4.1
Single-person household	18.7
Household in rural area	3.6
Household in urban area	9.0
All households	7.9

KEY: condo = condominium; apt. = apartment.

NOTES: Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1, available at http://nhts.ornl.gov/, as of January 2003.

TABLE 32b Average Trips and Miles by Households With and Without Vehicles: 2001

	Households without vehicles	Households with one or more vehicles
Trips per person	1,005	1,508
Miles per person	6,873	14,931

NOTES: Data are from the daily travel segment of the 2001 National Household Travel Survey. Long-distance travel data (i.e., trips of 50 miles or more collected during a 4-week travel period) are not included here.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, National Household Travel Survey, Preliminary Data Release Version 1, available at http://nhts.ornl.gov/, as of January 2003.

TABLE 33a Average Household Transportation Expenditures: 1991–2001
Chained 1996 dollars

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Vehicle purchases	2,445	2,468	2,528	2,868	2,682	2,815	2,743	2,996	3,335	3,436	3,585
Gasoline and motor oil	1,063	1,043	1,058	1,063	1,068	1,082	1,098	1,168	1,113	1,066	1,095
Other vehicle expenses	1,716	1,739	1,835	1,956	2,011	2,058	2,243	2,238	2,300	2,320	2,356
Other transportation	350	320	334	398	361	427	380	409	377	403	370

NOTES: Data are based on survey results. The Bureau of Labor Statistics uses the term "consumer unit" rather than "household." There are an average of 2.5 persons in each consumer unit, which is defined as members of a household related by blood, marriage, adoption, or other legal arrangement; a single person living alone or sharing a household with another but who is financially independent; or two or more persons living together who share responsibility for at least two-thirds of major types of expenses—food, housing, and other expenses.

Other transportation includes both local transit, such as bus and taxi travel, and long-distance travel, such as airplane trips.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, *Consumer Expenditure Survey* data query, February 2003.

TABLE 33b Average Household Transportation Expenditures: 1991–2001
Current dollars

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Vehicle purchases	2,111	2,189	2,319	2,725	2,638	2,815	2,736	2,964	3,305	3,418	3,579
Gasoline and motor oil	995	973	977	986	1,006	1,082	1,098	1,017	1,055	1,291	1,279
Other vehicle expenses	1,741	1,776	1,843	1,953	2,015	2,058	2,230	2,206	2,254	2,281	2,375
Other transportation	304	290	314	381	355	427	393	429	397	427	400

NOTES: Data are based on survey results. The Bureau of Labor Statistics uses the term "consumer unit" rather than "household." There are an average of 2.5 persons in each consumer unit, which is defined as members of a household related by blood, marriage, adoption, or other legal arrangement; a single person living alone or sharing a household with another but who is financially independent; or two or more persons living together who share responsibility for at least two-thirds of major types of expenses—food, housing, and other expenses.

Other transportation includes both local transit, such as bus and taxi travel, and long-distance travel, such as airplane trips.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, *Consumer Expenditure Survey* data query, February 2003.

TABLE 34a Average per Mile Cost of Owning and Operating an Automobile: 1991–2001
Chained 1996 dollars

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total	0.43	0.43	0.42	0.42	0.42	0.43	0.45	0.47	0.48	0.48	0.50
Variable	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.06
Fixed	0.32	0.34	0.32	0.32	0.32	0.33	0.34	0.36	0.37	0.37	0.37

NOTE: Data are the cost per mile based on 15,000 miles per year.

SOURCES: 1991–1998—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 3-14. **1999–2001**—American Automobile Association, "Your Driving Costs" (Heathrow, FL: 1999–2002 issues).

TABLE 34b Average per Mile Cost of Owning and Operating an Automobile: 1991–2002
Current dollars

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Total	0.37	0.39	0.39	0.39	0.41	0.43	0.45	0.46	0.47	0.49	0.51	0.50
Variable	0.10	0.09	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.12	0.14	0.12
Fixed	0.28	0.30	0.30	0.30	0.32	0.33	0.34	0.35	0.36	0.37	0.37	0.38

NOTE: Data are the cost per mile based on 15,000 miles per year.

SOURCES: 1991–1998—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 3-14. **1999–2002**—American Automobile Association, "Your Driving Costs" (Heathrow, FL: 1999–2002 issues).

TABLE 35a Amtrak Average Revenue per Revenue Passenger-Mile: 1993–2001
Current dollars

Year	Revenue per RPM
1993	0.13
1994	0.12
1995	0.14
1996	0.15
1997	0.15
1998	0.15
1999	0.20
2000	0.22
2001	0.23

TABLE 35b Amtrak Average Revenue per Revenue Passenger-Mile: 1993–2001
Chained 1996 dollars

Year	Revenue per RPM
1993	0.15
1994	0.14
1995	0.14
1996	0.15
1997	0.15
1998	0.15
1999	0.19
2000	0.20
2001	0.20

KEY FOR TABLES 35a and 35b: RPM = revenue passenger-mile.

NOTES FOR TABLES 35a and 35b: Amtrak data are not available prior to 1993. Revenue includes revenue from concessions and other passenger services in addition to passenger fares. RPM is revenue passenger-miles, or the number of revenue passengers multiplied by the average number of miles traveled by each passenger.

Current dollar amounts were adjusted to eliminate the effects of inflation over time. Amtrak revenue data were adjusted for inflation using the intercity rail deflator from the Bureau of Economic Analysis' Chain-Type Quantity and Price Indexes for Personal Consumption Expenditures.

SOURCE FOR TABLES 35a and 35b: American Association of Railroads, *Railroad Facts* (Washington, DC: 1994–2002 issues).

TABLE 36a Average Class I Intercity Bus Fare: 1990–2000
Current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Class I intercity bus	20.22	21.86	21.15	21.32	19.77	20.10	22.85	20.71	23.00	25.43	29.46

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 3-15a.

TABLE 36b Average Class I Intercity Bus Fare: 1990–2000
Chained 1996 dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Class I intercity bus	20.57	21.25	20.23	21.05	19.55	20.49	22.85	20.62	21.72	23.47	26.02

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 3-15b.

TABLE 37/38a Average Transit Fare per Passenger-Mile: Fiscal Years 1990–2000
Current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Bus	0.14	0.15	0.15	0.15	0.17	0.17	0.18	0.18	0.20	0.20	0.21
Commuter rail	0.13	0.13	0.13	0.14	0.14	0.13	0.14	0.15	0.14	0.15	0.15
Demand responsive	0.09	0.15	0.15	0.17	0.30	0.24	0.24	0.23	0.19	0.20	0.20
Heavy rail	0.15	0.16	0.17	0.19	0.19	0.19	0.20	0.20	0.19	0.18	0.18
Light rail	0.14	0.15	0.14	0.15	0.16	0.15	0.15	0.13	0.13	0.14	0.13
Trolley bus	0.24	0.26	0.24	0.28	0.29	0.29	0.30	0.30	0.30	0.32	0.31
Other	0.15	0.14	0.16	0.15	0.18	0.17	0.13	0.14	0.11	0.12	0.13
Total	0.14	0.15	0.15	0.16	0.17	0.17	0.18	0.18	0.18	0.18	0.18

NOTES: Data for 2000 are preliminary. Beginning in 1991, fares include subsidies formerly classified as "Other" operating funding.
Commuter rail: Urban/suburban passenger train service for short-distance travel between a central city and adjacent suburbs run on tracks of a traditional railroad system. Does not include heavy- or light-rail transit service.
Heavy rail: High-speed transit rail operated on rights-of-way that exlcude all other vehicles and pedestrians.
Light rail: Urban transit rail operated on a reserved right-of-way that may be crossed by roads used by motor vehicles and pedestrians.
Demand responsive: A nonfixed-route, nonfixed-schedule form of transportation that operates in response to calls from passengers or their agents to the transit operator or dispatcher.

SOURCES: American Public Transportation Association, *Public Transportation Fact Book 2001*, Tables 18 and 26, available at http://www.apta.com/stats/fares/faremode.htm, as of February 2003. **Modal definitions**—U.S. Department of Transportaton, Bureau of Transportation Statistics, *Pocket Guide to Transportation 2003* (Washington, DC: 2003), glossary.

TABLE 37/38b Average Transit Fare per Passenger-Mile: Fiscal Years 1990–2000
Chained 1996 dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Bus	0.18	0.18	0.18	0.18	0.19	0.19	0.18	0.18	0.20	0.20	0.20
Commuter rail	0.17	0.16	0.15	0.16	0.15	0.14	0.14	0.14	0.14	0.15	0.15
Demand responsive	0.12	0.19	0.18	0.19	0.33	0.26	0.24	0.22	0.19	0.20	0.20
Heavy rail	0.19	0.20	0.20	0.21	0.21	0.21	0.20	0.19	0.19	0.18	0.18
Light rail	0.18	0.18	0.16	0.17	0.18	0.16	0.15	0.13	0.13	0.14	0.13
Trolley bus	0.30	0.33	0.29	0.32	0.33	0.32	0.30	0.30	0.30	0.32	0.31
Other	0.19	0.18	0.18	0.17	0.20	0.19	0.13	0.14	0.11	0.12	0.13
Total	0.18	0.18	0.18	0.18	0.19	0.19	0.18	0.18	0.18	0.18	0.18

NOTES: Data for 2000 are preliminary. Beginning in 1991, fares include subsidies formerly classified as "Other" operating funding.

Commuter rail: Urban/suburban passenger train service for short-distance travel between a central city and adjacent suburbs run on tracks of a traditional railroad system. Does not include heavy- or light-rail transit service.
Heavy rail: High-speed transit rail operated on rights-of-way that exlcude all other vehicles and pedestrians.
Light rail: Urban transit rail operated on a reserved right-of-way that may be crossed by roads used by motor vehicles and pedestrians.
Demand responsive: A nonfixed-route, nonfixed-schedule form of transportation that operates in response to calls from passengers or their agents to the transit operator or dispatcher.

SOURCES: American Public Transportation Association, *Public Transportation Fact Book 2001*, Tables 18 and 26, available at http://www.apta.com/stats/fares/faremode.htm, as of February 2003. **Modal definitions**—U.S. Department of Transportaton, Bureau of Transportation Statistics, *Pocket Guide to Transportation 2003* (Washington, DC: 2003), glossary.

TABLE 39 Share of Personal Income Spent on Commuting by Income Group: 1999
Current dollars

Yearly personal income	Median spent	Percent
< $8,000	339	9.5
$8,000–$14,999	762	6.0
$15,000–$21,999	800	4.6
$22,000–$29,999	1,040	4.1
$30,000–$44,999	1,280	3.5
≥$45,000	1,600	2.2
Total population	960	3.9

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, U.S. Census Bureau, *Survey of Income and Program Participation* (Hyattsville, MD: 2001), also available at http://www.bls.census.gov/sipp/, as of April 2003.

TABLE 40 Share of Personal Income Spent on Commuting by Income Group and Transportation Mode: 1999
Current dollars

	Own vehicle		Public transit	
Yearly personal income	**Median spent**	**Percent**	**Median spent**	**Percent**
< $8,000	678	20.5	540	12.8
$8,000–$14,999	847	8.0	702	5.7
$15,000–$21,999	960	5.6	765	3.9
$22,000–$29,999	1,280	5.1	765	3.0
$30,000–$44,999	1,600	4.2	765	2.2
≥$45,000	1,694	2.6	1,080	1.5
Total population	1,280	4.9	765	3.3

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, U.S. Census Bureau, *Survey of Income and Program Participation* (Hyattsville, MD: 2001), also available at http://www.bls.census.gov/sipp/, as of April 2003.

TABLE 41 Origin and Destination Survey Index by City of Origin for Three Medium-sized U.S. Cities: 1995–2000
All classes of service, domestic carriers only
Q1 1995 = 100

Quarter	Charleston, SC	Colorado Springs, CO	Des Moines, IA
95Q1	100.0	100.0	100.0
95Q2	102.5	95.5	102.5
95Q3	104.5	90.0	97.1
95Q4	104.9	81.8	95.7
96Q1	103.2	76.4	95.5
96Q2	93.2	83.0	96.1
96Q3	98.8	83.8	95.7
96Q4	97.8	79.6	101.3
97Q1	100.2	80.8	106.1
97Q2	102.4	81.9	105.5
97Q3	99.2	86.3	107.1
97Q4	104.9	93.3	115.3
98Q1	104.5	94.6	103.0
98Q2	102.4	93.6	96.5
98Q3	96.8	98.5	94.9
98Q4	98.9	98.0	91.1
99Q1	102.1	104.8	93.1
99Q2	104.4	106.2	94.9
99Q3	101.6	105.9	92.8
99Q4	102.0	107.8	91.9
00Q1	105.0	111.9	94.8
00Q2	105.3	113.0	100.7
00Q3	103.6	113.0	99.7
00Q4	108.6	110.9	96.3

NOTES: These data have been developed for research purposes only and are not official BTS data. The O&D Survey indices are computed using the Fisher Index formula, which differs from the formulas used to compute the Bureau of Labor Statistics (BLS) airline fare Consumer Price Index (CPI).

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Airline Fare Consumer Price Index, available at http://www.bls.gov/cpi/home.htm, as of March 2003.

TABLE 42 Origin and Destination Survey Index by City of Origin for Three Large International Cities: 1995–2000
All classes of service combined
Q1 1995 = 100

Quarter	Frankfurt, Germany	London, England	Tokyo, Japan
95Q1	100.0	100.0	100.0
95Q2	108.7	118.7	114.9
95Q3	119.6	132.1	122.3
95Q4	106.1	121.3	94.6
96Q1	97.4	120.7	91.9
96Q2	103.3	113.1	91.2
96Q3	116.3	112.3	100.4
96Q4	93.3	106.0	86.4
97Q1	91.6	99.8	81.1
97Q2	88.3	108.0	78.8
97Q3	103.0	123.8	93.5
97Q4	92.2	105.4	73.5
98Q1	80.0	91.0	67.4
98Q2	88.0	96.8	63.4
98Q3	101.7	97.4	68.9
98Q4	86.4	81.5	67.7
99Q1	81.2	74.1	70.9
99Q2	83.6	71.6	70.6
99Q3	92.0	81.8	84.2
99Q4	84.0	71.3	79.2
00Q1	76.7	67.3	78.8
00Q2	79.5	70.9	81.9
00Q3	88.3	80.0	94.3
00Q4	74.0	67.4	80.4

NOTES: These data have been developed for research purposes only and are not official BTS data. The O&D Survey indices are computed using the Fisher Index formula, which differs from the formulas used to compute the Bureau of Labor Statistics (BLS) airline fare Consumer Price Index (CPI).

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics (BTS) and U.S. Department of Labor, Bureau of Labor Statistics, calculations based on data from BTS's quarterly *Passenger Origin & Destination Survey*, March 2003.

TABLE 43 Comparison of Airfare Indices: 1995–2000
Not seasonally adjusted, domestic carriers only
Q1 1995 = 100

Quarter	BLS airline fare CPI, quarterly average	O&D survey, all origins	O&D survey, U.S. origin only	O&D survey, foreign origin only
95Q1	100.0	100.0	100.0	100.0
95Q2	106.1	101.9	101.1	106.7
95Q3	105.7	102.3	100.4	113.6
95Q4	102.6	98.6	99.0	97.6
96Q1	101.1	98.4	98.7	97.3
96Q2	103.6	97.8	97.8	98.4
96Q3	105.5	99.3	98.4	105.6
96Q4	110.1	98.2	99.3	93.4
97Q1	107.9	100.5	102.0	93.3
97Q2	110.1	101.9	103.5	94.4
97Q3	108.4	101.9	102.2	101.9
97Q4	108.8	105.2	107.8	91.8
98Q1	112.4	101.4	104.6	84.5
98Q2	112.1	97.5	100.0	85.2
98Q3	113.1	97.3	99.5	86.3
98Q4	110.8	96.2	99.1	81.1
99Q1	116.3	98.9	102.2	81.6
99Q2	119.4	98.7	102.1	80.7
99Q3	119.1	98.4	100.4	88.0
99Q4	123.1	98.8	101.7	83.6
00Q1	126.1	102.5	106.1	83.0
00Q2	132.1	104.6	108.2	85.1
00Q3	135.1	106.4	109.0	92.8
00Q4	129.7	107.3	111.6	84.4

NOTES: These data have been developed for research purposes only and are not official BTS data. The O&D Survey indices are computed using the Fisher Index formula, which differs from the formulas used to compute the Bureau of Labor Statistics (BLS) Airline fare Consumer Price Index (CPI).

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics (BTS) and U.S. Department of Labor, Bureau of Labor Statistics, calculations based on data from BTS's quarterly *Passenger Origin & Destination Survey*, March 2003.

TABLE 44 Passenger-Miles by Type of Service: 1991–2001
Millions

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Bus	18,104	17,494	17,364	17,195	17,024	16,802	17,509	17,874	18,684	18,807	19,583
Heavy rail	10,488	10,737	10,231	10,668	10,559	11,530	12,056	12,284	12,902	13,844	14,178
Commuter rail	7,383	7,320	6,912	7,996	8,244	8,350	8,037	8,702	8,764	9,400	9,544
Light rail	661	700	704	831	859	955	1,024	1,115	1,190	1,339	1,427
Other	837	902	1,015	1,191	1,285	1,346	1,554	1,629	1,739	1,710	1,776
Total	37,473	37,153	36,225	37,882	37,971	38,984	40,180	41,605	43,279	45,100	46,508

NOTE: Other includes modes such as demand responsive, automated guideway, Alaska Railroad, cable car, ferryboat, inclined plane, monorail, trolleybus, and vanpool.

SOURCES: **1991–1994**—U.S. Department of Transportation, Federal Transit Administration, *1994 National Transit Summaries and Trends* (Washington, DC: 1996); **1995**—U.S. Department of Transportation, Federal Transit Administration, *1997 National Transit Summaries and Trends* (Washington, DC: 1999); **1996–2001**—U.S. Department of Transportation, Federal Transit Administration, National Transit Database, Data Tables (Washington, DC: 1996–2001 issues).

TABLE 45/46 Transit Ridership by Selected Type of Service: 1991–2001
Millions

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Bus	4,826	4,749	4,639	4,629	4,579	4,506	4,602	4,754	4,992	5,040	5,215
Commuter rail	324	314	321	339	344	352	357	381	396	413	418
Heavy rail	2,167	2,207	2,046	2,169	2,034	2,157	2,430	2,393	2,521	2,632	2,728
Light rail	184	188	188	282	249	259	259	273	289	316	334
Total	7,738	7,696	7,433	7,702	7,504	7,565	7,954	8,115	8,523	8,720	9,008

NOTE: Total includes other modes not shown, such as ferryboats, demand responsive, inclined planes, and trolley buses.

SOURCE: U.S. Department of Transportation, Federal Transit Administration, "National Transit Summaries and Trends," 2002 draft, available at http://www.ntdprogram.com, as of February 2003.

TABLE 47 Top 30 Transit Authorities by Unlinked Passenger Trips: 2001

Agency	Number of unlinked trips (thousands)
New York City Transit, NY	2,667,001
Chicago Transit Authority, IL	484,821
LA County Metro Transportation Authority, CA	398,111
Washington-Metro Area Transit Authority, DC	378,936
Massachusetts Bay Transit Authority, MA	364,337
SE Pennsylvania Transportation Authority, PA	318,051
San Francisco Municipal Railway, CA	235,078
New Jersey Transit, NJ	225,939
Metro Atlanta Rapid Transit Authority, GA	164,078
Maryland Transit Administration, MD	111,048
San Francisco Bay Area Rapid Transit, CA	103,919
Long Island Rail Road, NY	101,923
King County DOT, Metro Transit District, WA	101,000
Oregon Tri-County District, OR	91,186
Metro Transit Authority Harris County, TX	88,246
Miami-Dade Transit Agency, FL	84,005
Green Transit Jamaica Corporation, NY	82,191
Port Authority Trans-Hudson Corporation, NJ	82,038
Denver Regional Transportation District, CO	79,651
Port Authority Allegheny, PA	74,827
Metro Transit, MN	73,348
Metro North Rail Road, NY	73,213
NE IL Regional Commuter Railroad, IL	72,122
Milwaukee County Transportation System, WI	71,250
City and County of Honolulu, HI	71,115

(Table continues on the next page)

TABLE 47 Top 30 Transit Authorities by Unlinked Passenger Trips: 2001 *(continued)*

Agency	Number of unlinked trips (thousands)
Alameda-Contra Costa Transit District, CA	70,809
Dallas Area Rapid Transit, TX	61,434
Greater Cleveland Regional Transit Authority, OH	60,094
Orange County Transportation Authority, CA	57,328
Santa Clara Valley Transit Authority, CA	57,300
Total, top 30 authorities	6,789,770
Total, all authorities	9,007,800
Top 30 authorities as percent of all authorities	75.4

NOTES: The 30 largest transit agencies as of 2001. Tri-County Metropolitan is a municipal corporation of the State of Oregon. Green Transit Jamaica Corporation is a contractor for the New York City Department of Transportation.

SOURCE: U.S. Department of Transportation, Federal Transit Administration, National Transit Database, available at http://www.ntdprogram.com, as of February 2003.

TABLE 48 Lift- or Ramp-Equipped Transit Buses: 1993–2001

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total number of buses[1]	55,726	57,023	57,322	57,369	58,975	60,830	63,618	65,324	67,379
ADA-lift or ramp-equipped buses	29,088	31,065	35,381	38,316	40,932	46,278	51,213	54,585	58,785
ADA-lift or ramp-equipped buses (percent)	52	54	62	67	69	76	81	84	87

[1] Includes buses of transit agencies receiving federal funding for bus purchases, as well as buses of agencies not receiving federal funds that voluntarily report data to the Federal Transit Administration.

SOURCE: U.S. Department of Transportation, Federal Transit Administration, "National Transit Summaries and Trends," 2002 draft, available at http://www.ntdprogram.com, as of February 2003.

TABLE 49a Lift- or Ramp-Equipped Transit Buses by Type: 1993–2001
Percent

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Large buses	79.4	80.1	84.5	87.8	90.4	91.6	93.4	94.5	95.4
Medium buses	54.0	58.3	66.0	72.8	80.7	86.9	90.1	92.9	93.7
Small buses	50.3	51.9	59.2	63.8	65.2	72.6	76.8	79.9	84.5
Articulated buses	38.4	44.6	50.2	57.6	61.4	68.4	81.3	85.5	88.5

NOTES: Large buses have more than 35 seats, medium buses have 25–35 seats, and small buses have less than 25 seats. Articulated buses are extra-long buses that measure between 54 and 60 feet.

SOURCE: U.S. Department of Transportation, Federal Transit Administration, "National Transit Summaries and Trends," 2002 draft, available at http://www.ntdprogram.com, as of February 2003.

TABLE 49b Lift- or Ramp-Equipped Transit Buses by Type: 1993–2001
Number

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Large buses	23,338	24,398	27,420	29,073	29,684	33,512	36,029	37,581	40,501
Medium buses	1,911	2,153	2,561	3,081	4,143	5,150	5,959	6,926	7,337
Small buses	3,146	3,795	4,539	5,269	6,194	6,545	7,722	8,366	9,176
Articulated buses	693	719	861	893	911	1,071	1,503	1,712	1,771

NOTES: Large buses have more than 35 seats, medium buses have 25–35 seats, and small buses have less than 25 seats. Articulated buses are extra-long buses that measure between 54 and 60 feet.

SOURCE: U.S. Department of Transportation, Federal Transit Administration, "National Transit Summaries and Trends," 2002 draft, available at http://www.ntdprogram.com, as of February 2003.

TABLE 50 Roadside Truck Inspections: 1990–2001
Thousands

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Inspected	1,601	1,574	1,616	1,947	1,974	1,840	2,039	2,148	1,763	1,862	1,928	2,087
Trucks taken out of service	542	497	462	506	472	417	437	439	448	453	457	486

NOTE: Data for trucks taken out of service in 2001 not available.

SOURCE: U.S. Department of Transportation, Federal Motor Carrier Safety Administration (FMCSA), Motor Carrier Management Information System, available at http://www.fmcsa.dot.gov, as of June 2003. **1999–2001 data—**personal communication, FMCSA, Aug. 11, 2003.

TABLE 51 Inspected Trucks Taken Out of Service for Repairs: 1990–2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Percent	33.8	31.6	28.6	26.0	23.9	22.7	21.4	20.4	25.4	24.3	23.7	23.3

NOTE: Data for trucks taken out of service in 2001 not available.

SOURCE: U.S. Department of Transportation, Federal Motor Carrier Safety Administration (FMCSA), Motor Carrier Management Information System, available at http://www.fmcsa.dot.gov, as of June 2003. **2001 data**—personal communication, FMCSA, Aug. 11, 2003.

TABLE 52 Federal-Aid Roadway Projects Underway by Improvement Type: 2001

Improvement type	Miles
Restoration	5,167
Resurfacing	12,549
Minor widening	492
Reconstruction	3,937
Major widening	1,476
Relocation	246
New route	738

NOTES: Maintenance includes any work required to keep highways in usable condition that does not extend the service life of the roadway beyond the original design. Restoration includes renovation. Although the following categories are not generally considered maintenance, they are included for comparison: major widening, relocation, new route.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2001* (Washington, DC), "Miles of Federal-Aid Roadway Projects Underway by Improvement Type" chart, available at http://www.fhwa.dot.gov/ohim, as of June 2003.

TABLE 53 Federal, State, and Local Government Highway Maintenance Expenditures: 1991–2001
Billions of dollars

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total in current $	21,222	22,578	22,894	23,553	24,319	25,564	26,777	28,173	29,997	30,636	31,677
Total in constant 1987 $	17,700	18,282	17,998	18,048	18,121	18,514	18,952	19,635	20,455	20,400	20,319

NOTES: Although dollar values in most other sections of this book have been converted to chained 1996 dollars, these data are presented in constant 1987 dollars. The Federal Highway Administration, which collects the data, adjusts current dollar data to constant 1987 dollars using an index that they have designed for that purpose.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2001* (Washington, DC: 2002), "Highway Expenditures by Government Type, Current and Constant Dollars" chart, also available at http://www.fhwa.dot.gov/ohim, as of June 2003.

TABLE 54 Rail Installed or Replaced by U.S. Class I Railroads: 1990–2001
Thousands of tons

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Replacement	781.2	666.7	875.3	824.3	728.8	657.6	803.3	642.7	679.0	769.3	726.1	660.1
Addition	19.5	16.7	14.2	26.2	62.9	61.3	68.7	113.8	204.8	213.4	196.3	197.0

SOURCE: Association of American Railroads, *Railroad Ten-Year Trends, 1990–2000* (Washington, DC: 2000); **2000–2001 data**—Association of American Railroads, *Analysis of Class I Railroads* (Washington, DC: 2000 and 2001).

TABLE 55 Crossties Installed or Replaced by U.S. Class I Railroads: 1990–2001
Millions of crossties

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Replacements	14.1	12.6	13.5	12.8	12.3	12.1	13.4	11.9	10.4	10.8	10.8	11.4
Additions	0.2	0.2	0.2	0.4	0.6	0.7	0.8	1.5	1.8	1.3	0.7	0.5

SOURCES: Association of American Railroads, *Railroad Ten-Year Trends, 1990–2000* (Washington, DC: 2000); **2000–2001 data—**Association of American Railroads, *Analysis of Class I Railroads* (Washington, DC: 2000 and 2001).

TABLE 56 New or Rebuilt Locomotives and Freight Cars: 1990–2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Locomotives	706	584	460	707	1214	1129	821	811	1061	865	721	755
Percentage of fleet	3.7	3.2	2.6	3.9	6.6	6.0	4.3	4.1	5.2	4.3	3.6	3.8
Freight cars	37,769	32,083	28,876	43,332	51,079	66,052	59,993	51,963	83,076	77,901	58,245	35,475
Percentage of fleet	3.1	2.7	2.5	3.7	4.3	5.4	4.8	4.1	6.3	5.7	4.2	2.7

NOTE: Locomotive data are for Class I railroads only. Freight car data cover Class I railroads, other railroads, and private car owners.

SOURCE: Association of American Railroads, *Railroad Facts* (Washington, DC: 1999 and 2002).

TABLE 57 Interruptions of Service by Type of Transit: 1995–2000
Number per 100,000 revenue vehicle-miles

	1995	1996	1997	1998	1999	2000
Motor bus	28	27	27	29	28	28
Light rail	32	26	20	14	17	15
Heavy rail	4	4	3	7	7	6
Commuter rail	4	3	3	3	3	3
Demand responsive	2	2	3	3	3	3
Average	18.8	18.1	17.6	18.7	18.6	18.1

NOTES: Interruptions of service include major and minor mechnical failures. If the vehicle operator was able to fix the problem and return the vehicle to service without assistance, the incident is not considered an interruption of service.

Light rail includes streetcar-type vehicles operated on city streets, semiexclusive rights-of-way, or exclusive rights-of-way. Service may be provided by step-entry vehicles or by level boarding. **Commuter rail** includes urban passenger train service for short-distance travel between a central city and adjacent suburb. **Heavy rail** includes electric railways with the capacity to transport a heavy volume of passenger traffic and characterized by exclusive rights-of-way, multicar trains, high speed, rapid acceleration, sophisticated signaling, and high-platform loading. Also known as "subway," "elevated (railway)," or "metropolitan railway (metro)." **Demand responsive** transit includes nonfixed-route, a nonfixed-schedule vehicles that operates in response to calls from passengers or their agents to the transit operator or dispatcher.

SOURCES: U.S. Department of Transportation, Federal Transit Administration, National Transit Library, *2001 Reporting Manual*, available at http://www.ntdprogram.com/, as of April 2003; and American Public Transportation Association, Maintenance data tables, available at http://www.apta.com/research/stats/maint/index.cfm, as of April 2003.

TABLE 58 Saint Lawrence Seaway Lock Delays by Cause: 1990–2001
Hours

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Weather related	112.0	187.0	125.7	100.9	88.5	143.4	65.2	43.2	2.0	53.7	56.8
All other	56.0	42.0	199.4	62.7	49.3	44.2	66.8	55.4	47.6	30.4	54.0

SOURCE: U.S. Department of Transportation, Saint Lawrence Seaway Development Corporation, *Annual Reports* (Washington, DC: various years). Reports for years 1993–2000 available at http://www.greatlakes-seaway.com/en/aboutus/slsdc_annrept.html, as of April 2003.

TABLE 59 U.S. Domestic Flight Operations: September 5–17, 2001

Date	Actual flights	Cancellations
September 5	17,325	324
September 6	17,330	318
September 7	17,078	594
September 8	15,322	375
September 9	16,522	300
September 10	16,905	661
September 11	2,542	14,962
September 12	0	17,535
September 13	1,445	16,109
September 14	7,745	9,611
September 15	9,634	5,573
September 16	12,243	4,297
September 17	13,708	3,518

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Form 234 Delay Data for September 2001, tabulated Nov. 5, 2001, available at http://www.bts.gov, as of February 2003.

TABLE 60 Transportation Fatality Rates by Mode: 2001
Per 100,000 U.S. residents

Mode	
Air	0.32
Highway	14.79
Railroad	0.34
Transit	0.11
Waterborne	0.29
Pipeline	0.002
Total	15.8

NOTES: Air fatalities include air carrier service, commuter service, air taxi sevice, and general aviation. Highway fatalities include all types of highway motor vehicles, bicycles, and pedestrians. Railroad fatalities include railroad and highway-rail grade crossing incidents. Transit fatalities include motor bus, heavy rail, light rail, commuter rail, demand responsive, trolley bus, aerial tramway, automated guideway transit, cablecar, ferryboat, inclined plane, monorail, and vanpool. Waterborne fatalities include fatalities due to vessel-related incidents or nonvessel-related incidents on commercial and recreational vessels. Pipeline fatalities include hazardous liquid pipelines and gas pipelines.

SOURCES: Except as noted—U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 2-1, available at http://www.bts.gov/, as of April 2003. **Population**—U.S. Department of Commerce, U.S. Census Bureau, *Census 2000*, available at http://www.census.gov/main/www/cen2000.html, as of June 2003. **2001 waterborne**—U.S. Department of Homeland Security, U.S. Coast Guard, Data Administration Division, personal communication, June 6, 2003. **2001 transit**—USDOT, Federal Transit Administration, National Transit Database, *National Trends and Summaries 2001* (Washington, DC: 2002).

TABLE 61 Highway Fatalities per 100,000 Residents for Selected Vehicle Types: 1991–2001
Per 100,000 U.S. residents

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Passenger car occupants	8.8	8.3	8.3	8.4	8.4	8.4	8.1	7.7	7.5	7.3	7.1
Light truck occupants	3.3	3.2	3.3	3.4	3.6	3.7	3.8	3.9	4.0	4.1	4.1
Large truck occupants	0.3	0.2	0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.2
Motorcycle occupants	1.1	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.9	1.0	1.1

NOTES: Large trucks are defined as trucks over 10,000 pounds gross vehicle weight rating, including single-unit trucks and truck tractors. Light trucks are defined as trucks of 10,000 pounds gross vehicle weight rating or less, including pick-up trucks, vans, truck-based station wagons, and sport utility vehicles.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 2-1, available at http://www.bts.gov/, as of April 2003.

TABLE 62 Highway Fatalities per 100 Million Vehicle-Miles for Selected Vehicle Types: 1991–2001
Per 100,000 U.S. residents

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Passenger car occupants	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.4	1.3	1.3	1.3
Light truck occupants	1.3	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.3	1.2	1.2
Large truck occupants	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.3
Motorcycle occupants	30.6	25.1	24.7	22.7	22.7	21.8	21.0	22.3	23.5	27.7	33.4

NOTES: Large trucks are defined as trucks over 10,000 pounds gross vehicle weight rating, including single-unit trucks and truck tractors. Light trucks are defined as trucks of 10,000 pounds gross vehicle weight rating or less, including pick-up trucks, vans, truck-based station wagons, and sport utility vehicles.

SOURCES: Except as noted—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 2-1, available at http://www.bts.gov/, as of April 2003. **Population—**U.S. Department of Commerce, U.S. Census Bureau, *Census 2000*, available at http://www.census.gov/main/www/cen2000.html, as of June 2003.

TABLE 63 Deaths and Years of Potential Life Lost Due to Transportation Accidents: 1991–2000
Percentage of total deaths of people under 65 years

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Deaths	6.2	5.8	5.8	5.8	5.9	6.1	6.2	6.2	5.8	6.0
YPLL	10.4	9.8	9.7	9.8	9.9	10.4	10.5	10.4	10.0	10.2

NOTE: Years of potential life lost (YPLL) is the difference between the age of death and 65 years of age. Fatalities of people 65 years old and older are not included in this calculation.

SOURCE: U.S. Department of Health and Human Services, Centers for Disease Control, National Center for Injury Prevention and Control, Web-based Injury Statistics Query and Reporting System (WISQARS), available at http://www.cdc.gov/ncipc/wisqars/, as of February 2003.

TABLE 64 Years of Potential Life Lost Due to Motor Vehicle and Other Transportation Accidents: 1991–2000
Percentage of total deaths of people under 65 years

Accidents	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Motor vehicle	10.0	9.3	9.3	9.3	9.5	9.9	10.1	10.0	9.7	9.9
Other transportation	0.4	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.3	0.3

NOTE: Years of potential life lost (YPLL) is the difference between the age of death and 65 years of age. Fatalities of people 65 years old and older are not included in this calculation.

SOURCE: U.S. Department of Health and Human Services, Centers for Disease Control, National Center for Injury Prevention and Control, Web-based Injury Statistics Query and Reporting System (WISQARS), available at http://www.cdc.gov/ncipc/wisqars/, as of February 2003.

TABLE 65 Injury Rates for Occupants of Highway Vehicles: 2001
Injuries per 100 million passenger-miles

Vehicle type	
Passenger car	74.8
Motorcyclists	574.7
Light truck	57.7
Large truck	14.0
Bus	10.1
Total	68.4

SOURCES: 2001—based on data from U.S. Department of Transportation (USDOT), Federal Highway Administration, *Highway Statistics 2001* (Washington, DC: 2002), table VM-1; USDOT, National Highway Traffic Safety Administration, *Traffic Safety Facts 2001—Overview* (Washington, DC: 2002), page 2; ENO Transportation Foundation, *Transportation in America*, 19th Edition (Washington, DC: 2002), page 45; USDOT, Bureau of Transportation Statistics, *Air Carrier Traffic Statistics, December 2001* (Washington, DC: 2003), domestic data; and USDOT, Federal Transit Administration, *National Trends and Summaries 2001* (Washington, DC: 2002), page 21.

TABLE 66 Injury Rates for Occupants of Selected Highway Vehicles and Motorcyclists: 1991–2001
Injuries per 100 million passenger-miles

Vehicle type	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Passenger car	101.6	101.1	102.3	105.1	108.0	105.2	98.0	89.3	85.7	80.6	74.8
Light truck	50.4	45.3	48.0	49.7	57.5	58.7	55.8	55.2	59.1	60.4	57.7
Motorcycle	690.1	544.9	487.8	463.3	533.4	506.6	474.1	433.0	429.4	501.2	574.7
Large truck	18.7	22.0	20.1	17.7	17.0	17.9	16.1	14.6	16.2	15.0	14.0
Bus	17.2	16.4	13.1	11.6	14.1	14.6	11.6	10.5	13.5	11.0	10.1

SOURCES: 1991–2000—U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), tables 1-34 and 2-2, available at http://www.bts.gov/, as of April 2003. **2001—**based on data from: USDOT, Federal Highway Administration, *Highway Statistics 2001* (Washington, DC: 2002), table VM-1; USDOT, National Highway Traffic Safety Administration, *Traffic Safety Facts 2001—Overview* (Washington, DC: 2002), page 2; ENO Transportation Foundation, Transportation in America, 19th Edition (Washington, DC: 2002), page 45; USDOT, Bureau of Transportation Statistics, *Air Carrier Traffic Statistics, December 2001* (Washington, DC: 2003), domestic data; and USDOT, Federal Transit Administration, *National Trends and Summaries 2001* (Washington, DC: 2002), page 21.

TABLE 67 Minor Motor Vehicle-Related Injuries by Age and Gender: 2001

Age	Males (number)	Females (number)
0–4	55,886	55,855
5–9	63,060	53,269
10–14	78,288	70,415
15–19	230,730	275,220
20–24	237,790	249,814
25–29	171,204	191,162
30–34	154,889	165,354
35–39	147,072	158,733
40–44	125,389	138,331
45–49	95,898	113,938
50–54	69,647	83,155
55–59	48,655	59,008
60–64	32,454	40,228
65–69	24,925	33,520
70–74	20,533	26,474
75–79	17,098	22,315
80–84	10,058	14,396
85–89	4,418	5,762
90–94	1,320	1,733
95–99	348	264
100+	0	119

TABLE 68 Serious Motor Vehicle-Related Injuries by Age and Gender: 2001

Age	Males (number)	Females (number)
0–4	3,543	3,329
5–9	6,287	4,037
10–14	6,834	4,809
15–19	25,279	16,701
20–24	26,360	16,158
25–29	15,410	10,223
30–34	14,214	8,831
35–39	14,382	8,199
40–44	14,384	9,394
45–49	10,836	7,340
50–54	10,988	6,966
55–59	6,985	4,486
60–64	5,154	4,226
65–69	3,637	4,545
70–74	3,423	3,702
75–79	4,331	4,092
80–84	3,383	3,894
85–89	1,222	1,786
90–94	354	100
95–99	135	325
100+	0	0

NOTE for Tables 67 and 68: A minor injury is one in which the victim was treated and released. A serious injury is one in which the victim was either hospitalized or treated and transferred to another facility.

SOURCE for Tables 67 and 68: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Consumer Product Safety Commission, National Electronic Injury Surveillance (NEISS) System, available at http://www.cpsc.gov/Neiss/oracle.html, as of June 2003.

TABLE 69 Serious Motor Vehicle-Related Injuries by Type: 2001

Type	Total number of Injuries	Number of serious injuries	Percent serious
Vehicle occupants	3,350,837	249,309	7.4
Motorcycle occupants	110,665	21,957	19.8
Pedalcyclists	60,313	6,412	10.6
Pedestrians	130,812	25,025	19.1

NOTES: A pedalcyclist is a person on a vehicle that is powered solely by pedals.

A minor injury is one in which the victim was treated and released. A serious injury is one in which the victim was either hospitalized or treated and transferred to another facility. Data are the share of injuries that were serious for one person type (e.g., the share of seriously injured pedestrians of all injured pedestrians).

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Consumer Product Safety Commission, National Electronic Injury Surveillance (NEISS) System, available at http://www.cpsc.gov/Neiss/oracle.html, as of June 2003.

TABLE 70 Components of the Economic Costs of Motor Vehicle Crashes: 2000
Millions of current dollars

Type of cost	Cost
Market productivity	60,991
Property damage	59,036
Medical costs	32,622
Travel delay	25,560
Household productivity	20,151
Insurance administration	15,167
Legal costs	11,118
Workplace costs	4,472
Emergency services	1,453
Total	230,568

SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration, *The Economic Impact of Motor Vehicle Crashes 2000*, available at http://www.nhtsa.dot.gov/people/economic/, as of December 2002.

TABLE 71 Estimated Sources of Payment for Motor Vehicle Crashes: 2000
Millions of current dollars

	Federal government	State government	Total government	Insurer	Other	Self
Emergency services	NA	1	1	NA	NA	NA
Market productivity	10	2	12	25	1	23
Medical	5	3	8	18	2	5
Household productivity	NA	NA	NA	8	NA	12
Insurance administration	NA	NA	NA	15	NA	NA
Workplace costs	NA	NA	NA	NA	4	NA
Legal/court	NA	NA	NA	11	NA	NA
Travel delay	NA	NA	NA	NA	26	NA
Property damage	NA	NA	NA	38	NA	21
Total	15	6	21	116	33	60

KEY: NA = not applicable.

SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration, *The Economic Impact of Motor Vehicle Crashes 2000*, available at http://www.nhtsa.dot.gov/people/economic/, as of December 2002.

TABLE 72 Share of Selected Air Pollution Emissions by Mode: 2001
Percent

	CO	NO_x	VOC	PM-10
Highway gasoline	92.9	41.7	74.7	27.1
Highway diesel	1.4	37.5	3.6	37.8
Aircraft	5.1	0.8	0.3	0.9
Marine vessels	0.3	9.7	0.0	13.1
Railroad	0.2	9.6	0.6	7.4
Other	0.1	0.8	20.2	13.7

KEY: CO = carbon monoxide; NO_x = nitrogen oxides; VOC = volatile organic compounds; PM-10 = particulate matter 10 microns in diameter or smaller.

NOTES: EPA no longer estimates lead emissions. Modal shares in 2000 were: highway gasoline vehicles, 4.1%; aircraft, 95.9%. Highway gasoline vehicles include: light-duty gas vehicles and motorcycles, light-duty gas trucks, and heavy-duty gas vehicles. Highway diesel includes heavy-duty diesel vehicles, light-duty diesel trucks and vehicles. Marine vessels include: coal, diesel, residual oil, gasoline and other. Other includes: diesel and gasoline recreational vehicles, airport service, railway maintenance, and recreational marine service. This table does not include farm, construction, industrial, logging, light commercial, and lawn and garden equipment.

SOURCE: U.S. Environmental Protection Agency (EPA), Office of Air Quality Planning and Standards, "National Emissions Inventory, Air Pollutant Emission Trends," available at http://www.epa.gov/ttn/chief/trends/index.html/, as of December 2002.

TABLE 73a Transportation Air Emissions by Type of Pollutant: 1991–2001
Index: 1991 = 1.00

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
CO	1.00	0.95	0.90	0.86	0.81	0.76	0.74	0.71	0.71	0.66	0.73
NO_x	1.00	0.99	0.98	0.97	0.96	0.95	0.95	0.94	0.91	0.91	0.90
VOC	1.00	0.95	0.90	0.85	0.80	0.75	0.73	0.72	0.70	0.66	0.62
PM-10	1.00	0.97	0.94	0.94	0.90	0.87	0.83	0.79	0.76	0.73	0.70
PM-2.5	1.00	0.96	0.93	0.90	0.86	0.83	0.80	0.76	0.73	0.69	0.66
Lead[1]	1.00	0.99	0.92	0.92	0.95	0.89	0.88	0.88	0.91	0.95	U
NH_3	1.00	1.08	1.15	1.23	1.31	1.40	1.57	1.52	1.54	1.61	1.64

TABLE 73b Transportation Air Emissions by Type of Pollutant: 1991–2001
Thousand short tons

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
CO	109,113	103,833	98,667	93,440	88,217	82,988	80,222	77,644	77,178	72,493	79,336
NO_x	11,558	11,445	11,332	11,217	11,101	10,990	11,021	10,819	10,537	10,572	10,423
VOC	10,049	9,549	9,050	8,553	8,056	7,554	7,326	7,212	7,067	6,681	6,226
PM-10	478	464	449	447	432	417	395	377	363	348	336
PM-2.5	407	392	378	366	351	338	325	308	296	279	268
Lead[1]	0.6	0.6	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.6	U
NH_3	173	186	199	213	226	242	271	263	267	278	283

[1] Data not available. EPA is no longer estimating lead emissions. The data presented here appeared in prior year EPA reports.

KEY FOR TABLES 73a AND 73b: CO = carbon monoxide; NO_x = nitrogen oxides; VOC = volatile organic compounds; PM-10 = particulate matter 10 microns in diameter or smaller; U = data are unavailable.

NOTES FOR TABLES 73a AND 73b: Revisions to previous estimates are all related to the development of the 1999 National Emissions Inventory (NEI). The 1999 estimates In the table are taken from Version 2 of the 1999 NEI and reflect many new data submissions from state and local air management agencies. The 1999 emissions estimates from mobile sources are in most cases based on the new MOBILE6 and the draft NONROAD2002 emissions models. This is the first time that estimates using these models have appeared in this format. Some but relatively few mobile source estimates were provided by state air agencies. The largest set of state-submitted data in 1999 was from California. Estimates for mobile sources for years prior to 1999 were made consistent with the estimates for 1999 and later, allowing for a generally consistent time trend except that state-submitted data was incorporated for 1999 only.

SOURCE FOR TABLES 73a AND 73b: U.S. Environmental Protection Agency (EPA), Office of Air Quality Planning and Standards, "National Emissions Inventory, Air Pollutant Emission Trends," available at http://www.epa.gov/ttn/chief/trends/index.html/, as of August 2002.

TABLE 74a Nitrogen Oxide Emissions by Mode: 1991–2001
Index: 1991 = 1.00

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Highway gasoline	1.00	0.96	0.91	0.87	0.83	0.78	0.77	0.74	0.71	0.69	0.72
Highway diesel	1.00	1.04	1.07	1.11	1.14	1.18	1.21	1.22	1.19	1.24	1.16
Aircraft	1.00	1.01	1.03	1.04	1.04	1.06	1.19	1.30	1.43	1.26	1.16
Marine vessels	1.00	1.01	1.02	1.03	1.04	1.05	1.00	0.95	0.90	1.00	1.00
Railroad	1.00	1.02	1.04	1.05	1.07	1.09	1.10	1.12	1.13	1.04	1.04
Other nonroad	1.00	0.97	1.03	1.03	1.03	1.10	1.19	1.11	1.37	1.19	1.19

TABLE 74b Nitrogen Oxide Emissions by Mode: 1991–2001
Thousands of short tons

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Highway gasoline	6,072	5,811	5,548	5,287	5,026	4,765	4,705	4,509	4,312	4,201	4,345
Highway diesel	3,377	3,495	3,614	3,732	3,850	3,968	4,087	4,111	4,035	4,192	3,904
Aircraft	70	71	72	73	73	74	83	91	100	88	81
Marine vessels	1,012	1,021	1,030	1,039	1,049	1,058	1,008	958	908	1,008	1,011
Railroad	962	979	996	1,014	1,031	1,048	1,061	1,073	1,085	1,001	999
Other nonroad	70	68	72	72	72	77	83	78	96	83	83

NOTES: Highway gasoline vehicles include: light-duty gas vehicles and motorcycles, light-duty gas trucks, and heavy duty gas vehicles. Highway diesel includes heavy-duty diesel vehicles, light-duty diesel trucks and vehicles. Marine vessels include: coal, diesel, residual oil, gasoline and other. Other includes: diesel and gasoline recreational vehicles, airport service, railway maintenance, and recreational marine service. These tables do not include farm, construction, industrial, logging, light commercial, and lawn and garden equipment.

SOURCE: U.S. Environmental Protection Agency (EPA), Office of Air Quality Planning and Standards, "National Emissions Inventory, Air Pollutant Emission Trends," available at http://www.epa.gov/ttn/chief/trends/index.html/, as of August 2002.

TABLE 75/76a Carbon Dioxide Emissions by Transportation Mode: 1991–2001
Index: 1991 = 1.00

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Passenger cars	1.00	1.00	1.03	1.04	1.04	1.06	1.05	1.08	1.10	1.11	1.13
Light-duty trucks	1.00	1.06	1.10	1.13	1.18	1.22	1.26	1.29	1.34	1.35	1.38
All other trucks	1.00	1.02	1.05	1.12	1.17	1.22	1.27	1.33	1.40	1.45	1.47
Buses	1.00	1.01	1.07	1.13	1.13	1.17	1.19	1.23	1.37	1.33	1.23
Total highway	1.00	1.02	1.05	1.08	1.11	1.14	1.16	1.19	1.23	1.25	1.27
Alternative fuel vehicles	1.00	0.92	1.08	1.75	1.00	0.92	0.92	1.08	0.92	1.08	1.00
Aircraft[1]	1.00	0.99	0.99	1.04	1.01	1.06	1.06	1.08	1.10	1.15	1.09
Boats and vessels	1.00	1.22	1.06	1.07	1.13	1.05	0.73	0.60	0.84	1.30	1.27
Locomotives	1.00	1.03	1.06	1.17	1.21	1.25	1.24	1.28	1.34	1.33	1.35
Other[2]	1.00	1.01	1.02	1.07	1.08	1.11	1.14	1.06	1.04	1.07	1.15
Total	**1.00**	**1.02**	**1.04**	**1.08**	**1.10**	**1.13**	**1.13**	**1.15**	**1.19**	**1.23**	**1.24**
International bunker fuels[3]	1.00	0.92	0.83	0.82	0.84	0.85	0.92	0.94	0.88	0.84	0.81

[1] Aircraft emissions are from all jet fuel (less bunker fuels) and aviation gas consumption.
[2] "Other" carbon dioxide emissions are from motorcycles, construction equipment, agricultural machinery, pipelines, and lubricants.
[3] Emissions from international bunker fuels include emissions from both civilian and military activities, but are not included in totals.

NOTE: Highway total includes passenger cars, buses, light-duty trucks, and other trucks.

SOURCE: U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2001* (Washington, DC: April 2003), table 1-14, also available at http://www.epa.gov, as of June 2003.

TABLE 75/76b Carbon Dioxide Emissions by Mode: 1991–2001

Teragrams of CO_2 equivalent[1]

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Passenger cars	562.4	564.8	577.6	584.3	587.2	594.3	592.8	607.9	618.6	621.7	632.7
Light-duty trucks	332.7	351.7	367.5	376.7	392.9	406.5	419.1	427.6	446.1	450.2	460.0
All other trucks	202.6	206.2	212.0	227.1	237.0	246.5	257.6	269.3	284.2	294.7	298.3
Buses	7.0	7.1	7.5	7.9	7.9	8.2	8.3	8.6	9.6	9.3	8.6
Total highway	1,105.9	1,130.9	1,165.9	1,198.1	1,226.2	1,256.6	1,278.9	1,314.7	1,359.6	1,377.2	1,400.8
Alternative fuel vehicles	1.2	1.1	1.3	2.1	1.2	1.1	1.1	1.3	1.1	1.3	1.2
Aircraft[2]	169.3	167.0	168.0	175.9	171.4	180.2	179.0	183.0	186.8	195.3	183.9
Boats and vessels	45.9	56.2	48.5	48.9	51.7	48.1	33.6	27.4	38.6	59.7	58.3
Locomotives	25.4	26.2	26.9	29.8	30.8	31.8	31.6	32.4	34.1	33.8	34.3
Other[3]	93.5	94.4	95.0	100.4	100.7	103.8	107.0	99.5	97.1	100.2	107.2
Total	**1,440.0**	**1,474.7**	**1,504.3**	**1,553.1**	**1,580.8**	**1,620.5**	**1,630.1**	**1,657.0**	**1,716.2**	**1,766.2**	**1,784.5**
International bunker fuels[4]	119.9	109.9	99.8	98.0	101.0	102.3	109.9	112.9	105.3	100.2	97.3

[1] Teragrams of CO_2 equivalent—1 $TgCO_2Eq$ = 1 million metric ton of carbon equivalent x (44/12). A teragram equals 1 trillion grams.

[2] Aircraft emissions are from all jet fuel (less bunker fuels) and aviation gas consumption.

[3] "Other" carbon dioxide emissions are from motorcycles, construction equipment, agricultural machinery, pipelines, and lubricants.

[4] Emissions from international bunker fuels include emissions from both civilian and military activities, but are not included in totals.

NOTE: Highway total includes passenger cars, buses, light-duty trucks, and other trucks.

SOURCE: U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2001* (Washington, DC: April 2003), table 1-14, also available at http://www.epa.gov, as of June 2003.

TABLE 77 Volume of Oil Spills Reported to the U.S. Coast Guard by Source: 1991–2000
Gallons

Mode or source	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Transportation-related[1]	1,624,043	1,440,177	1,893,188	2,040,858	2,543,706	3,035,138	767,439	832,689	991,313	1,373,538
Maritime vessels and facilities	1,565,492	1,159,266	1,462,701	1,966,782	2,484,891	2,050,317	537,668	772,261	940,212	1,342,630
All other transportation	58,551	280,911	430,487	74,076	58,815	984,821	229,771	60,428	51,101	30,908
Pipeline	49,382	200,396	362,399	62,340	11,894	978,392	224,122	47,863	36,140	17,021
Air	760	63,717	63,384	3,360	1,716	2,221	683	943	355	2,224
Highway	7,203	13,577	748	3,219	758	690	1,432	10,111	13,037	7,148
Rail	1,206	123	3,419	2,117	43,955	610	34	305	563	7
Other transportation[2]	0	3,098	537	3,040	492	2,908	3,500	1,206	1,006	4,508
Nontransportation	77,872	152,249	102,348	48,161	27,602	43,540	102,671	20,987	90,779	25,890
Unknown and other	174,038	283,241	71,852	400,254	66,921	39,153	72,464	31,627	90,357	31,942
Total	1,875,953	1,875,667	2,067,388	2,489,273	2,638,229	3,117,831	942,574	885,303	1,172,449	1,431,370
Transportation as percent of total	86.6	76.8	91.6	82.0	96.4	97.3	81.4	94.1	84.6	96.0

[1] Oil spilled from transportation vessels, vehicles, and equipment, as well as from transportation-related facilities (e.g., at ports and fuel stations).
[2] Other transportation includes nonvessel common carriers.

NOTE: Data are preliminary.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on U.S. Coast Guard, *Pollution Incidents in and Around U.S. Waters,* available at: http://www.uscg.mil/hq/g-m/nmc/response/stats/ac.htm, as of September 2002.

TABLE 78 Average Volume of Oil Spills by Source: 1991–2000
Gallons

Mode or source	Volume of all oil spills (1991–2000)	Percent share of all spills (1991–2000)
Maritime	14,282,220	77.2
Facilities	4,020,880	21.7
Maritime nontank vessels and other	3,353,840	18.1
Waterborne tank vessels	6,907,500	37.3
Pipeline	1,989,949	10.8
Non-transportation structures and facilities	692,099	3.7
Unknown and other	1,261,849	6.8
Highway, aircraft, rail, and other	269,920	1.5
Total	18,496,037	100.0

NOTE: Data are preliminary.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on U.S. Coast Guard, *Pollution Incidents in and Around U.S. Waters,* available at: http://www.uscg.mil/hq/g-m/nmc/response/stats/ac.htm, as of September 2002.

TABLE 79 Hazardous Materials Transportation Incidents by Mode: 1991–2001
Number

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Air	299	414	622	931	817	919	1,029	1,386	1,584	1,420	1,080
Highway	7,644	7,843	11,095	14,011	12,868	11,962	11,864	13,110	15,004	15,126	15,807
Rail	1,155	1,128	1,113	1,157	1,155	1,112	1,103	989	1,074	1,059	896
Water	12	8	8	6	12	6	5	14	8	17	5
Total	9,110	9,393	12,838	16,105	14,852	13,999	14,001	15,499	17,670	17,622	17,788

SOURCE: U.S. Department of Transportation, Research and Special Programs Administration, Hazardous Materials Information System database, available at http://hazmat.dot.gov/files/hazmat/10year/10yearfrm.htm, as of January 2003.

TABLE 80a Hazardous Materials Transportation Injuries by Mode: 1991–2001
Number

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Air	31	23	50	57	33	33	24	20	12	5	13
Highway	333	465	511	425	296	216	152	151	217	164	101
Rail	75	116	66	95	71	926	45	22	35	82	29
Water	0	0	0	0	0	0	0	2	0	0	0
Total	439	604	627	577	400	1,175	221	195	264	251	143

SOURCE: U.S. Department of Transportation, Research and Special Programs Administration, Hazardous Materials Information System database, available at http://hazmat.dot.gov/files/hazmat/10year/10yearfrm.htm, as of January 2003.

TABLE 80b Hazardous Materials Transportation Fatalities by Mode: 1991–2001
Number

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Air	0	0	0	0	0	110	0	0	0	0	0
Highway	10	16	15	11	7	8	12	13	10	15	7
Rail	0	0	0	0	0	2	0	0	0	0	0
Water	0	0	0	0	0	0	0	0	0	0	0
Total	10	16	15	11	7	120	12	13	10	15	7

SOURCE: U.S. Department of Transportation, Research and Special Programs Administration, Hazardous Materials Information System database, available at http://hazmat.dot.gov/files/hazmat/10year/10yearfrm.htm, as of January 2003.

TABLE 81/82a Transportation Capital Stock for Selected Modes: 1990–2000
Billions of chained 1996 dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Railroad transportation stock	363	358	353	349	347	344	343	343	344	343	342
In-house transportation stock	336	350	364	382	408	432	462	486	521	571	609
Highways and streets	1,009	1,015	1,038	1,063	1,105	1,121	1,129	1,148	1,169	1,207	1,234
Consumer motor vehicles	704	680	666	659	665	657	663	676	709	760	811
Local and interurban transit stock	24	24	24	25	25	25	26	27	28	29	31
Trucking and warehousing stock	83	80	79	82	91	99	104	113	115	118	121
Water transportation stock	40	39	38	38	38	38	37	38	38	39	39
Air transportation stock	101	104	110	113	113	116	121	129	143	165	183
Pipelines stock, except natural gas	44	44	44	44	44	45	45	45	45	45	46
Transportation services stock	29	29	29	30	31	34	36	38	43	47	53

NOTES: Data include only privately owned capital stock, except for highways and streets. Consumer motor vehicles are consumer durable goods. In-house transportation includes transportation service provided within a firm whose main business is not transportation. For example, grocery companies often use their own truck fleets to move goods from their warehouses to their retail outlets.
Data have been adjusted for inflation using price deflators from the following sources: U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Accounts, Quantity and Price Indexes; and U.S. Department of Labor, Bureau of Labor Statistics, Producer Price Indexes.

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, *Fixed Assets and Consumer Durable Goods in the United States*, available at http://www.bea.gov, as of March 2003.

TABLE 81/82b Transportation Capital Stock for Selected Modes: 1990–2000
Billions of current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Railroad transportation stock	304	303	307	324	329	337	349	352	347	341	341
In-house transportation stock	286	309	331	360	396	429	463	481	517	573	618
Highways and streets	869	889	910	941	1,004	1,075	1,129	1,193	1,238	1,322	1,420
Consumer motor vehicles	574	567	574	599	629	646	663	673	703	748	796
Local and interurban transit stock	21	21	22	23	24	25	27	28	28	30	32
Trucking and warehousing stock	71	71	72	77	89	99	104	113	117	122	127
Water transportation stock	35	35	35	36	37	37	38	39	40	41	43
Air transportation stock	85	91	99	104	108	115	122	131	145	169	194
Pipelines stock, except natural gas	38	39	40	42	44	44	45	47	47	49	50
Transportation services stock	26	27	27	28	30	34	36	37	41	45	50

NOTES: Data include only privately owned capital stock, except for highways and streets. Consumer motor vehicles are consumer durable goods. In-house transportation includes transportation service provided within a firm whose main business is not transportation. For example, grocery companies often use their own truck fleets to move goods from their warehouses to their retail outlets.

Data have been adjusted for inflation using price deflators from the following sources: U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Accounts, Quantity and Price Indexes; and U.S. Department of Labor, Bureau of Labor Statistics, Producer Price Indexes.

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, *Fixed Assets and Consumer Durable Goods in the United States*, available at http://www.bea.gov, as of March 2003.

TABLE 83 Rural Roads in Poor or Mediocre Condition by Functional Class: 1993–2001
Percent of mileage in roadway class

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Interstates	34.7	33.0	27.0	23.0	22.7	20.6	16.4	14.3	13.6
Other principal arterials	12.1	10.6	12.0	7.3	6.5	6.1	4.5	4.0	3.7
Minor arterials	13.0	14.0	12.7	10.5	9.0	7.9	6.9	7.0	6.9
Collectors	19.2	17.8	18.0	17.0	20.1	21.8	21.4	21.2	20.4

NOTES: Because of the transition to a new indicator for pavement condition beginning with U.S. Department of Transportation, Federal Highway Administration (FHWA) data published in 1993, comparisons between pre-1993 data and 1993 and later data are difficult. Data are for the 50 states and the District of Columbia.

SOURCE: Various sources, as cited in U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-26, also available at http://www.bts.gov/, as of April 2003.

TABLE 84 Urban Roads in Poor or Mediocre Condition by Functional Class: 1993–2001
Percent of mileage in roadway class

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Interstates	41.5	42.9	37.2	36.9	36.0	34.9	30.4	28.2	28.2
Other freeways and expressway	13.2	18.0	14.6	12.1	12.0	12.0	10.6	10.9	10.2
Other principal arterials	22.5	28.8	27.1	25.9	26.7	31.3	30.6	30.0	29.3
Minor arterials	21.7	19.0	20.3	19.9	20.2	17.9	17.5	26.0	26.4
Collectors	27.4	26.0	26.5	26.3	26.6	20.9	22.0	32.1	31.9

NOTES: Because of the transition to a new indicator for pavement condition beginning with U.S. Department of Transportation, Federal Highway Administration (FHWA) data published in 1993, comparisons between pre-1993 data and 1993 and later data are difficult. Data are for the 50 states and the District of Columbia.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-26, also available at http://www.bts.gov/, as of April 2003.

TABLE 85 Structurally Deficient and Functionally Obsolete Bridges: All Roadways—1991–2001
Number

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Structurally deficient	134,534	118,698	111,980	107,683	104,317	101,518	98,475	93,072	88,150	83,576	83,595
Functionally obsolete	97,593	80,393	80,000	79,832	80,950	81,208	77,410	79,500	81,900	81,510	81,439

NOTES: Functionally obsolete refers to bridges that do not have the lane widths, shoulder widths, or vertical clearances adequate to serve traffic demand, or the bridge may not be able to handle occasional roadway flooding. Structurally deficient refers to bridges needing significant maintenance attention, rehabilitation, or replacement.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, Office of Engineering, Bridge Division, National Bridge Inventory database, available at http://www.fhwa.dot.gov/bridge/britab.htm, as of December 2002.

TABLE 86a Rural Bridge Condition by Functional Class: 2001
Percent

	Structurally deficient	Functionally obsolete	Total
Principal arterial—Interstate	4	12	16
Other principal arterial	6	10	16
Minor arterial	9	12	20
Major collector	12	11	23
Minor collector	14	11	26
Local	22	12	34

TABLE 86b Rural Bridge Condition by Functional Class: 2001
Number

	Structurally deficient	Functionally obsolete	Total
Principal arterial—Interstate	1,108	3,193	27,579
Other principal arterial	1,964	3,565	35,652
Minor arterial	3,405	4,666	39,686
Major collector	11,634	10,256	95,736
Minor collector	6,844	5,442	47,782
Local	45,935	24,934	209,849

NOTES FOR TABLES 86a AND 86b: Functionally obsolete refers to bridges that do not have the lane widths, shoulder widths, or vertical clearances adequate to serve traffic demand, or the bridge may not be able to handle occasional roadway flooding. Structurally deficient refers to bridges needing significant maintenance attention, rehabilitation, or replacement.

SOURCE FOR TABLES 86a AND 86b: U.S. Department of Transportation, Federal Highway Administration, Office of Engineering, Bridge Division, National Bridge Inventory database, available at http://www.fhwa.dot.gov/bridge/britab.htm, as of December 2002.

TABLE 87a Urban Bridge Condition by Functional Class: 2001
Percent

	Structurally deficient	Functionally obsolete	Total
Interstate	6	20	27
Other freeways or expressways	6	21	27
Other principal arterial	10	22	32
Minor arterial	11	26	37
Collector	12	25	37
Local	12	19	31

TABLE 87b Urban Bridge Condition by Functional Class: 2001
Number

	Structurally deficient	Functionally obsolete	Total
Interstate	1,760	5,675	27,875
Other freeways or expressways	985	3,368	16,112
Other principal arterial	2,415	5,514	24,804
Minor arterial	2,500	6,064	23,158
Collector	1,831	3,836	15,407
Local	3,214	4,926	26,045

NOTES FOR TABLES 87a AND 87b: Functionally obsolete refers to bridges that do not have the lane widths, shoulder widths, or vertical clearances adequate to serve traffic demand, or the bridge may not be able to handle occasional roadway flooding. Structurally deficient refers to bridges needing significant maintenance attention, rehabilitation, or replacement.

SOURCE FOR TABLES 87a AND 87b: U.S. Department of Transportation, Federal Highway Administration, Office of Engineering, Bridge Division, National Bridge Inventory database, available at http://www.fhwa.dot.gov/bridge/britab.htm, as of December 2002.

TABLE 88 Runway Pavement Condition of 546 Commercial Service Airports: 1990–2001
Percent

	1990	1993	1997	1999	2000	2001
Good condition	78	79	79	78	79	79
Fair condition	17	18	19	20	19	19
Poor condition	5	3	2	2	2	2

NOTES: There are 546 commercial service airports. There are 3,364 NPIAS airports, including the commercial serivice airports. Data only available for years shown. Raw data not readily available.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington DC: 2003), also available at http://www.bts.gov/, as of January 2003. Based on data obtained from the U.S. Department of Transportation, Federal Aviation Administration, Office of Airport Planning and Programming, National Planning Division, personal communication, 2003.

TABLE 89 Runway Pavement Condition of 3,364 NPIAS Airports: 1990–2001
Percent

	1990	1993	1997	1999	2000	2001
Good condition	61	68	72	72	73	73
Fair condition	29	25	23	23	22	22
Poor condition	10	7	5	5	5	5

KEY: NPIAS = National Plan of Integrated Airport Systems.

NOTES: There are 546 commercial service airports. There are 3,364 NPIAS airports, including the commercial serivice airports. Data only available for years shown. Raw data not readily available.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington DC: 2003), also available at http://www.bts.gov/, as of January 2003. Based on data obtained from the U.S. Department of Transportation, Federal Aviation Administration, Office of Airport Planning and Programming, National Planning Division, personal communication, 2003.

TABLE 90 Median Age of Cars and Trucks in the United States: 1992–2002
Years

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Cars	7.0	7.3	7.5	7.7	7.9	8.1	8.3	8.3	8.3	8.1	8.4
Trucks	7.2	7.5	7.5	7.6	7.7	7.8	7.6	7.2	6.9	6.8	6.8

NOTE: "Trucks" represents all types of trucks, including light trucks (sport utility vehicles, vans, and pick-up trucks).

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-25, also available at http://www.bts.gov/, as of April 2003. R.L. Polk & Co., "Median Age of U.S. Cars and Light Trucks Increases According to R.L. Polk & Co.," press release, February 11, 2003.

TABLE 91 Average Age of Selected Urban Transit Vehicles: 1990–2000
Years

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Heavy-rail passenger cars	16.2	16.9	17.7	17.8	15.8	19.3	20.2	21.1	22.0	22.5	22.9
Commuter rail passenger coaches	17.6	17.3	19.3	18.6	20.1	21.4	24.1	21.6	19.4	17.5	16.9
Light rail vehicles (streetcars)	15.2	16.6	17.0	14.9	16.7	16.8	16.0	15.9	15.7	15.7	16.1
Full-size transit buses	8.2	8.0	8.3	8.5	9.9	8.7	8.8	8.6	8.5	8.4	8.1
Vans	2.8	3.0	3.1	3.1	3.9	3.1	3.1	3.0	2.9	3.1	3.1
Ferryboats	21.7	19.6	22.7	24.7	23.5	23.4	25.3	25.4	25.8	25.1	25.6

NOTE: Full-size buses have more than 35 seats.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-28.

TABLE 92 Average Age of Amtrak Locomotive and Car Fleets: 1990–2000
Years

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Locomotives	12.0	13.0	13.0	13.2	13.4	13.9	14.4	12.0	12.6	12.8	11.2
Passenger and other train cars	20.0	21.0	21.5	22.6	22.4	21.8	20.7	19.8	21.1	22.2	19.4

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-30, also available at http://www.bts.gov/, as of April 2003.

TABLE 93 Age of U.S. Flag Vessels by Type: 2000

	Age range (years)					
Ship type (number of vessels)	< 6	6–10	11–15	16–20	21–25	> 25
Dry cargo (733)	66	50	113	136	105	263
Tanker (135)	11	4	8	34	30	48
Towboat (4,990)	325	143	142	929	954	2,497
Passenger (915)	134	118	178	124	90	271
Support (1,420)	246	106	58	454	332	214
Dry barge (29,009)	6,721	3,051	1,565	5,846	5,365	6,461
Liquid barge (3,987)	582	329	48	602	712	1,714
Total (41,182)	8,085	3,802	2,112	8,125	7,588	11,470

NOTE: Support includes offshore support and crewboats. Liquid barge includes tank barges.

SOURCES: U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics (BTS), *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-31, also available at http://www.bts.gov/, as of April 2003.

TABLE 94 Average Age of U.S. Commercial and Major Airlines Aircraft: 1991–2000
Years, unless noted

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
All commercial aircraft	11.2	11.3	11.6	12.2	12.4	13.2	13.5	13.6	12.9	12.8
Major airlines' aircraft	10.7	10.5	10.4	10.8	11.3	12.3	12.4	12.3	11.8	11.8
Major airlines share of commercial aircraft (percent)	86.8	84.1	82.1	79.9	76.1	72.5	78.7	77.8	78.5	78.8

NOTES: Commercial airlines are air carriers providing scheduled or nonscheduled passenger or freight service, including commuter and air taxi on-demand services. Major airlines includes only commercial airlines with operating revenues greater than $1 billion in 2000: America West Airlines, American Airlines, American Eagle Airlines, America Trans Air, Alaska Airlines, Continental Airlines, Delta Airlines, Federal Express, Northwest Airlines, Southwest Airlines, Trans World Airlines, United Airlines, United Parcel Service, and US Airways. Average aircraft age is based on the year that an aircraft was delivered to the original owner from the manufacturer. It does not reflect the age of the engines or other parts that may have been replaced more recently.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on Form 41, Schedule B-43, 1991–2000.

TABLE 95 Relative Prices for Transportation Goods and Services for the United States and Selected Major Trade Partners: 1999
United States = 1.0

Country	1999
Mexico	0.64
Poland	0.76
Hungary	0.86
Turkey	0.87
Greece	0.90
Australia	0.95
Canada	0.96
New Zealand	0.97
Luxembourg	1.00
United States	1.00
Spain	1.04
Italy	1.07

Country	1999
Portugal	1.12
Germany	1.15
Belgium	1.18
France	1.21
Austria	1.24
Netherlands	1.25
Ireland	1.26
Sweden	1.32
Switzerland	1.41
United Kingdom	1.45
Japan	1.55
Denmark	1.61
Norway	1.75

NOTES: 1999 is the most recent year for which these data are available by country. For these countries, the data are unavailable for goods and services separately. Relative prices are based on purchasing power parity for transportation-related goods and services. All dollar amounts are in current 1999 dollars. Raw data are not readily available.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculation based on data from Organisation for Economic Co-operation and Development, *Purchasing Power Parities and Real Expenditures, 1999 Results* (Paris, France: August 2002), table 11.

TABLE 96a U.S. Trade in Transportation-Related Goods: 1990–2002
Millions of current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Imports	82,101	81,109	85,070	92,804	105,754	110,781	115,504	126,927	140,053	166,553	185,027	183,003	190,880
Exports	64,642	72,364	78,773	76,658	81,658	80,091	89,958	103,819	114,971	111,469	105,429	106,860	108,744
Total	146,744	153,473	163,843	169,462	187,412	190,872	205,462	230,745	255,024	278,022	290,456	289,863	299,624

NOTES: Transportation-related goods are motor vehicles and parts, aircraft and spacecraft and parts, railway vehicles and parts, and ships and boats. Totals may not equal the sum of parts due to rounding.

All dollar amounts are in current dollars. These data have not been adjusted for inflation because there is no specific deflator available for transportation-related goods. In addition, it is difficult to control for trading partners' inflation rates as well as currency exchange fluctuations when adjusting the value of internationally traded goods and services for inflation.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, U.S. International Trade Commission, Interactive Tariff and Trade DataWeb, available at http://dataweb.usitc.gov/, as of February 2003.

TABLE 96b U.S. Trade in Transportation-Related Goods by Commodity: 2002
Millions of current dollars

	Overall (exports plus imports)	Balance (exports minus imports)
Vehicles other than railway	233,027	–108,005
Aircraft, spacecraft, and parts	61,897	25,905
Ships, boats, and floating structures	2,568	–90
Railway locomotives and parts	2,133	53
Total, transportation-related goods	299,624	–82,136
Total, all commodites	1,856,806	–470,292

NOTES: Transportation-related goods are motor vehicles and parts, aircraft and spacecraft and parts, railway vehicles and parts, and ships and boats. Totals may not equal the sum of parts due to rounding.

All dollar amounts are in current dollars. These data have not been adjusted for inflation because there is no specific deflator available for transportation-related goods. In addition, it is difficult to control for trading partners' inflation rates as well as currency exchange fluctuations when adjusting the value of internationally traded goods and services for inflation.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, U.S. International Trade Commission, Interactive Tariff and Trade DataWeb, available at http://dataweb.usitc.gov/, as of February 2003.

TABLE 97 U.S. Trade Balance in Transportation-Related Goods: 1990–2002
Transportation-related goods exports minus imports
Millions of current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Trade balance	–17,459	–8,745	–6,296	–16,145	–24,096	–30,689	–25,546	–23,108	–25,082	–55,083	–79,598	–76,143	–82,136

NOTES: Transportation-related goods are motor vehicles and parts, aircraft and spacecraft and parts, railway vehicles and parts, and ships and boats. Totals may not equal the sum of parts due to rounding.

All dollar amounts are in current dollars. These data have not been adjusted for inflation because there is no specific deflator available for transportation-related goods. In addition, it is difficult to control for trading partners' inflation rates as well as currency exchange fluctuations when adjusting the value of internationally traded goods and services for inflation.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, U.S. International Trade Commission, Interactive Tariff and Trade DataWeb, available at http://dataweb.usitc.gov/, as of February 2003.

TABLE 98 U.S. International Trade in Transportation-Related Services: 1990–2002
Millions of current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Imports	35,497	34,987	34,370	35,934	39,081	41,697	43,212	47,097	50,334	55,454	65,904	61,241	59,624
Exports	37,339	38,485	38,149	38,486	40,751	44,989	46,496	47,878	45,702	46,701	50,897	46,313	45,746
Total	72,836	73,472	72,519	74,420	79,832	86,686	89,708	94,975	96,036	102,155	116,801	107,554	105,370

NOTES: Detail service type data are not available in inflation-adjusted terms. Transportation services include passenger fares and freight and port services. It excludes receipts and payments for travel services, which includes purchases of goods and services (e.g., food, lodging, recreation, gifts, entertainment, and any incidental expense on a foreign visit). These data have not been adjusted for inflation because there is no specific deflator available for transportation-related services. In addition, it is difficult to control for trading partners' inflation rates as well as currency exchange fluctuations when adjusting the value of internationally traded goods and services for inflation.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculation based on data from U.S. Department of Commerce, Bureau of Economic Analysis, International Transactions Accounts data, available at http://www.bea.doc.gov/bea/di1.htm, as of April 2003.

TABLE 99 U.S. Trade Balance in Transportation-Related Services: 1990–2002
Transportation-related services exports minus imports
Millions of current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Trade balance	1,842	3,498	3,779	2,552	1,670	3,292	3,284	781	–4,632	–8,753	–15,007	–14,928	–13,878

NOTES: Detail service type data are not available in inflation-adjusted terms. Transportation services include passenger fares and freight and port services. It excludes receipts and payments for travel services, which includes purchases of goods and services (e.g., food, lodging, recreation, gifts, entertainment, and any incidental expense on a foreign visit). These data have not been adjusted for inflation because there is no specific deflator available for transportation-related services. In addition, it is difficult to control for trading partners' inflation rates as well as currency exchange fluctuations when adjusting the value of internationally traded goods and services for inflation.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculation based on data from U.S. Department of Commerce, Bureau of Economic Analysis, International Transactions Accounts data, available at http://www.bea.doc.gov/bea/di1.htm, as of April 2003.

TABLE 100a Value of Transportation-Related Final Demand and Its Share in GDP: 1990–2001
Billions of chained 1996 dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Transportation-related final demand	719.8	695.8	723.9	747.6	781.7	802.8	837.7	881.2	934.8	981.1	977.8	984.1
Transportation share in GDP (percent)	10.7	10.4	10.5	10.6	10.6	10.6	10.7	10.8	11.0	11.1	10.6	10.7

NOTES: Total transportation-related final demand is the sum of all consumer, private business, and government purchases of transportation-related goods and services, and net exports (i.e., transportation imports subtracted from transportation exports). Gross private domestic investment constitutes railroad and petroleum pipelines only.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics (BTS), calculations based on data from U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Accounts" available at http://www.bea.doc.gov/bea/dn/nipaw, as of Feb. 24, 2003.

TABLE 100b Value of Transportation-Related Final Demand and Its Share in GDP: 1990–2001
Billions of current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Transportation-related final demand	617.5	616.9	656.2	697.2	747.6	782.0	837.7	893.3	932.4	993.7	1,031.8	1,046.9
Transportation share in GDP (percent)	10.6	10.3	10.4	10.5	10.6	10.6	10.7	10.7	10.6	10.7	10.5	10.4

NOTES: Total transportation-related final demand is the sum of all consumer, private business, and government purchases of transportation-related goods and services, and net exports (i.e., transportation imports subtracted from transportation exports). Gross private domestic investment constitutes railroad and petroleum pipelines only.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics (BTS), calculations based on data from U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Accounts" available at http://www.bea.doc.gov/bea/dn/nipaw, as of Feb. 24, 2003.

TABLE 101 Share of Transportation-Related Final Demand by Type: 1990–2001
Percent

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Personal consumption	74.0	69.8	70.4	71.5	71.8	71.6	71.0	70.3	70.4	71.8	74.4	76.4
Gross private domestic investment	12.7	13.2	13.4	14.4	16.0	16.5	17.2	17.7	18.7	20.3	19.6	17.1
Net exports (exports minus imports)	–4.3	–2.7	–2.5	–3.9	–5.2	–5.4	–5.1	–4.6	–5.2	–8.2	–10.6	–10.5
Government purchases	17.7	19.7	18.7	18.0	17.4	17.2	16.9	16.6	16.1	16.0	16.6	17.0

NOTES: Total transportation-related final demand is the sum of all consumer, private business, and government purchases of transportation-related goods and services, and net exports (i.e., transportation imports subtracted from transportation exports). Gross private domestic investment constitutes railroad and petroleum pipelines only.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics (BTS), calculations based on data from U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Accounts" available at http://www.bea.doc.gov/bea/dn/nipaw, as of Feb. 24, 2003.

TABLE 102a Value Added by For-Hire Transportation Services to U.S. GDP and Its Share in U.S. Total GDP: 1990–2001
Billions of chained 1996 dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
GDP of for-hire transportation services	180.6	185.9	193.6	201.2	218.6	225.1	243.4	248.9	257.9	268.6	282.5	270.3
As a share of GDP (percent)	2.7	2.8	2.8	2.8	3.0	3.0	3.1	3.1	3.0	3.0	3.1	2.9

KEY: GDP = Gross Domestic Product.

NOTES: For-hire transportation services include railroad transportation, local and interurban passenger transit, trucking and warehousing, water transportation, transportation by air, pipelines (except natural gas), and transportation services. Transportation services cover establishments furnishing services incidental to transportation (e.g., forwarding and packing services, and the arrangement of passenger and freight transportation).

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, Bureau of Economic Analysis, "Gross Domestic Product by Industry" available at http://www.bea.gov/bea/dn2/gpo.htm, as of February 2003.

TABLE 102b Value Added by For-Hire Transportation Services to U.S. GDP and Its Share in U.S. Total GDP: 1990–2001
Billions of current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
GDP of for-hire transportation services	177.4	186.1	193.4	206	223.2	233.4	243.4	261.8	288.7	301.9	313.7	306.1
As a share of GDP (percent)	3.1	3.1	3.1	3.1	3.2	3.2	3.1	3.1	3.3	3.3	3.2	3.0

KEY: GDP = Gross Domestic Product.

NOTES: For-hire transportation services include railroad transportation, local and interurban passenger transit, trucking and warehousing, water transportation, transportation by air, pipelines (except natural gas), and transportation services. Transportation services cover establishments furnishing services incidental to transportation (e.g., forwarding and packing services, and the arrangement of passenger and freight transportation).

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, Bureau of Economic Analysis, "Gross Domestic Product by Industry" available at http://www.bea.gov/bea/dn2/gpo.htm, as of February 2003.

TABLE 103 Share of For-Hire Transportation Value Added by Mode: 1990–2001
Percent

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Railroad transportation	10.0	11.2	10.7	10.4	10.1	10.1	9.6	9.2	8.8	8.3	8.9	9.2
Local and interurban passenger transit	7.1	6.7	6.4	6.3	5.9	5.9	5.5	5.9	6.0	6.3	6.1	6.4
Trucking and warehousing	37.7	38.5	39.1	39.3	39.0	38.5	37.8	36.4	37.0	37.3	36.6	36.7
Water transportation	5.6	5.6	5.3	5.2	5.2	5.0	5.0	5.3	5.1	4.5	4.7	4.9
Transportation by air	26.0	24.2	25.4	25.8	27.3	27.9	29.1	30.2	29.8	30.0	30.0	29.0
Pipelines, except natural gas	3.2	3.3	3.0	3.0	2.5	2.2	2.3	2.5	2.5	2.5	2.3	2.2
Transportation services	10.8	10.7	10.1	10.1	10.1	10.4	10.6	10.6	10.8	11.1	11.5	11.5

KEY: GDP = Gross Domestic Product.

NOTES: For-hire transportation services include railroad transportation, local and interurban passenger transit, trucking and warehousing, water transportation, transportation by air, pipelines (except natural gas), and transportation services. Transportation services cover establishments furnishing services incidental to transportation (e.g., forwarding and packing services, and the arrangement of passenger and freight transportation).

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, calculations based on data from U.S. Department of Commerce, Bureau of Economic Analysis, "Gross Domestic Product by Industry" available at http://www.bea.gov/bea/dn2/gpo.htm, as of February 2003.

TABLE 104a Federal, State, and Local Government Transportation-Related Revenues: 1990–2000
Billions of chained 1996 dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total	82.2	88.2	89.8	92.3	92.4	95.8	96.4	98.1	107.0	118.9	113.6
Federal	26.1	30.2	29.5	29.9	28.8	30.8	30.7	30.8	37.7	48.9	42.6
State	40.2	41.3	43.3	44.7	45.1	45.9	46.0	46.5	48.0	48.2	48.6
Local	15.9	16.7	17.0	17.7	18.5	19.1	19.7	20.8	21.4	21.8	22.4

SOURCES: Except as noted—U.S. Department of Transportation, Bureau of Transportation Statistics, "Government Transportation Financial Statistics Searchable Database," available at http://www.bts.gov, as of February 2003. **State and local portion for 2000—**U.S. Department of Commerce, U.S. Census Bureau, "State and Local Government Finances," available at ftp://ftp2.census.gov/pub/outgoing/govs/Finance/, as of February 2003. **Chain-type price index—**U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Accounts Tables," table 7.1, available at http://www.bea.doc.gov/bea/dn/nipaweb/, as of February 2003.

TABLE 104b Federal, State, and Local Government Transportation-Related Revenues: 1990–2000
Billions of current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total	69.8	77.4	80.3	85.2	87.6	93.7	96.4	100.5	111.2	126.9	125.8
Federal	21.4	26.0	25.9	27.4	27.2	30.2	30.7	31.4	38.9	52.0	46.8
State	34.6	36.6	39.1	41.4	42.9	44.8	46.0	47.7	50.0	51.6	54.1
Local	13.7	14.8	15.4	16.4	17.6	18.6	19.7	21.3	22.3	23.3	24.9

SOURCES: Except as noted—U.S. Department of Transportation, Bureau of Transportation Statistics, "Government Transportation Financial Statistics Searchable Database," available at http://www.bts.gov, as of February 2003. **State and local portion for 2000—**U.S. Department of Commerce, U.S. Census Bureau, "State and Local Government Finances," available at ftp://ftp2.census.gov/pub/outgoing/govs/Finance/, as of February 2003. **Chain-type price index—**U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Accounts Tables," table 7.1, available at http://www.bea.doc.gov/bea/dn/nipaweb/, as of February 2003.

TABLE 105a Federal, State, and Local Government Transportation-Related Revenues by Mode: 2000
Billions of chained 1996 dollars

	2000
Total	113,569
Highway	79,202
Transit	11,436
Air	19,552
Water	3,320
Pipeline	36
General support	23

TABLE 105b Federal, State, and Local Government Transportation-Related Revenues by Mode: 2000
Billions of current dollars

	2000
Total	125,847
Highway	87,800
Transit	12,674
Air	21,627
Water	3,682
Pipeline	40
General support	25

SOURCES: Except as noted—U.S. Department of Transportation, Bureau of Transportation Statistics, "Government Transportation Financial Statistics Searchable Database," available at http://www.bts.gov, as of February 2003. **State and local portion for 2000—**U.S. Department of Commerce, U.S. Census Bureau, "State and Local Government Finances," available at ftp://ftp2.census.gov/pub/outgoing/govs/Finance/, as of February 2003. **Chain-type price index—**U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Accounts Tables," table 7.1, available at http://www.bea.doc.gov/bea/dn/nipaweb/, as of February 2003.

TABLE 106a Federal, State, and Local Government Transportation-Related Expenditures From Own Funds: FY 1990–2000
Billions of chained 1996 dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
State and local	81	85	88	86	91	92	93	94	100	104	105
Federal	38	38	40	41	42	42	41	41	40	41	44
Total	119	123	128	126	133	133	133	135	140	145	149

NOTES: Federal expenditures from own funds consists of outlays of the federal government including not only direct spending but also grants to state and local governments. State and local expenditures from own funds include outlays of state and local governments from all sources of funds excluding federal grants. State and local data are reported together because disaggregated federal grants data are not available.

SOURCES: Except as noted—U.S. Department of Transportation, Bureau of Transportation Statistics, "Government Transportation Financial Statistics Searchable Database," available at http://www.bts.gov, as of February 2003. **State and local portion for 2000—**U.S. Department of Commerce, U.S. Census Bureau, "State and Local Government Finances," available at ftp://ftp2.census.gov/pub/outgoing/govs/Finance/, as of February 2003. **Chain-type price index—**U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Accounts Tables," table 7.1, available at http://www.bea.doc.gov/bea/dn/nipaweb/, as of February 2003.

TABLE 106b Federal, State, and Local Government Transportation-Related Expenditures From Own Funds: FY 1990–2000
Billions of current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
State and local	31	33	35	37	40	41	41	42	41	44	48
Federal	70	75	79	79	86	90	93	97	104	111	117
Total	101	108	115	116	126	131	133	138	146	155	165

NOTES: Federal expenditures from own funds consists of outlays of the federal government including not only direct spending but also grants to state and local governments. State and local expenditures from own funds include outlays of state and local governments from all sources of funds excluding federal grants. State and local data are reported together because disaggregated federal grants data are not available.

SOURCES: Except as noted—U.S. Department of Transportation, Bureau of Transportation Statistics, "Government Transportation Financial Statistics Searchable Database," available at http://www.bts.gov, as of February 2003. **State and local portion for 2000—**U.S. Department of Commerce, U.S. Census Bureau, "State and Local Government Finances," available at ftp://ftp2.census.gov/pub/outgoing/govs/Finance/, as of February 2003. **Chain-type price index—**U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Accounts Tables," table 7.1, available at http://www.bea.doc.gov/bea/dn/nipaweb/, as of February 2003.

TABLE 107a Shares of Federal, State, and Local Government Transportation-Related Expenditures by Mode From Own Funds: FY 2000
Millions of current dollars

	2000
Highway	103,838
Transit	31,395
Rail	781
Air	20,820
Water	7,942
Pipeline	27
General support	259
Total	165,062

TABLE 107b Shares of Federal, State, and Local Government Transportation-Related Expenditures by Mode From Own Funds: FY 2000
Millions of chained 1996 dollars

	2000
Highway	93,553
Transit	28,243
Rail	712
Air	18,814
Water	7,193
Pipeline	25
General support	236
Total	148,775

NOTES for Tables 107a and 107b: Federal expenditures from own funds consists of outlays of the federal government including not only direct spending but also grants to state and local governments. State and local expenditures from own funds include outlays of state and local governments from all sources of funds excluding federal grants. State and local data are reported together because disaggregated federal grants data are not available.

SOURCES for Tables 107a and 107b: Except as noted—US Department of Transportation, Bureau of Transportation Statistics, "Government Transportation Financial Statistics Searchable Database," available at http://www.bts.gov, as of February 2003. **State and local portion for 2000—**U.S. Department of Commerce, U.S. Census Bureau, "State and Local Government Finances," available at ftp://ftp2.census.gov/pub/outgoing/govs/Finance/ , as of February 2003. **Chain-type price index—**U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Accounts Tables," table 7.1, available at http://www.bea.doc.gov/bea/dn/nipaweb/, as of February 2003.

TABLE 108a Gross Government Investments in Transportation Infrastructure and Rolling Stock: 1990–2000
Billions of chained 1996 dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Infrastructure	52.0	52.5	52.8	56.3	59.2	56.3	57.0	60.2	62.7	67.2	65.5
Rolling stock	7.0	6.8	6.7	7.4	7.6	7.6	7.9	9.3	9.6	9.9	10.5
Total	59.0	59.2	59.5	63.7	66.8	63.9	64.9	69.5	72.3	77.1	76.0

NOTES: Investment in transportation infrastructure constitutes the purchase or construction value of transportation facilities and structures for all modes except pipeline. Data on state and local transportation investment are not available separately. Rail infrastructure data are only available for state and local infrastructure investment from 1993 to 2000. Investment in rolling stock consists of government outlays for motor vehicles.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, "Transportation Investment-Concepts, Data and Analysis," draft, compiled based on data from U.S. Department of Commerce, Bureau of Economic Analysis (BEA), "Fixed Assets and Consumer Durables," and Personal communications with BEA; and U.S. Department of Commerce, U.S. Census Bureau, "Value of Construction Put in Place Statistics," Detailed Construction Expenditures Tables, available at http://www.census.gov, as of February 2003.

TABLE 108b Gross Government Investments in Transportation Infrastructure and Rolling Stock: 1990–2000
Billions of current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Infrastructure	44.8	46.1	46.5	50.6	54.6	54.6	57.4	62.9	67.0	74.5	76.4
Rolling stock	6.2	5.2	6.6	7.0	7.5	7.9	7.9	8.3	9.0	9.4	9.6
Total	51.0	51.3	53.1	57.6	62.1	62.5	65.3	71.2	76.0	84.0	86.1

NOTES: Investment in transportation infrastructure constitutes the purchase or construction value of transportation facilities and structures for all modes except pipeline. Data on state and local transportation investment are not available separately. Rail infrastructure data are only available for state and local infrastructure investment from 1993 to 2000. Investment in rolling stock consists of government outlays for motor vehicles.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, "Transportation Investment-Concepts, Data and Analysis," draft, compiled based on data from U.S. Department of Commerce, Bureau of Economic Analysis (BEA), "Fixed Assets and Consumer Durables," and Personal communications with BEA; and U.S. Department of Commerce, U.S. Census Bureau, "Value of Construction Put in Place Statistics," Detailed Construction Expenditures Tables, available at http://www.census.gov, as of February 2003.

TABLE 109a Gross Government Investment in Transportation Infrastructure by Level of Government: 1990–2000
Billions of chained 1996 dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Federal	2.4	2.9	2.7	3.5	4.0	3.8	3.9	3.4	3.7	4.0	3.9
State and local	49.6	49.5	50.1	53.2	55.7	53.0	53.4	57.2	59.5	64.3	63.0
Total	52.0	52.5	52.8	56.7	59.7	56.8	57.4	60.6	63.2	68.3	66.9

NOTES: Investment in transportation infrastructure constitutes the purchase or construction value of transportation facilities and structures for all modes except pipeline. Data on state and local transportation investment are not available separately. Rail infrastructure data are only available for state and local infrastructure investment from 1993 to 2000. Investment in rolling stock consists of government outlays for motor vehicles.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, "Transportation Investment-Concepts, Data and Analysis," draft, compiled based on data from U.S. Department of Commerce, Bureau of Economic Analysis (BEA), "Fixed Assets and Consumer Durables," and Personal communications with BEA; and U.S. Department of Commerce, U.S. Census Bureau, "Value of Construction Put in Place Statistics," Detailed Construction Expenditures Tables, available at http://www.census.gov, as of February 2003.

TABLE 109b Gross Government Investment in Transportation Infrastructure by Level of Government: 1990–2000
Billions of current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Federal	2.0	2.6	2.4	3.1	3.7	3.7	3.9	3.5	3.9	4.3	4.4
State and local	42.8	43.6	44.1	47.4	50.9	50.9	53.4	59.4	63.1	70.3	72.1
Total	44.8	46.1	46.5	50.6	54.6	54.6	57.4	62.9	67.0	74.5	76.4

NOTES: Investment in transportation infrastructure constitutes the purchase or construction value of transportation facilities and structures for all modes except pipeline. Data on state and local transportation investment are not available separately. Rail infrastructure data are only available for state and local infrastructure investment from 1993 to 2000. Investment in rolling stock consists of government outlays for motor vehicles.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, "Transportation Investment-Concepts, Data and Analysis," draft, compiled based on data from U.S. Department of Commerce, Bureau of Economic Analysis (BEA), "Fixed Assets and Consumer Durables," and Personal communications with BEA; and U.S. Department of Commerce, U.S. Census Bureau, "Value of Construction Put in Place Statistics," Detailed Construction Expenditures Tables, available at http://www.census.gov, as of February 2003.

TABLE 110a Gross Government Investment in Transportation Infrastructure by Mode: 1990–2000
Billions of chained 1996 dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Highway	38.6	38.2	38.3	40.0	42.3	40.4	41.0	43.9	46.0	49.9	48.2
Air	5.5	6.4	6.8	8.0	7.4	6.4	6.4	6.9	7.6	8.1	7.7
Water	1.6	1.5	1.5	1.5	1.5	1.5	1.7	1.7	1.8	2.0	2.1
Transit	6.3	6.4	6.2	6.9	7.9	8.0	7.9	7.7	7.2	7.2	7.5
Railroad	U	U	U	0.4	0.5	0.5	0.4	0.4	0.5	1.0	1.4
Total	52.0	52.5	52.8	56.7	59.7	56.8	57.4	60.6	63.2	68.3	66.9

KEY: U = data are unavailable.

NOTES: Investment in transportation infrastructure constitutes the purchase or construction value of transportation facilities and structures for all modes except pipeline. Data on state and local transportation investment are not available separately. Rail infrastructure data are only available for state and local infrastructure investment from 1993 to 2000. Investment in rolling stock consists of government outlays for motor vehicles.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, "Transportation Investment-Concepts, Data and Analysis," draft, compiled based on data from U.S. Department of Commerce, Bureau of Economic Analysis (BEA), "Fixed Assets and Consumer Durables," and Personal communications with BEA; and U.S. Department of Commerce, U.S. Census Bureau, "Value of Construction Put in Place Statistics," Detailed Construction Expenditures Tables, available at http://www.census.gov, as of February 2003.

TABLE 110b Gross Government Investment in Transportation Infrastructure by Mode: 1990–2000
Billions of current dollars

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Highway	33.2	33.5	33.6	35.4	38.5	38.7	41.0	45.6	48.8	54.7	55.5
Air	4.7	5.6	6.1	7.2	6.9	6.2	6.4	7.2	8.1	8.8	8.7
Water	1.4	1.3	1.3	1.4	1.4	1.5	1.7	1.7	1.9	2.1	2.3
Transit	5.5	5.7	5.6	6.2	7.3	7.7	7.9	8.0	7.7	7.9	8.5
Railroad	U	U	U	0.3	0.5	0.5	0.4	0.4	0.6	1.0	1.4
Total	45	46	47	50.6	54.6	54.6	57.4	62.9	67.0	74.5	76.4

KEY: U = data are unavailable.

NOTES: Investment in transportation infrastructure constitutes the purchase or construction value of transportation facilities and structures for all modes except pipeline. Data on state and local transportation investment are not available separately. Rail infrastructure data are only available for state and local infrastructure investment from 1993 to 2000. Investment in rolling stock consists of government outlays for motor vehicles.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, "Transportation Investment-Concepts, Data and Analysis," draft, compiled based on data from U.S. Department of Commerce, Bureau of Economic Analysis (BEA), "Fixed Assets and Consumer Durables," and Personal communications with BEA; and U.S. Department of Commerce, U.S. Census Bureau, "Value of Construction Put in Place Statistics," Detailed Construction Expenditures Tables, available at http://www.census.gov, as of February 2003.

TABLE 111 U.S. Energy Consumption by Sector: 1990–2001
Quadrillion British thermal units (BTU)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Residential	16.9	17.4	17.3	18.1	18.1	18.5	19.5	18.9	18.7	19.2	19.8	19.3
Commercial	13.2	13.4	13.3	13.6	13.9	14.4	14.9	15.4	15.6	15.9	16.4	16.4
Industrial	31.7	31.4	32.5	32.7	33.7	34.1	35.1	35.2	35.0	35.5	35.7	33.8
Transportation	22.5	22.1	22.5	22.9	23.5	24.0	24.5	24.8	25.4	26.2	26.9	26.9

SOURCE: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* (Washington, DC: August 2002), table 2.1.

TABLE 112a Transportation Sector Energy Use and Gross Domestic Product: 1991–2001
Index: 1991 = 1.0

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Transportation sector energy use	1.00	1.02	1.03	1.06	1.08	1.11	1.12	1.15	1.18	1.21	1.21
Gross Domestic Product (GDP)	1.00	1.03	1.06	1.10	1.13	1.17	1.22	1.27	1.33	1.38	1.38
Transportation energy use per GDP	1.00	0.99	0.98	0.97	0.96	0.95	0.92	0.90	0.89	0.88	0.88

SOURCES: Transportation sector energy use—U.S. Department of Energy, Energy Information Adminstration, *Annual Energy Review 2001*, available at http://www.eia.doe.gov/emeu/aer/contents.html, as of February 2003. **GDP—**U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Account Tables," available at http://www.bea.doc.gov/bea/dn1.htm, as of February 2003.

TABLE 112b Transportation Sector Energy Use and Gross Domestic Product: 1991–2001

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Transportation sector energy use (Quadrillion BTU)	22.12	22.46	22.88	23.50	23.96	24.51	24.81	25.35	26.09	26.70	26.75
Gross Domestic Product (GDP) (Billions of chained 1996 dollars)	6,676	6,880	7,063	7,348	7,544	7,813	8,160	8,509	8,859	9,191	9,215
Transportation energy use per GDP	3,314	3,264	3,240	3,199	3,176	3,137	3,040	2,979	2,945	2,905	2,903

KEY: BTU = British thermal units. The average heat content of motor gasoline is 129,024 BTU per gallon. One quadrillion BTU is equivalent to 7.75 billion gallons of motor gasoline.

SOURCES: Transportation sector energy use—U.S. Department of Energy, Energy Information Adminstration, *Annual Energy Review 2001*, available at http://www.eia.doe.gov/emeu/aer/contents.html, as of February 2003. **GDP—**U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Account Tables," available at http://www.bea.doc.gov/bea/dn1.htm, as of February 2003.

TABLE 113 U.S. Petroleum Use by Sector: 1990–2001
Million barrels per day

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Transportation	10.97	10.80	10.94	11.18	11.48	11.72	11.96	12.13	12.46	12.83	13.08	13.16
Industry	4.32	4.25	4.54	4.43	4.66	4.57	4.79	4.92	4.80	4.98	4.89	4.67
Buildings	1.15	1.14	1.13	1.14	1.11	1.10	1.21	1.17	1.08	1.18	1.22	1.20
Utilities	0.56	0.53	0.43	0.49	0.47	0.33	0.36	0.41	0.58	0.54	0.51	0.57

SOURCES: Transportation Sector Energy Use—U.S. Department of Energy, Energy Information Adminstration, *Annual Energy Review 2001*, available at http://www.eia.doe.gov/emeu/aer/contents.html, as of February 2003. **GDP—**U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Account Tables," available at http://www.bea.doc.gov/bea/dn1.htm, as of February 2003.

TABLE 114a Transportation Fuel Prices: 1991–2002
Chained 1996 dollars per gallon

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Aviation gasoline	1.17	1.12	1.05	1.00	1.02	1.12	1.11	0.94	1.01	1.22	1.21	1.19
Jet fuel, kerosene	0.73	0.66	0.62	0.56	0.55	0.65	0.60	0.44	0.52	0.84	0.71	0.65
Motor gasoline, all types	1.33	1.30	1.25	1.22	1.23	1.29	1.27	1.08	1.17	1.46	1.40	1.30
Diesel no. 2	0.72	0.67	0.64	0.58	0.57	0.68	0.63	0.48	0.56	0.87	0.77	0.69
Railroad diesel	0.75	0.69	0.67	0.62	0.61	0.68	0.67	0.55	0.53	0.82	0.78	0.66
Crude oil	0.21	0.20	0.17	0.16	0.18	0.21	0.19	0.12	0.17	0.26	0.21	0.22

TABLE 114b Transportation Fuel Prices: 1991–2002
Current dollars per gallon

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Aviation gasoline	1.05	1.03	0.99	0.96	1.01	1.12	1.13	0.98	1.06	1.31	1.32	1.32
Jet fuel, kerosene	0.65	0.61	0.58	0.53	0.54	0.65	0.61	0.45	0.54	0.90	0.78	0.72
Motor gasoline, all types	1.20	1.19	1.17	1.17	1.21	1.29	1.29	1.12	1.22	1.56	1.53	1.44
Diesel no. 2	0.65	0.62	0.60	0.55	0.56	0.68	0.64	0.49	0.58	0.94	0.84	0.76
Railroad diesel	0.67	0.63	0.63	0.60	0.60	0.68	0.68	0.57	0.55	0.87	0.85	0.73
Crude oil	0.19	0.18	0.16	0.16	0.17	0.21	0.19	0.13	0.18	0.28	0.23	0.24

NOTE FOR TABLES 114a AND 114b: All categories exclude taxes, except motor gasoline, which includes taxes.

SOURCES FOR TABLES 114a AND 114b: 1991–2001 fuel prices—U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics (BTS), *National Transportation Statistics 2002* (Washington, DC: 2002), table 3-8. **2002 fuel prices—**U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* (Washington, DC: 2002), tables 9.4 and 9.7; and Association of American Railroads, *Railroad Facts 2003* (Washington, DC: 2002), p. 6.

TABLE 115a Motor Fuel Prices Compared with per Capita Motor Vehicle-Miles Traveled: 1991–2001
Chained 1996 dollars per gallon

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Gasoline price	1.33	1.30	1.25	1.22	1.23	1.29	1.27	1.08	1.17	1.46	1.40	1.30
VMT per capita	9,164	9,350	9,444	9,602	9,089	9,218	9,387	9,531	9,635	9,729	9,759	U

KEY: U = data are unavailable.

SOURCES: 1991–2001 fuel prices—U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics (BTS), *National Transportation Statistics 2002* (Washington, DC: 2002), table 3-8. **2002 Fuel Prices—**U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* (Washington, DC: 2002), tables 9.4 and 9.7; and Association of American Railroads, *Railroad Facts 2003* (Washington, DC: 2002), p. 6. **Per capita vehicle- and aircraft-miles computed using data from—**USDOT, BTS, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-29; and U.S. Department of Commerce, Census Bureau, International Database (IDB), available at http://www.census.gov/ipc/www/idbnew.html, as of April 2003. **Deflator—**U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Account Tables," table 7.1, available at http://www.bea.gov, as of April 2003.

TABLE 115b Motor Fuel Prices Compared with per Capita Motor Vehicle-Miles Traveled: 1991–2001
Current dollars per gallon

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Gasoline price	1.20	1.19	1.17	1.17	1.21	1.29	1.29	1.12	1.22	1.56	1.53	1.44
VMT per capita	9,164	9,350	9,444	9,602	9,089	9,218	9,387	9,531	9,635	9,729	9,759	U

KEY: U = data are unavailable.

SOURCES: 1991–2001 fuel prices—U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics (BTS), *National Transportation Statistics 2002* (Washington, DC: 2002), table 3-8. **2002 Fuel Prices—**U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* (Washington, DC: 2002), tables 9.4 and 9.7; and Association of American Railroads, *Railroad Facts 2003* (Washington, DC: 2002), p. 6. **Per capita vehicle- and aircraft-miles computed using data from—**USDOT, BTS, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-29; and U.S. Department of Commerce, Census Bureau, International Database (IDB), available at http://www.census.gov/ipc/www/idbnew.html, as of April 2003.

TABLE 116a Jet Fuel Prices Compared with per Capita Aircraft-Miles Traveled: 1991–2001
Chained 1996 dollars per gallon

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Jet fuel price	0.65	0.61	0.58	0.53	0.54	0.65	0.61	0.45	0.54	0.90	0.78	0.72
Vehicle-miles	15.2	15.6	16.0	16.6	17.4	17.8	18.0	18.2	19.1	20.1	19.5	U

KEY: U = data are unavailable.

SOURCES: 1991–2001 fuel prices—U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics (BTS), *National Transportation Statistics 2002* (Washington, DC: 2002), table 3-8. **2002 Fuel Prices—**U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* (Washington, DC: 2002), tables 9.4 and 9.7; and Association of American Railroads, *Railroad Facts 2003* (Washington, DC: 2002), p. 6. **Per capita vehicle- and aircraft-miles computed using data from—**USDOT, BTS, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-29; and U.S. Department of Commerce, Census Bureau, International Database (IDB), available at http://www.census.gov/ipc/www/idbnew.html, as of April 2003. **Deflator—**U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Account Tables," table 7.1, available at http://www.bea.gov, as of April 2003.

TABLE 116b Jet Fuel Prices Compared with per Capita Aircraft-Miles Traveled: 1991–2001
Current dollars per gallon

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Jet fuel price	0.73	0.66	0.62	0.56	0.55	0.65	0.60	0.44	0.52	0.84	0.71	0.65
Vehicle-miles	15.2	15.6	16.0	16.6	17.4	17.8	18.0	18.2	19.1	20.1	19.5	U

KEY: U = data are unavailable.

SOURCES: 1991–2001 fuel prices—U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics (BTS), *National Transportation Statistics 2002* (Washington, DC: 2002), table 3-8. **2002 Fuel Prices—**U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* (Washington, DC: 2002), tables 9.4 and 9.7; and Association of American Railroads, *Railroad Facts 2003* (Washington, DC: 2002), p. 6. **Per capita vehicle- and aircraft-miles computed using data from—**USDOT, BTS, *National Transportation Statistics 2002* (Washington, DC: 2002), table 1-29; and U.S. Department of Commerce, Census Bureau, International Database (IDB), available at http://www.census.gov/ipc/www/idbnew.html, as of April 2003.

TABLE 117a Passenger-Miles, Energy Consumption, and Energy Efficiency: 1990–2000
Index: 1990 = 1.00

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Passenger-miles	1.00	1.01	1.04	1.06	1.08	1.09	1.12	1.16	1.19	1.22	1.25
Energy consumption	1.00	0.97	1.01	1.04	1.06	1.07	1.10	1.12	1.15	1.19	1.19
Energy efficiency (PM/BTU)	1.00	1.04	1.03	1.02	1.02	1.02	1.02	1.03	1.03	1.02	1.05

KEY: BTU = British thermal unit; PM = passenger-miles.

NOTES: General aviation data are excluded because passenger and freight operations data cannot be disaggregated. Transit bus data are excluded because those operations are included in highway bus data. Commercial domestic aviation fuel consumption data for passenger and freight operations were estimated from the total commercial domestic aviation fuel consumption.

SOURCES: Passenger-miles and energy use (unless otherwise noted)—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), tables 1-34, 4-6, and 4-8, available at http://www.bts.gov/, as of May 2003. **Transit energy use calculated from—**American Public Transportation Association, Transit Statistics, tables 30 and 33, available at http://www.apta.com, as of May 2003.

TABLE 117b Passenger-Miles, Energy Consumption, and Energy Efficiency: 1990–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Passenger-miles (billions)	3,787	3,815	3,925	3,996	4,082	4,120	4,247	4,376	4,497	4,620	4,737
Energy consumption (trillion BTU)	14,582	14,167	14,668	15,123	15,404	15,631	16,033	16,399	16,787	17,416	17,355
Energy efficiency (PM/BTU)	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003

KEY: BTU = British thermal unit; PM = passenger-miles.

NOTES: General aviation data are excluded because passenger and freight operations data cannot be disaggregated. Transit bus data are excluded because those operations are included in highway bus data. Commercial domestic aviation fuel consumption data for passenger and freight operations were estimated from the total commercial domestic aviation fuel consumption.

SOURCES: Passenger-miles and energy use (unless otherwise noted)—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), tables 1-34, 4-6, and 4-8, available at http://www.bts.gov/, as of May 2003. **Transit energy use calculated from—**American Public Transportation Association, Transit Statistics, tables 30 and 33, available at http://www.apta.com, as of May 2003.

TABLE 118a Freight Ton-Miles, Energy Consumption, and Energy Efficiency: 1990-2000
Index: 1990 = 1.00

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Ton-miles	1.00	1.02	1.05	1.06	1.12	1.17	1.19	1.17	1.18	1.21	1.23
Energy consumption	1.00	1.01	1.03	1.02	1.07	1.13	1.15	1.15	1.22	1.27	1.32
Energy efficiency (TM/BTU)	1.00	1.00	1.02	1.04	1.05	1.03	1.03	1.02	0.97	0.96	0.93

KEY: BTU = British thermal unit; TM = ton-miles.

NOTES: General aviation data are excluded because passenger and freight operations data cannot be disaggregated. Marine gasoline use data are excluded from freight energy use total because marine gasoline is used primarily in recreational vehicles. Pipeline data are excluded because ton-miles data include all types of petroleum products, and energy consumption data are available for natural gas only. Commercial domestic aviation fuel consumption data for passenger and freight operations were estimated from the total commercial domestic aviation fuel consumption.

SOURCES: Ton-miles and energy use (unless otherwise noted)—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), tables 1-34, 1-44, 4-6, and 4-8, available at http://www.bts.gov/, as of May 2003. **Truck ton-miles for 2000**—The Eno Transportation Foundation, *Transportation in America*, 19th Edition (Washington, DC: 2002), page 45.

TABLE 118b Freight Ton-Miles, Energy Consumption, and Energy Efficiency: 1990-2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Ton-miles (billions)	3,196	3,233	3,337	3,364	3,527	3,648	3,725	3,682	3,710	3,780	3,818
Energy consumption (trillion BTU)	6,175	6,191	6,260	6,249	6,605	6,942	7,060	7,090	7,362	7,624	7,931
Energy efficiency (TM/BTU)	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005

KEY: BTU = British thermal unit; TM = ton-miles.

NOTES: General aviation data are excluded because passenger and freight operations data cannot be disaggregated. Marine gasoline use data are excluded from freight energy use total because marine gasoline is used primarily in recreational vehicles. Pipeline data are excluded because ton-miles data include all types of petroleum products, and energy consumption data are available for natural gas only. Commercial domestic aviation fuel consumption data for passenger and freight operations were estimated from the total commercial domestic aviation fuel consumption.

SOURCES: Ton-miles and energy use (unless otherwise noted)—U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2002* (Washington, DC: 2002), tables 1-34, 1-44, 4-6, and 4-8, available at http://www.bts.gov/, as of May 2003. **Truck ton-miles for 2000**—The Eno Transportation Foundation, *Transportation in America*, 19th Edition (Washington, DC: 2002), page 45.