U.S. International Trade and Freight Transportation Trends

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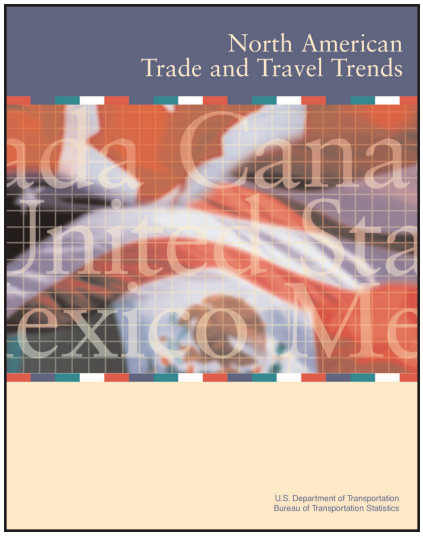
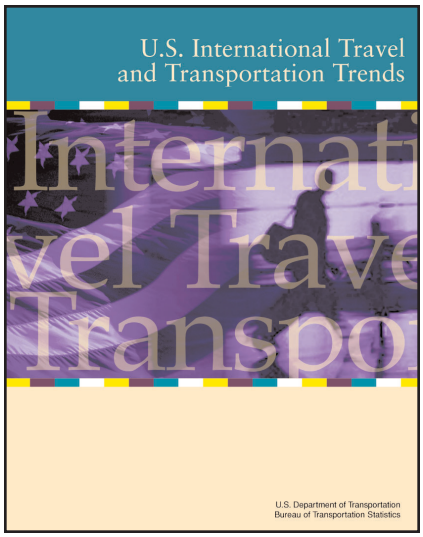


North American Trade and Travel Trends examines recent patterns in U.S. international trade and passenger travel with Canada and Mexico. It also reviews modal shares of NAFTA-partner trade and travel, examines the geography of the trade and travel flows, and identifies key influencing factors (31 pages, 2001).



U.S. International Travel and Transportation Trends examines recent trends in U.S. international travel overall, as well as overnight and same-day travel for all modes of transportation. It reviews the linkage between transportation and international travel, examines changing patterns in modal shares, geography and purpose of travel, and identifies key influencing factors. Particular attention is paid to air travel and security issues (42 pages, 2002).

U.S. International Trade and Freight Transportation Trends

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Acknowledgments

U.S. Department of Transportation

Norman Y. Mineta
Secretary

Michael P. Jackson
Deputy Secretary

Bureau of Transportation Statistics

Rick Kowalewski
Acting Director

William J. Chang
Associate Director for Information Systems

John V. Wells
Chief Economist

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

Project Manager
Lisa Randall

Editor
Marsha Fenn

Major Contributors
Felix Ammah-Tagoe
Michael Sprung
Michael Szustakowski

Other Contributors
Don Bright
Martha Courtney
Scott Dennis
Chester Ford
Patrick Flanagan
Alpha Glass
Elijah Henley
Deborah Johnson
Pamela Lafontaine
Nathan Liu
Marcus Mathias
Matthew Sheppard
Lynn Weidman

Layout
Lorisa Smith

Cover Design
Colabours
Communications Inc.

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EXECUTIVE SUMMARY

Overview. As the world's largest trading nation, the United States imports and exports more merchandise than any other country. This report provides a broad overview of changes in U.S. international merchandise trade since 1990 and how transportation modes and services enable this trade, which is a vital part of the U.S. economy.

From 1990 to 2001, U.S. gross domestic product (GDP), overall merchandise trade, and the merchandise trade deficit all experienced substantial growth, although at varying rates. The relative importance of export and import merchandise trade to the U.S. economy also increased during this period. Between 1990 and 2001, the ratio of the value of merchandise trade to GDP rose from 13 to 22 percent in inflation-adjusted terms. Furthermore, U.S. merchandise exports compared to the production of tradable goods has risen, meaning goods exports have become more important to domestic production despite the decline in manufacturing's share of GDP.

The September 11, 2001, terrorist attacks exacerbated an economic slowdown already in progress, resulting in a marked decline in U.S. international trade and freight movements. U.S. merchandise trade was down 6.2 percent in 2001, with most of the decline taking place after the attacks. Compared with the same period in 2000, the value of overall U.S. merchandise trade dropped 1.7 percent from January through August 2001, but dropped 14.7 percent between September and December. While all modes were affected by September 11, air cargo saw the largest decline in freight activity (13 percent by value), followed by trucking (8 percent), maritime (3 percent), and rail (2 percent). Pipeline activity increased by 12 percent.

In the aftermath of the attacks, transportation security concerns have focused on the vulnerability of the U.S. transportation system. Because large volumes of traded merchandise from all over the world enter the United States daily on ships and airplanes, and on trucks and trains from Canada and Mexico, transportation security has become a top priority with growing attention focused on international import traffic. For example, in 2001, about 19 million containers were used to transport imports into the United States, 6 million by ocean vessel and 13 million by truck and rail from Canada and Mexico. The attacks

changed how government and industry view cargo security and both are seeking ways to enhance security for traded goods from their foreign points of origin to final destinations within the United States.

Shifts in Major Trading Partners. The United States trades with nearly 200 countries worldwide. In 2001, 15 countries alone accounted for 77 percent of the value of merchandise trade. One-third of this trade was with Canada and Mexico, our partners in the North American Free Trade Agreement (NAFTA). Due to strong growth in NAFTA and Asian Pacific trade, relative to that with Europe, the share of trade passing through border crossings and freight corridors with Canada and Mexico and with West Coast ports has increased, as has related container and intermodal traffic.

Modal Trends. Over 1.6 billion tons of international merchandise moved to and from the United States in 2001, accounting for 10 percent of the 16 billion tons of freight moved on the nation's transportation system. Even though maritime transportation is the predominant mode for moving U.S. international freight (whether measured by weight or value), freight transported by other modes, notably air and truck, has grown faster. While air cargo accounts for less than 1 percent of U.S. merchandise trade tonnage, it accounts for over one-quarter of the value of the trade. The number of truck crossings into the United States from Canada and Mexico grew at an average annual rate of 5 percent per year since NAFTA's inception in 1994 and is expected to continue to climb, especially between Mexico and the United States once all NAFTA trucking provisions are fully implemented. Security concerns and demands now affect all modal transportation networks and the ports and border crossings serving U.S. international freight flows.

Trends in Major Commodities. Since at least 1980, manufactured goods' share of the value of U.S. merchandise trade has increased, affecting the growth in containerization and the demand for intermodal transportation. Although the United States continues to produce, export, and import vast quantities of natural resources, such as coal and petroleum products, and raw materials, such as lumber, these goods' share of the value of trade declined as the commodity mix of U.S. international trade changed. Growth in higher-value manufactured goods was a

major reason for the rise in air cargo and emergence of U.S. airports as world leaders in handling this cargo. Also, U.S. trade in transportation-related goods (motor vehicles, aircraft, rail locomotives, and ships and boats) nearly doubled between 1990 and 2001. A $24 billion surplus in aircraft and parts trade was the single highest surplus of any commodity in U.S. international trade in 2001. Changes in the commodity mix of U.S. trade and our major trading partners affect transportation choices and the border and port facilities that handle the trade.

Transportation Services Trade. U.S. international trade in freight transportation and airport and seaport services generates substantial revenues for U.S. carriers and ports. Freight and port services facilitate domestic and international movement of freight and are essential to U.S. global competitiveness. Between 1990 and 2001, the United States maintained a trade surplus in airport and seaport services as the volume of merchandise imports and the payments by foreign carriers for using U.S. ports rose. However, the United States had a deficit in freight services. This deficit grew in large part because of the sustained growth of the U.S. economy that spurred demand for imported merchandise transported by foreign carriers. The freight services deficit contrasts with the surplus in overall U.S. services trade. Air carriers accounted for most of the receipts for exports of U.S. freight services, overtaking ocean carriers in 1997.

Factors of Change and Continuity. Many factors have influenced the pace of expansion in U.S. international merchandise and transportation services trade, including growth and changes in the U.S. population and economy, increased internationalization of the U.S. economy, advances in transportation and telecommunications technology, easing of regulatory structures in international transportation markets, and reduction of trade barriers. Shifts in the composition of the U.S. economy toward more services, increased dependence on imports for manufactured products, and changes in major trading partners likely will continue to affect goods movements within the United States for many years to come. While the pace of trade with Canada and Mexico will affect the relative roles of trucking and rail, growth trends in trade with Pacific Rim nations will impact U.S. containerized cargo throughput and intermodal traffic. Also, trends in U.S. direct investment abroad and foreign direct

investment into the United States will continue to complement the movement of merchandise trade and affect U.S. transportation services carriers.

Trade Growth and Concerns. With the growth in U.S. international merchandise trade, the condition and performance of the nation's freight transportation infrastructure, such as local access roads at ports, at-grade rail crossings, dredging and channel depths, and availability of truck-only lanes for port access, will continue to be an important transportation concern. Landside access to U.S. ports, congestion on highways around major gateways, delays at border crossings, and environmental and community concerns may also continue to affect the movement of merchandise from, to, and within the United States. Government and industry efforts to enhance transportation security while ensuring the efficient flow of goods are likely to affect freight throughput at the major U.S. gateways, although the full impacts of the security measures remain uncertain.

INTRODUCTION

Today, Americans are buying more imported merchandise than ever before, and more of the goods produced in U.S. factories are bound for export. Much of the imported merchandise is transported in containers from far-flung corners of the world, raising the need for heightened cargo security measures from the foreign points of origin to the final destinations in the United States. In 2001, the U.S. transportation system carried merchandise exports worth $731 billion and merchandise imports valued at $1.1 trillion (in current dollars). Transporting this merchandise requires a significant amount of equipment. For example, in 2001, there were over 936,000 aircraft, 215,000 maritime vessels, and 19 million vessel, truck, and rail container entries into the United States.[1] From a national security perspective, the large amount of transportation equipment involved in U.S. international trade highlights the possible threat of using freight vessels and vehicles for terrorist activity. This vulnerability underscores the importance of national measures aimed at improving security while maintaining quick and efficient freight flows (see appendix A, Transportation Security and International Trade, pp. 101–109).

In the aftermath of the September 11, 2001, terrorist attacks on the United States, improving security and maintaining an efficient flow of goods have become key transportation and international trade issues. Immediately following the attacks, the U.S. economy and international transportation networks were affected as merchandise imports and exports temporarily declined and the volume of freight passing through the nation's airports, seaports, and land borders slowed. In the attacks' aftermath, cargo security and handling have received increased attention, with government and industry seeking enhancements in this area. A key component of this effort is expanded information on traded goods and crews, such as advance and near real-time data (see appendix B, International Trade and Transportation: Data Issues and Challenges, pp. 111–114).

This report provides an overview of U.S. international merchandise trade, reviews changes in trading patterns and modal trends, and examines shifts in the patterns of freight demand

[1] U.S. Department of Transportation, Bureau of Transportation Statistics; based on U.S. Department of the Treasury (2002).

among U.S. international freight gateways.[2] In addition, the report reviews the changing mix of traded commodities, focusing especially on transportation-related goods. It also examines U.S. freight transportation and port services and their important role in facilitating U.S. international merchandise trade.

The report further analyzes the critical role freight transportation continues to play in enabling international trade and discusses capacity and access challenges that growth in international freight pose to the U.S. freight transportation system. It also looks at some of the new security challenges facing the U.S. freight transportation system as the nation implements transportation security measures following the 2001 terrorist attacks. The report concludes with a discussion of some of the major underlying factors that are driving change and continuity in U.S. international merchandise trade and the possible effects of trade growth on the nation's transportation networks. For most of the major topics discussed in this report, detailed trade and transportation data tables are provided in appendix C. These tables complement the tables in the text.

Overview of Merchandise and Services Trade

Although total U.S. international trade, including trade of goods and services, rose throughout the 1990s, levels fell in 2001. U.S. merchandise trade, the primary focus of this report, accounted for more than three-quarters of total U.S. international trade in 2001.[3]

From 1990 to 2000, the United States experienced strong growth in merchandise trade and economic output. During this period, the expanding U.S. economy favorably affected U.S. international merchandise trade, which grew at an average annual rate of 9.3 percent, about three times the rate of the nation's economy in inflation-adjusted terms (box 1). Between 2000 and 2001, however, real GDP grew by 1.2 percent while total merchandise trade declined by 3.9 percent.[4]

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[2] This report generally examines merchandise trade trends from 1990 to 2001. Unless otherwise stated, references to U.S. trade and trade balances represent U.S. merchandise trade only. Due to limitations of data availability, some of the maritime and aviation trends are only reviewed through 2000, because 2001 data were unavailable at the time this report was prepared. This report also includes a section on transportation services trade.

[3] Total U.S. international trade includes both merchandise and services trade.

[4] In current dollars, GDP grew by 3.4 percent and U.S. merchandise trade declined by 6.2 percent (USDOC BEA 2002a).

Since 1990, freight transportation and port services used in moving the traded goods have also increased. Between 1990 and 2001, U.S. exports (receipts) and imports (payments) for freight services grew at an average annual rate of 5.3 percent, while port services grew at 4.2 percent per year (in current dollars) (USDOC BEA 2003). During this period, the United States remained the world's largest exporter of transportation services, maintaining its share of the global export of these services at about 16 percent (IMF 2001).

The U.S. freight transportation system has shaped and been shaped by the increase in and changing demands of international trade. Major U.S. seaports have grown in importance, reflecting, in part, the use of large container vessels to ship goods between ports in Europe, the Pacific Rim, and the United States. Increased containerization and other developments by the nation's freight railroads have contributed to the continued expansion in intermodal transportation. Growth in international air freight has contributed to the emergence of U.S. cargo airports as global leaders in this industry. Expanded trade between the United States and its top two trading partners, Canada and Mexico, has increased the importance of north-south surface freight corridors relative to the traditional east-west movement of international trade.

This expansion in trade has been accompanied by changes in how freight moves. It has raised concerns about potential capacity bottlenecks at major freight gateways, for example, landside access to and from seaports and traffic congestion that can cause delays and impact the cost-effective delivery of goods. Since many of the nation's major ports are located primarily in metropolitan areas, delays and congestion sometimes occur as port-related truck and rail traffic flow into local passenger

Box 1
Current and Inflation-Adjusted Economic Data

To compare trends in economic activity, current or nominal values of currencies must be deflated or adjusted for inflation. This is important because a fundamental issue in comparing GDP and economic data over time is determining how much of any increase is real and how much reflects price inflation. This report uses inflation-adjusted figures whenever official statistics are available. Where inflation-adjusted data are unavailable, as is the case with official overall merchandise trade data prior to 1987 and all trade data by country, mode of transportation, and specific commodity detail, the report uses current dollar figures without controlling for inflation.

For GDP and overall U.S. merchandise imports and exports, inflation-adjusted chained 1996 dollars are presented, as reported by the Bureau of Economic Analysis. The technique used to derive chained dollars adjusts for inflation and captures the effect of relative changes in prices and the composition of economic output better than nominal or current value.

While adjusting for inflation is important to reflect the correct size of any change in the value of trade, other factors such as foreign currency exchange rates, business cycles, balance of payments, stock market news, and policies of central banks affect the prices of goods and services traded internationally. Due to the complexity of the factors that influence international trade, it is difficult to control for trading partners' inflation rates as well as currency exchange fluctuations.

traffic. Furthermore, the effects of trade-related transportation on the quality of life in communities near or adjacent to major gateways and corridors are a concern. After September 11, security issues have come to the forefront and heightened cargo-handling procedures are being implemented at all of the nation's ports of entry, but their long-term implications for throughput are not yet known.

OVERALL TRENDS IN U.S. INTERNATIONAL MERCHANDISE TRADE

The United States is the world's largest merchandise-trading nation,[5] accounting for 12 percent of world merchandise exports and about 19 percent of world merchandise imports in 2000[6] (table 1). From 1990 to 2001, the value of U.S. international merchandise trade more than doubled (in inflation-adjusted dollars), from $891 billion to over $2 trillion (table 2, p. 10). During this period, the value of U.S. merchandise trade grew at an average annual rate of 8 percent, while growth in U.S. real gross domestic product (GDP) averaged 3 percent per year.

Table 1
Top 10 Leading Exporters and Importers in World Merchandise Trade: 2000
(Billions of current U.S. dollars)

Rank in 2000	Exporters	Value	Percent	Rank in 2000	Importers	Value	Percent
1	United States	781	12.3	1	United States	1,258	18.9
2	Germany	552	8.7	2	Germany	503	7.5
3	Japan	479	7.5	3	Japan	380	5.7
4	France	298	4.7	4	United Kingdom	337	5.1
5	United Kingdom	284	4.5	5	France	305	4.6
6	Canada	277	4.3	6	Canada	245	3.7
7	China	249	3.9	7	Italy	236	3.5
8	Italy	238	3.7	8	China	225	3.4
9	Netherlands	213	3.3	9	Hong Kong	214	3.2
10	Hong Kong	202	3.2	10	Netherlands	198	3.0
	Total, top 10 countries	**3,573**	**56.1**		**Total, top 10 countries**	**3,901**	**58.5**
	Total, all countries[1]	6,364	100.0		Total, all countries[1]	6,669	100.0

[1] Includes significant re-exports or imports for re-export.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from the World Trade Organization, "Table 1.5: Leading Exporters and Importers in World Merchandise Trade, 2000," *International Trade Statistics 2001,* available at http://www.wto.org/english/res_e/statis_e/its2001_e/section1/i05.xls, as of June 11, 2002.

[5] This report primarily analyzes trends in U.S. international merchandise trade in terms of value, because aggregate trade data for both exports and imports by weight are not available for all modes of transportation. It is possible, when prices change significantly, for the value of trade to change at a rate different from the quantity or volume of trade. Where possible, this report uses reported data or estimates of aggregate weight by mode of transportation to show changes in trade volumes.

[6] The United States is also the largest services trading nation, accounting for about 20 percent of total private service exports (WTO 2001).

Table 2
U.S. International Merchandise Trade and Gross Domestic Product: 1990–2001
(Billions of chained 1996 dollars)

Year	Real GDP[1]	Total merchandise trade	Exports	Imports	Balance (exports–imports)	Export share of total merchandise trade (percent)	Import share of total merchandise trade (percent)
1990	6,708	891	393	498	–105	44.1	55.9
1991	6,676	919	421	498	–77	45.8	54.2
1992	6,880	994	450	544	–94	45.3	54.7
1993	7,063	1,062	463	598	–135	43.6	56.4
1994	7,348	1,186	508	678	–170	42.8	57.2
1995	7,544	1,308	569	739	–170	43.5	56.5
1996	7,813	1,427	618	808	–190	43.3	56.7
1997	8,160	1,631	708	923	–215	43.4	56.6
1998	8,509	1,754	723	1,031	–309	41.2	58.8
1999	8,857	1,911	751	1,159	–408	39.3	60.7
2000	9,224	2,152	836	1,316	–480	38.9	61.1
2001	9,334	2,068	789	1,279	–490	38.2	61.8
Percentage change, 1990–2001	39.1	132.0	100.6	156.8			
Annual growth rate (percent)	3.0	8.0	6.5	9.0			

[1] To compare economic changes over time, current or nominal values of currencies must be deflated or adjusted for inflation. In the United States, the Bureau of Economic Analysis (BEA) establishes indices to calculate changes between years. These are used to calculate real chained dollars. Annual changes in the indices are chained (multiplied) together to form a time series. Chained dollars, instead of merely reflecting inflation, capture the effect of relative changes in prices and in the composition of output. They also better reflect cyclical fluctuations in the economy. Chained 1996 dollars are the most currently available indices from BEA for adjusting for inflation.

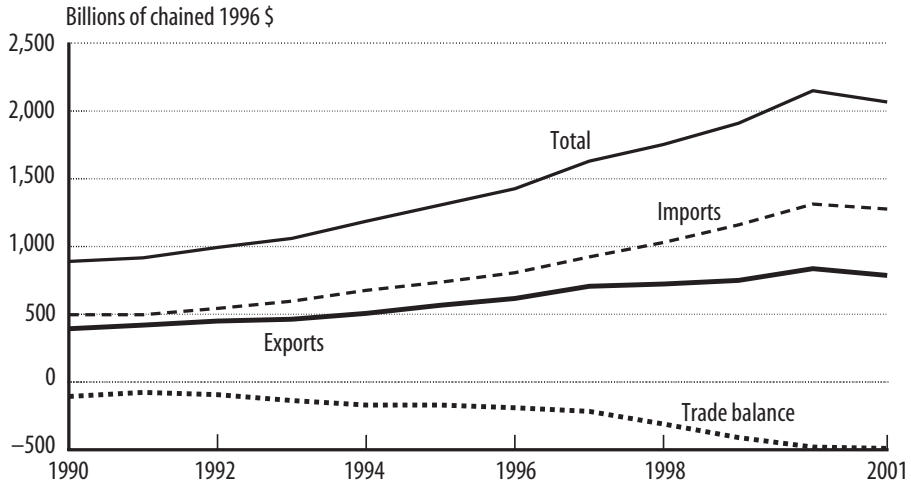
KEY: GDP = gross domestic product.

NOTE: Data reflect revisions through February 2002 and are based on the National Income and Products Accounts (NIPA) basis. The NIPA basis reflects adjustments for statistical differences and coverage to the Balance of Payments basis.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Accounts, available at http://www.bea.doc.gov/bea/dn1.htm, as of Aug. 1, 2002.

U.S. merchandise exports accounted for 38 percent of traded goods in 2001, compared with 44 percent in 1990. Imports grew to 62 percent of traded goods in 2001. The different growth rates for imports and exports resulted in a sharp rise in the U.S. merchandise trade deficit (figure 1). In just over a decade, the U.S. merchandise trade deficit more than quadrupled from $105 billion to $490 billion (in inflation-adjusted dollars). Despite this large increase, the deficit rose at a slower rate in 2001 when compared with 2000, as both exports and imports fell (table 2). Throughout most of the 1990s, strong growth of the U.S. economy spurred the rise in imports and increased the merchandise trade deficit. Rising household wealth and income in the United States and strong consumer demand

Figure 1
Value of U.S. International Merchandise Trade: 1990–2001



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, based on data from the U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Accounts, available at http://www.bea.doc.gov/bea/dn1.htm, as of March 2002.

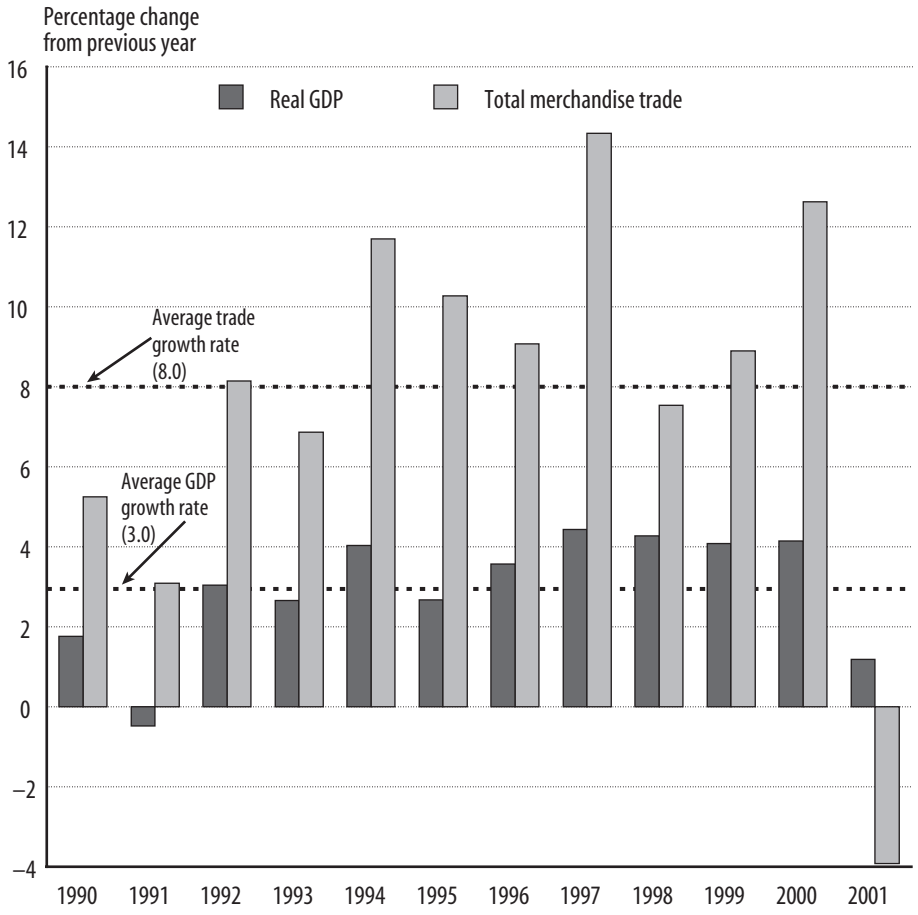
are some of the key factors that continue to contribute to the increase in merchandise imports. Growth in trade, whether imports or exports, results in higher levels of international freight movement and the demand for expanded freight transportation services.

In 2001, the value of total U.S. international merchandise trade declined nearly 4 percent from the record $2.2 trillion reached in 2000 (in inflation-adjusted terms), the largest annual decrease since 1990[7] (figure 2). In 2000, both trade and GDP grew at high positive rates. The decline in 2001 was due, in part, to the weakness of global economic activity and the effect of the September 11 terrorist attacks. Exports were particularly affected, falling by 6 percent in 2001, while imports fell 3 percent.[8] Between 1990 and 2001, merchandise trade saw greater year-to-year fluctuations than U.S. GDP due to its dependence on global economic activity.

[7] Data on inflation-adjusted exports and imports of goods are only available from 1987 and the 4 percent annual decrease is the largest recorded decline since then. The only other decline was a less than 1 percent decline in imports in 1991 that followed the U.S. economic recession in that year but was offset by a 7 percent growth in U.S. merchandise exports.

[8] Export of transportation services also declined during 2001. See section on U.S. services trade.

Figure 2
U.S. International Merchandise Trade and Real GDP: 1990–2001



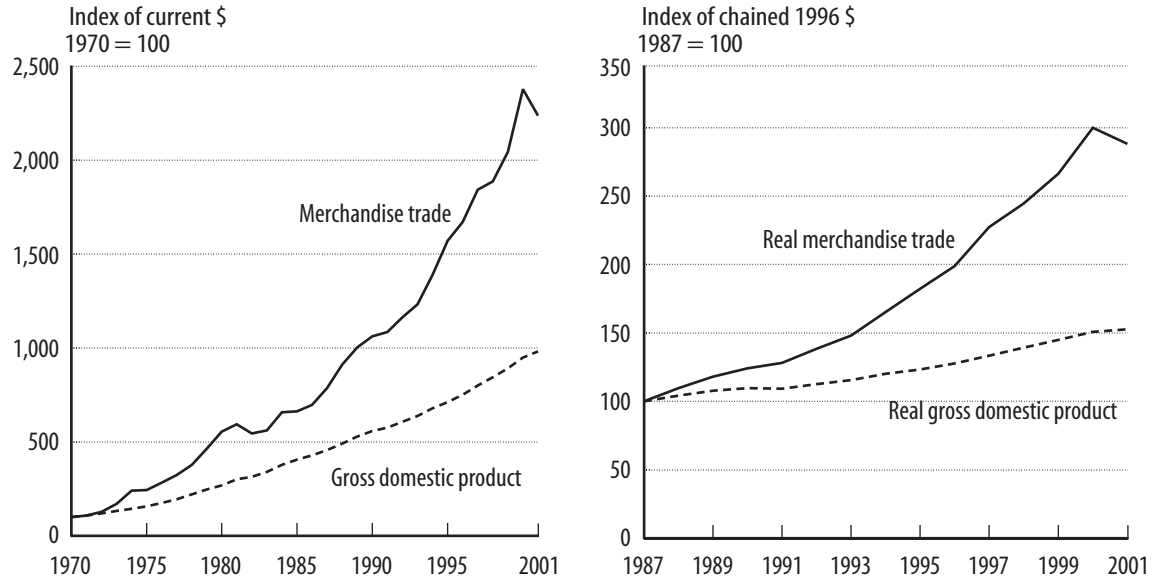
NOTE: Real gross domestic product (GDP) and total merchandise trade are in chained 1996 inflation-adjusted dollars.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, based on data from U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Accounts, available at http://www.bea.doc.gov/bea/dn1.htm, as of March 2002.

Importance of Merchandise Trade to the U.S. Economy

Despite the 2001 decline in trade, the relative importance of international merchandise trade to the overall U.S. economy has increased during the past three decades. Not only did the growth rate in trade continue to exceed the growth rate in the overall U.S. economy (figure 3), but the ratio of international goods trade in comparison to GDP also rose. By 2001, U.S. international merchandise trade (both exports and imports) was more than 20 times greater than in 1970, while total U.S. economic

Figure 3
U.S. International Merchandise Trade and Gross Domestic Product: 1970–2001



NOTE: This figure shows current dollars because data on total merchandise trade that are adjusted for inflation in chained dollars are only available starting from 1987.

NOTE: 1987 is the earliest year for which the U.S. Department of Commerce, Bureau of Economic Analysis reports total merchandise trade figures that are adjusted for inflation in chained 1996 dollars.

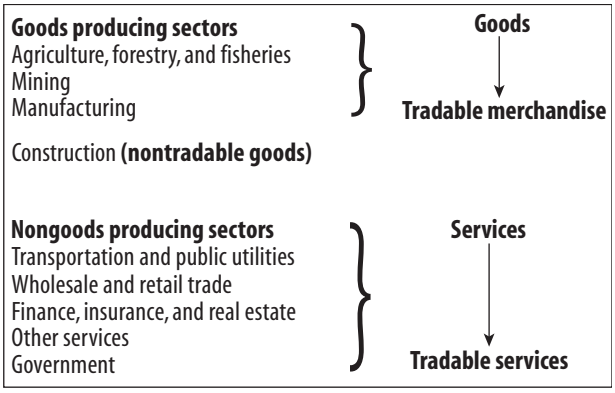
SOURCE: U.S. Departmnet of Transportation, Bureau of Transportation Statistics, based on data from U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Account (NIPA), available at http://www.bea.doc.gov/bea/dn1.htm, as of August 2002.

output was about 10 times greater (in current dollars).[9] The ratio of the value of U.S. merchandise trade to GDP reached 22 percent in 2001, a sizeable jump from 13 percent in 1990 (both in inflation-adjusted terms).

Although it is instructive to compare the ratio of international merchandise trade to *overall* GDP, this ratio understates the importance of international goods trade because overall GDP is derived from both goods and services. The ratio of merchandise trade to *goods* GDP is, therefore, more comparable than the ratio to overall GDP. Compared with three decades ago, international merchandise trade today has risen in relation to goods GDP (the proportion of GDP produced by the goods sectors). Of the primary GDP sectors, only agriculture, mining, and manufacturing are significant producers of goods that are traded internationally (figure 4). The construction sector

[9] A similar comparison in inflation-adjusted terms is possible only for 1987 to 2001, because data on total merchandise trade, adjusted for inflation in chained dollars, are unavailable prior to 1987. For the comparable data in real terms, see Statistical Appendix table C-3, p. 117.

Figure 4
Gross Domestic Product (GDP) by Sector



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Transportation Analysis, May 2002.

produces goods (e.g., highways, bridges, and buildings) that are not traded internationally and are excluded from merchandise trade statistics.

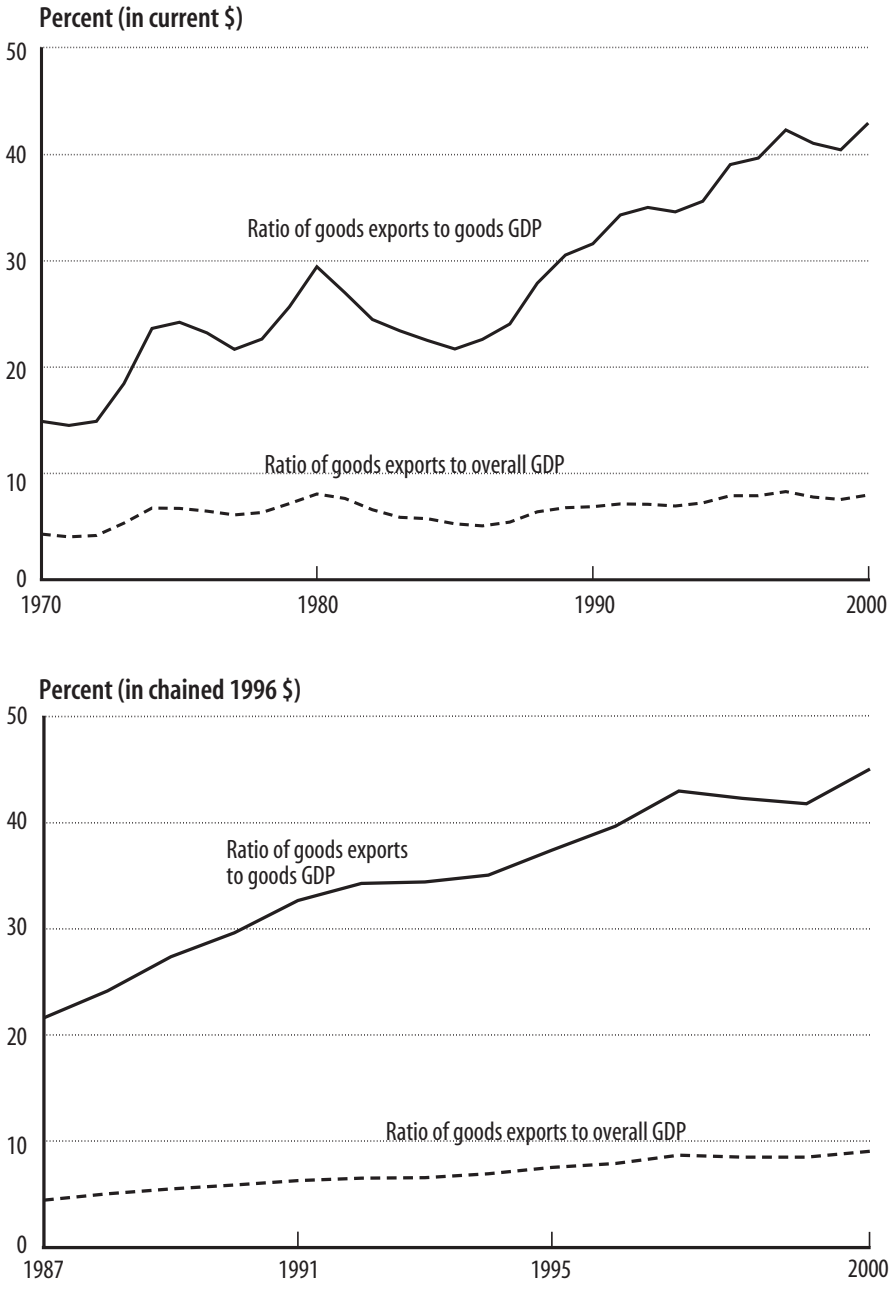
The ratio of goods exports to goods GDP was 43 percent in 2000, up from 15 percent in 1970.[10] This suggests a rapid surge in merchandise exports compared to domestic goods production, a surge also evident in inflation-adjusted data available from 1987 to 2000. By contrast, a relatively modest change is seen when comparing goods exports to overall GDP (figure 5). Examining trends in the major commodities also confirms the increasing importance of exports to the goods-producing sectors of the U.S. economy.

With international trade growing so rapidly, planning and deployment of multimodal freight transportation systems and services to effectively move the resulting cargo have become key areas to address. The development and maintenance of intermodal connectors is a particularly critical consideration, since such connections are often the weakest links in the nation's multimodal transportation networks (USDOT MARAD 2002b, p. 3-5; USDOT FHWA 2000, p. 33).[11]

[10] Export figures represent the value of the traded commodity. In contrast, *goods* GDP figures for agriculture, mining, and manufacturing represent the value-added by production of goods of these sectors to the U.S. economy. Therefore, it would be inaccurate to say that over 40 percent of U.S. merchandise production was exported in 2001 (Bordo et al. 1999).

[11] Intermodal connectors are often local, county, or city streets and remain one of the key areas where improvements are needed in the intermodal transportation system (USDOT MARAD 2002b, p. 3–5; USDOT FHWA 2000, p. 33).

Figure 5
Merchandise Export Trade and Goods Production in the U.S. Economy: 1970–2000



NOTE: Goods production refers to the agriculture, mining, and manufacturing sectors based on the 1987 Standard Industrial Classification.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, based on data from U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Accounts (NIPA) basis, revisions through August 2001, available at http:// www.bea.doc. gov/bea/dn1.htm, as of August 2002.

SHIFTS IN MAJOR TRADING PARTNERS

The overwhelming majority of U.S. merchandise trade is with relatively few countries, although the United States trades with nearly 200 countries worldwide.[12] In 2001, over three-quarters (77 percent) of the value of U.S. merchandise trade was with 15 countries (table 3). Of these, just five countries—Canada, Mexico, Japan, China, and Germany—accounted for over half (54 percent) of the value of U.S. international trade in goods. Nearly one-third of U.S. merchandise trade was with Canada and Mexico, the U.S.-NAFTA trade partners. Canada, the top U.S. trading partner for decades, remained the leading country and accounted for over one-fifth ($381 billion) of U.S. merchandise trade in 2001. The relatively high concentration of U.S. trade with a few major trading partners, and the geographic spread of the remaining trade among the other countries, influences the modes of transportation used in moving international freight to and from the United States. The proximity of Canada and Mexico to the United States allows surface modes (trucks, rail, and pipeline) to be the primary modes of transportation for NAFTA trade. For all the other U.S. trading partners, maritime vessels and air transportation are, by necessity, the modes used.

The 2001 decline in trade levels affected U.S. trade partners differently. Trade with a number of the top 25 trading partners declined sharply in 2001 compared with 2000 (table 4). Among the top 10 trading partners, trade with Taiwan declined the most (21 percent), followed by South Korea (16 percent) and Japan (13 percent). Trade with the Asian countries was hit the hardest, in part because of sluggish demand in those countries and the global decline in the information technology industry.[13]

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[12] This discussion of trade with the major trading partners uses current dollar figures because detailed official trade data by country, commodity, and mode of transportation are unavailable in inflation-adjusted real dollars. While adjusting for inflation is important to reflect the correct size of changes in the value of trade, other factors, e.g., foreign currency exchange rates, business cycles, balance of payments, stock market news, and central bank policies, affect the prices of goods and services traded internationally. Due to the complexity of the factors that influence international trade, it is difficult to control for trading partners' inflation rates as well as currency exchange fluctuations.

[13] One area of the U.S. economy that was hit particularly hard by the economic downturn in 2001 was the information technology (IT) sector. As private sector demand for IT products sagged, U.S. international trade in these commodities fell by 16 percent from $145 billion in 2000 to $122 billion in 2001. This slump in IT-related goods accounted for about one-fifth of the 2001 U.S. trade decline. Among the top countries for IT-related trade with the United States, Japan, Taiwan, Singapore, and South Korea were especially hard hit in 2001 in this area. See appendix table C-22 (p. 140) for the source data.

Table 3
Top 25 U.S. International Merchandise Trade Partners by Value: 2001
(Millions of current U.S. dollars)

Rank	Country	Value of total U.S. trade (all modes)	Value of total maritime trade	Value of total air trade	Value of total surface trade
1	Canada	380,693	9,180	24,999	346,515
2	Mexico	232,942	20,148	11,997	200,797
3	Japan	184,241	115,204	63,667	5,371
4	China	121,515	96,277	20,173	5,065
5	Germany	89,265	42,067	35,733	11,465
6	United Kingdom	82,195	26,214	45,980	10,001
7	South Korea	57,381	30,819	23,805	2,757
8	Taiwan	51,543	25,160	24,165	2,218
9	France	50,191	12,974	27,744	9,473
10	Italy	33,740	15,940	15,131	2,669
11	Singapore	32,671	7,043	21,766	3,862
12	Malaysia	31,717	10,361	20,217	1,139
13	Brazil	30,391	17,157	10,061	3,173
14	Netherlands	29,025	12,507	14,339	2,179
15	Ireland	25,689	2,337	21,978	1,374
16	Hong Kong[1]	23,722	11,153	11,477	1,092
17	Belgium	23,653	11,593	9,834	2,226
18	Venezuela	20,920	19,413	1,331	177
19	Thailand	20,724	12,631	7,150	942
20	Israel	19,453	3,836	14,267	1,350
21	Switzerland	19,409	3,055	14,956	1,398
22	Saudi Arabia	19,304	16,865	1,116	1,323
23	Philippines	18,995	6,511	11,976	508
24	Australia	17,424	10,466	5,797	1,161
25	India	13,502	7,007	5,867	628
	All other trading partners	242,680	172,532	53,075	17,073
	Top 25 countries	**1,630,305**	**545,916**	**465,527**	**618,863**
	Top 25, % of total	87.0	76.0	89.8	97.3
	Total, all countries	**1,872,985**	**718,448**	**518,602**	**635,935**
	North America	613,635	29,328	36,996	547,312
	% of total	32.8	4.1	7.1	86.1
	Overseas	1,259,350	689,120	481,606	88,624
	% of total	67.2	95.9	92.9	

[1] Hong Kong has officially been a part of China since 1997. However, the United States continues to publish merchandise trade statistics separately for Hong Kong.

NOTE: Surface includes truck, rail, pipeline, and other miscellaneous modes.

SOURCES: Compiled by U.S. Department of Transporation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Exports of Merchandise CD* and *U.S. Imports of Merchandise CD*, December 2001.

Table 4
Top 25 U.S. International Merchandise Trade Partners by Value: 2001 vs. 2000
(Millions of current U.S. dollars)

Rank in 2001	Country	2000	2001	Percentage change
1	Canada	405,639	380,693	–6.1
2	Mexico	247,631	232,942	–5.9
3	Japan	211,831	184,241	–13.0
4	China	116,316	121,515	4.5
5	Germany	87,981	89,265	1.5
6	United Kingdom	85,038	82,195	–3.3
7	South Korea	68,202	57,381	–15.9
8	Taiwan	64,894	51,543	–20.6
9	France	50,035	50,191	0.3
10	Italy	37,003	33,740	–8.8
11	Singapore	36,564	32,671	–10.6
12	Malaysia	36,050	31,717	–12.0
13	Brazil	31,677	30,391	–4.1
14	Netherlands	29,215	29,025	–0.6
15	Ireland	26,077	25,689	–1.5
16	Hong Kong[1]	24,201	23,722	–2.0
17	Belgium	24,136	23,653	–2.0
18	Venezuela	23,891	20,920	–12.4
19	Thailand	23,032	20,724	–10.0
20	Israel	22,727	19,453	–14.4
21	Switzerland	20,725	19,409	–6.3
22	Saudi Arabia	20,449	19,304	–5.6
23	Philippines	20,116	18,995	–5.6
24	Australia	18,898	17,424	–7.8
25	India	14,349	13,502	–5.9
	All other trading partners	250,628	242,680	–3.2
	Top 25 countries	**1,746,678**	**1,630,305**	**–6.7**
	Top 25, % of total	87.5	87.0	
	Total, all countries	**1,997,306**	**1,872,985**	**–6.2**
	North America	653,270	613,635	–6.1
	% of total	32.7	32.8	
	Overseas	1,344,036	1,259,350	–6.3
	% of total	67.3	67.2	

[1] Hong Kong has officially been a part of China since 1997. However, the United States continues to publish merchandise trade statistics separately for Hong Kong.

SOURCES: Compiled by U.S. Department of Transporation, Bureau of Transportation Statistics, March 2002; based on U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Exports of Merchandise CD* and *U.S. Imports of Merchandise CD,* December 2000 and 2001.

U.S. trade relationships have changed over the past three decades (table 5). By far the most pronounced changes have been the rising importance of Mexico and China. In 1970, Mexico was the fifth ranked U.S. trading partner with about $3 billion in merchandise trade with the United States. By 2001, Mexico had moved past Japan and was the second leading trading partner with about $233 billion trade. China, the 24th largest U.S. trading partner in 1980,[14] rose to the 10th position in 1990, and in 2001 was the 4th ranked trading partner with over $121 billion in merchandise trade. If the current growth rate of U.S.-China trade continues, China may overtake Japan in the very near future. These striking shifts in the geography of U.S. trade relationships clearly underscore the growth of North American trade and the associated land trade routes, as well as the growth in Pacific Rim trade and the greater role of U.S. West Coast maritime ports.

Since 1970, as trade with Mexico and China mushroomed, trade with major European partners grew more slowly, thereby changing the relative importance of trans-Atlantic trade. During this period, U.S. trade with several other Pacific Rim nations also grew rapidly. In particular, trade with South Korea,Taiwan, Singapore, and Malaysia grew quickly as these nations became centers for global manufacturing. Most notably in 1970, Japan was the only Asian country among the top 10 U.S. trading partners. Today, 4 of our top 10 trading partners are from Asia—Japan, China, South Korea, and Taiwan (table 6, p. 22).

These shifts in the major U.S. trading partners affect the global pattern of U.S. merchandise trade and the transportation of these goods. Contemporary patterns of goods production and trade—in which manufacturing and assembly operations are often located in different countries—depend on extensive and reliable transportation and logistics networks worldwide. For example, the automobile industry brings together a large number of different components manufactured in various locations in several countries. As global automakers rely on factories in many parts of the world to make cars, the demand for transportation services will grow. General Motors builds automobiles in Thailand for markets in Japan and Europe; DaimlerChrysler

[14] In 1970, China was not listed separately in the official trade statistics. It was listed as part of the "Communist World."

Table 5
Top 25 U.S. International Merchandise Trade Partners by Value: 1970–2001
(Millions of current U.S. dollars)

Rank in 1970	Rank in 1980	Rank in 1990	Rank in 2001	Country	Total trade, 2001
1	1	1	1	Canada	380,693
5	3	3	2	Mexico	232,942
2	2	2	3	Japan	184,241
	24	10	4	China[1]	121,515
3	4	4	5	Germany[2]	89,265
4	5	5	6	United Kingdom	82,195
17	13	7	7	South Korea	57,381
15	9	6	8	Taiwan	51,543
7	7	8	9	France	50,191
6	11	9	10	Italy	33,740
38	23	12	11	Singapore	32,671
36	26	20	12	Malaysia	31,717
12	16	17	13	Brazil	30,391
8	14	11	14	Netherlands	29,025
45	47	30	15	Ireland	25,689
13	17	13	16	Hong Kong[3]	23,722
9	15	14	17	Belgium[4]	23,653
10	10	18	18	Venezuela	20,920
44	38	23	19	Thailand	20,724
22	33	25	20	Israel	19,453
14	21	19	21	Switzerland	19,409
56	6	15	22	Saudi Arabia	19,304
21	27	26	23	Philippines	18,995
11	20	16	24	Australia	17,424
19	35	27	25	India	13,502
				All other trading partners	242,680
				Top 25 countries	**1,630,305**
				Top 25, % of total	87.0
				Total, all countries	**1,872,985**

[1] In 1970, China was not listed separately in official U.S. trade statistics. It was listed as part of the "Communist World."
[2] For 1970, 1980, and 1990, Germany includes both West Germany and East Germany.
[3] Hong Kong has officially been a part of China since 1997. However, the United States continues to publish merchandise trade statistics separately for Hong Kong.
[4] Merchandise trade figures for Belgium include Luxembourg for 1970, 1980, and 1990 but not 2001.

SOURCES: Compiled by U.S. Department of Transporation, Bureau of Transportation Statistics, March 2002.
2001 data—U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Exports of Merchandise CD* and *U.S. Imports of Merchandise CD,* December 2001.
1970, 1980, 1990 data—U.S. Department of Commerce, U.S. Census Bureau, *Statistical Abstract of the United States* (Washington, DC: 1982, 1985, and 1991).

Table 6
Top 25 U.S. International Merchandise Trade Partners by Value: 1970 and 2001
(Millions of current U.S. dollars)

Rank in 1970	Country	Total trade by all modes	Rank in 2001	Country	Total trade by all modes
1	Canada	20,171	1	Canada	380,693
2	Japan	10,527	2	Mexico	232,942
3	Germany[1]	5,910	3	Japan	184,241
4	United Kingdom	4,730	4	China	121,515
5	Mexico	2,923	5	Germany	89,265
6	Italy	2,669	6	United Kingdom	82,195
7	France	2,425	7	South Korea	57,381
8	Netherlands	2,179	8	Taiwan	51,543
9	Belgium and Luxembourg	1,891	9	France	50,191
10	Venezuela	1,841	10	Italy	33,740
11	Australia	1,597	11	Singapore	32,671
12	Brazil	1,510	12	Malaysia	31,717
13	Hong Kong	1,350	13	Brazil	30,391
14	Switzerland	1,159	14	Netherlands	29,025
15	Taiwan	1,076	15	Ireland	25,689
16	Spain	1,075	16	Hong Kong[2]	23,722
17	South Korea	1,013	17	Belgium[3]	23,653
18	Sweden	942	18	Venezuela	20,920
19	India	870	19	Thailand	20,724
20	South Africa	853	20	Israel	19,453
21	Phillipines	845	21	Switzerland	19,409
22	Israel	742	22	Saudi Arabia	19,304
23	Colombia	664	23	Philippines	18,995
24	Argentina	613	24	Australia	17,424
25	Peru	555	25	India	13,502
	All other trading partners	13,046		All other trading partners	242,680
	Top 25 countries	**70,130**		**Top 25 countries**	**1,630,305**
	Top 25, % of total	84.3		Top 25, % of total	87.0
	Total, all countries	**83,176**		**Total, all countries**	**1,872,985**
	North America	23,094		North America	613,635
	% of total	27.8		% of total	32.8
	Overseas	60,082		Overseas	1,259,350
	% of total	72.2		% of total	67.2

[1] Includes $5,868 million for the Federal Republic of Germany (formerly West Germany) and $42 million for the Democratic Republic of Germany (formerly East Germany).
[2] Hong Kong has officially been a part of China since 1997. However, the United States continues to publish merchandise trade statistics separately for Hong Kong.
[3] Merchandise trade figures for Belgium include Luxembourg for 1970, 1980, and 1990 but not 2001.

SOURCES: Compiled by U.S. Department of Transporation, Bureau of Transportation Statistics, March 2002.
2001 data—U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Exports of Merchandise CD* and *U.S. Imports of Merchandise CD,* 2001.
1970 data—U.S. Department of Commerce, U.S. Census Bureau, *Statistical Abstract of the United States* (Washington, DC: 1982 and 1983).

and Volkswagen build vehicles in South African plants for European markets; and BMW manufactures vehicles in South Africa for the United States market (*Wall Street Journal* 2002). Also, when foreign companies produce vehicles (e.g., Volkswagen, Toyota, BMW, and Honda) in the United States for North American markets, demand is generated for freight and port services as components and parts are transported to the United States from multiple locations worldwide and the finished products are sold throughout North America.

MODAL TRENDS IN U.S. MERCHANDISE TRADE

A large amount of freight carried over the U.S. transportation network is imported or bound for export. In 2001, over 1.6 billion short tons of international merchandise moved to and from the United States, a 5 percent increase from 1997.[15] Imports accounted for about 71 percent of this tonnage in 2001, up from about 65 percent in 1997. The relative roles of transportation modes in carrying this large amount of freight vary by value and weight[16] (table 7).

Water transportation carries more trade, both in terms of tonnage and value, than any other mode (figure 6). Its share of the weight of U.S. trade rose from 73 percent in 1997 to 78 percent in 2001, but its share of the value declined slightly from 40 percent to 38 percent. Water is less dominant in terms of value because higher value-per-ton commodities are often moved by air and truck, especially in U.S.-NAFTA trade. While air transportation accounted for nearly 28 percent of the value of total U.S. trade in 2001, its share of the tonnage remained less than 1 percent. Trucks moved 21 percent of the value and 11 percent of the weight.

In terms of value, a far higher share of imports enter the United States by water transportation than are exported by ship—46 percent compared with 27 percent. By contrast, truck and air moved a larger share of the value of exports than imports. Trucks moved 26 percent of the value of exports and 18 percent of imports (table 7). In terms of weight, water accounted for 79 percent of U.S. imports and 75 percent of U.S. exports.

Despite the decline in overall freight movements in 2001 compared with 2000 (see appendix table C-6, p. 121), the relative modal shares do not show a dramatic change. However,

[15] During the same period, however, the value of merchandise trade grew by 20 percent (current dollars). Due to the way official U.S. trade statistics have been collected and processed by U.S. Customs and the U.S. Census Bureau, it is not possible to report an overall weight for all U.S. international merchandise trade for all modes prior to 1997. To calculate the total tonnage for all imports and exports, BTS estimated the U.S. export weight for truck, rail, pipeline, and other and unknown modes based on value-to-weight ratios from the import data. These estimates were added to official export weight data for water and air and then combined with official import weight data for all modes.

[16] Due to the way in which U.S. trade data are collected, the modal shares represent single modes in use at U.S. ports of entry or exit even though more than one mode may be used in transporting the goods from point of origin to destination.

Table 7
Value and Weight of U.S. International Merchandise Trade by Mode of Transportation: 1997 and 2001

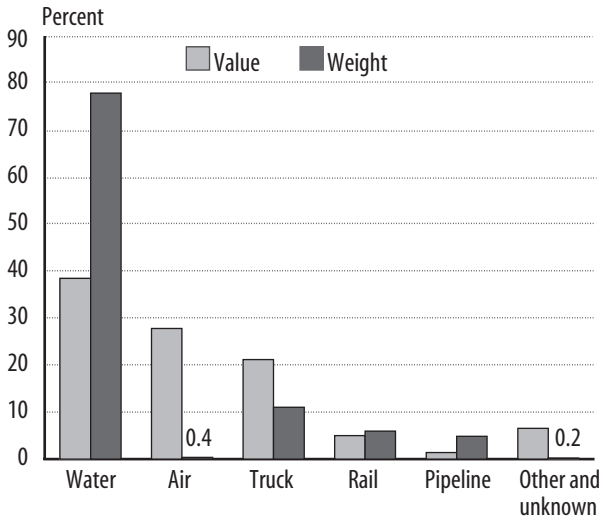
Mode	Total trade		Exports		Imports	
	1997	2001	1997	2001	1997	2001
VALUE	Billions of current U.S. dollars					
Water	626	718	225	199	401	520
Air	433	519	220	251	213	267
Truck	323	395	167	192	157	204
Rail	70	93	19	23	51	69
Pipeline	14	26	0.2	0.5	14	26
Other, unknown, and miscellaneous	92	121	57	65	35	57
Total, all modes	**1,557**	**1,873**	**688**	**731**	**870**	**1,142**
	Modal shares in percent					
Water	40.2	38.4	32.7	27.2	46.1	45.5
Air	27.8	27.7	32.0	34.4	24.5	23.4
Truck	20.8	21.1	24.3	26.3	18.0	17.8
Rail	4.5	4.9	2.7	3.2	5.9	6.1
Pipeline	0.9	1.4	0.04	0.1	1.6	2.3
Other, unknown, and miscellaneous	5.9	6.5	8.3	8.9	4.0	5.0
Total, all modes	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
WEIGHT	Millions of short tons[1]					
Water	1,144	1,276	408	361	736	915
Air	6	6	3	3	3	3
Truck	176	180	92	89	85	92
Rail	84	97	22	22	62	75
Pipeline	75	79	3	4	72	75
Other, unknown, and miscellaneous	76	4	27	2	49	2
Total, all modes	**1,561**	**1,643**	**554**	**481**	**1,007**	**1,162**
	Modal shares in percent					
Water	73.3	77.7	73.5	75.1	73.1	78.7
Air	0.4	0.4	0.5	0.6	0.3	0.3
Truck	11.3	11.0	16.6	18.5	8.4	7.9
Rail	5.4	5.9	4.0	4.6	6.2	6.5
Pipeline	4.8	4.8	0.5	0.8	7.2	6.5
Other, unknown, and miscellaneous	4.9	0.2	4.9	0.4	4.8	0.2
Total, all modes	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

[1] BTS estimated the export weight for truck, rail, pipeline, and other and unknown based on value-to-weight ratios from the import data. This was necessary because export weights for surface modes are not currently reported. Weight for water and air exports and imports is reported.

NOTES: Excludes imports valued at less than $1,250. Import value is based on U.S. general imports, customs value basis. Excludes exports valued at less than $2,500. Export value is FAS (free alongside ship) and represents the value of exports at the port of export, including the transaction price and inland freight, insurance, and other charges. Due to the way in which U.S. trade data are collected, the modal shares represent single modes in use at U.S. ports of entry or exit even though more than one mode may be used in transporting the goods from origin to destination.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, May 2002; based on: **total, water, and air data—**U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Exports of Merchandise CD* and *U.S. Imports of Merchandise CD,* December 2001; **truck, rail, pipeline, and other and unknown data—**U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, 1997 and 2001; and special tabulations.

Figure 6
Modal Shares of U.S. International Merchandise Trade by Value and Weight: 2001



SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, May 2002, based on: **total, water, and air data—**U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Exports of Merchandise CD* and *U.S. Imports of Merchandise CD,* December 2001; **truck, rail, pipeline, and other and unknown data—**U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, 2001; and special tabulations.

air's share of the total value declined noticeably from 30 percent to 28 percent, in part, due to the closure of U.S. airspace for several days following the September 11 terrorist attacks. Trucking maintained its share, while rail rose very slightly. Water's share rose slightly by value but remained stable by weight (table 8).

International Maritime Trade and Transportation

In 2001, merchandise trade valued at over $718 billion moved between the United States and foreign seaports. Trade with Canada and Mexico accounted for only 4 percent of the value of this maritime trade, while trade with overseas countries[17] represented the remaining 96 percent. In 2001, Japan was the top U.S. maritime trading partner by value, followed by China and Germany (table 9, p. 29). Like overall U.S. trade, maritime

[17] Overseas countries are all countries except Canada and Mexico.

Table 8
Modal Shares of U.S. International Merchandise Trade by Value and Weight: 2000 and 2001
(In percent)

Mode	Value		Weight	
	2000	2001	2000	2001
Total trade				
Water	37.0	38.4	77.3	77.7
Air	29.7	27.7	0.4	0.4
Truck	21.5	21.1	11.5	11.0
Rail	4.7	4.9	5.7	5.9
Pipeline	1.2	1.4	4.9	4.8
Other and unknown	5.9	6.5	0.1	0.2
Total, all modes	**100.0**	**100.0**	**100.0**	**100.0**
Imports to the United States				
Water	44.4	45.5	78.1	78.7
Air	25.4	23.4	0.4	0.3
Truck	17.8	17.8	8.3	7.9
Rail	5.8	6.1	6.4	6.5
Pipeline	1.9	2.3	6.7	6.5
Other and unknown	4.7	5.0	0.1	0.2
Total, all modes	**100.0**	**100.0**	**100.0**	**100.0**
Exports from the United States				
Water	25.5	27.2	75.5	75.1
Air	36.4	34.4	0.6	0.6
Truck	27.2	26.3	18.8	18.5
Rail	3.0	3.2	4.1	4.6
Pipeline	0.1	0.1	0.8	0.8
Other and unknown	7.8	8.9	0.2	0.4
Total, all modes	**100.0**	**100.0**	**100.0**	**100.0**

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, May 2002; based on: **total, water, and air data—**U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Exports of Merchandise CD* and *U.S. Imports of Merchandise CD*, December 2000 and 2001; **truck, rail, pipeline, and other and unknown data—**U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, 2000 and 2001; and special tabulations.

trade is concentrated among a few large trading partners, with the top five maritime partners accounting for 43 percent of the value of this trade in 2001.

Over 1.6 billion tons of goods were traded between the United States and other countries in 2001, and maritime transportation carried over three-quarters of the weight of these goods. The top U.S. maritime trading partner by weight was Mexico followed by Venezuela and Saudi Arabia. These three countries were also among the leading crude oil suppliers to the United States. Nigeria and the United Kingdom, which also supply a large amount of crude oil to the United States, are

Table 9
Top 25 U.S. Maritime Trade Partners by Value and Weight: 2001

Ranked by value	Country	Million dollars	Percent	Ranked by weight	Country	Million short tons	Percent
1	Japan	115,204	16.0	1	Mexico	122	9.5
2	China	96,277	13.4	2	Venezuela	118	9.3
3	Germany	42,067	5.9	3	Saudi Arabia	95	7.4
4	South Korea	30,819	4.3	4	Canada	92	7.2
5	United Kingdom	26,214	3.6	5	Japan	69	5.4
6	Taiwan	25,160	3.5	6	China	53	4.1
7	Mexico	20,148	2.8	7	Nigeria	50	3.9
8	Venezuela	19,413	2.7	8	Iraq	43	3.3
9	Brazil	17,157	2.4	9	Brazil	37	2.9
10	Saudi Arabia	16,865	2.3	10	Colombia	37	2.9
11	Italy	15,940	2.2	11	United Kingdom	31	2.4
12	France	12,974	1.8	12	South Korea	29	2.3
13	Thailand	12,631	1.8	13	Norway	22	1.7
14	Netherlands	12,507	1.7	14	Italy	21	1.6
15	Belgium	11,593	1.6	15	Netherlands	20	1.6
16	Hong Kong[1]	11,153	1.6	16	Taiwan	20	1.5
17	Indonesia	10,658	1.5	17	Angola	19	1.5
18	Australia	10,466	1.5	18	Algeria	18	1.4
19	Malaysia	10,361	1.4	19	Trinidad and Tobago	18	1.4
20	Canada	9,180	1.3	20	Spain	16	1.3
21	Nigeria	9,036	1.3	21	Kuwait	15	1.2
22	Dominican Republic	7,268	1.0	22	Germany	15	1.2
23	Singapore	7,043	1.0	23	Belgium	14	1.1
24	India	7,007	1.0	24	Indonesia	14	1.1
25	Spain	6,890	1.0	25	Russia	13	1.0
	All other trading partners	154,418	21.5		All other trading partners	276	21.7
	Total, top 25 countries	**564,030**	**78.5**		**Total, top 25 countries**	**999**	**78.3**
	Total, all countries	718,448	100.0		Total, all countries	1,276	100.0

[1] Hong Kong has officially been a part of China since 1997. However, the United States continues to publish merchandise trade statistics separately for Hong Kong.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, May 2002; based on data from U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Merchandise of Exports* and *Imports CD,* December 2001.

among the top maritime partners by tonnage. The top five maritime trade partners by weight accounted for more than one-third of the tonnage of U.S. maritime trade.

The type of goods transported in U.S. maritime imports and exports varies greatly, affecting the kinds of vessels and the seaports used. The physical characteristics, value, and weight of commodities are some of the factors that determine the use of container, tanker, or bulk vessels. Among the top U.S. maritime trading partners, the value per ton of merchandise ranged from

a high of $2,800 for trade with Germany to a low of $100 for trade with Canada. Clearly, most U.S.-Canada maritime trade involves low value-per-ton commodities (e.g., petroleum, agricultural, and lumber products), while higher value-per-ton goods (e.g., automobiles and automotive parts) move by surface modes. By contrast, most U.S.-Germany maritime trade involves higher value merchandise (e.g., automobiles) that moves by container vessels.

In 2001, the top U.S. seaport for international merchandise trade by weight was Houston, handling over 130 million short tons of commodities, mostly petroleum, valued at $44 billion (table 10). The leading port by value was Los Angeles, which handled 46 million short tons of commodities, primarily manufactured goods, valued at $104 billion. The rankings of the leading ports by value and weight are evidence of the specialization among U.S. seaports, with the U.S. Pacific and Atlantic coast ports heavily involved in container trade, while the U.S. Gulf Coast ports are mainly involved in dry bulk and tanker trade. Houston handled mostly bulk commodities (e.g., grain and coal) and petroleum products valued at an average of about $340 per ton, while Los Angeles handled primarily containerized commodities valued at nearly $2,300 per ton.

Growth and Shift in Container Trade

One of the most important trends in maritime trade worldwide in recent decades has been the growth in containerization and the resulting increase in longer distance shipments. Over 18 million 20-foot equivalent units (TEUs)[18] of merchandise moved in and out of U.S. container ports in 2001, up 36 percent from 13 million in 1995 (table 11, p. 32). U.S. container ports handled an average of 50,000 TEUs a day in 2001.

In 2001, there were 5.6 million maritime container entries into the United States, down 6 percent from nearly 6 million in 2000[19] (figure 7, p. 33). While the number of vessel containers entering the United States had been declining even in the months

[18] A TEU is the standard unit for counting containers of various lengths and describing the capacity of container vessels.

[19] These numbers are for individual containers, not TEUs. Because containers come in different lengths (e.g., 20 foot, 40 foot, 48 foot, and 53 foot), these figures differ from the TEU figures, which convert the tonnage of goods moved in the containers into TEUs.

Table 10
Top 25 U.S. International Maritime Ports by Value and Weight: 2001
(Preliminary data)

Ranked by value	Port	Million dollars	Percent	Ranked by weight	Port	Million short tons	Percent
1	Los Angeles, CA	104,193	14.5	1	Houston, TX	130	10.2
2	Long Beach, CA	94,699	13.2	2	New York, NY/NJ	79	6.2
3	New York, NY/NJ	85,918	12.0	3	New Orleans, LA	72	5.6
4	Houston, TX	44,489	6.2	4	Gramercy, LA	61	4.8
5	Charleston, SC	33,411	4.7	5	Corpus Christie, TX	54	4.2
6	Seattle, WA	28,595	4.0	6	Morgan City, LA	53	4.1
7	Oakland, CA	24,985	3.5	7	Los Angeles, CA	46	3.6
8	Norfolk, VA	24,864	3.5	8	Beaumont, TX	45	3.6
9	Baltimore, MD	20,820	2.9	9	Long Beach, CA	44	3.5
10	Tacoma, WA	18,650	2.6	10	Philadelphia, PA	41	3.2
11	Savannah, GA	17,158	2.4	11	Lake Charles, LA	34	2.7
12	New Orleans, LA	16,976	2.4	12	Mobile, AL	28	2.2
13	Miami, FL	16,600	2.3	13	Baltimore, MD	26	2.0
14	Jacksonville, FL	10,807	1.5	14	Port Arthur, TX	25	2.0
15	Portland, OR	10,713	1.5	15	Norfolk, VA	25	1.9
16	Port Everglades, FL	10,283	1.4	16	Baton Rouge, LA	25	1.9
17	Philadelphia, PA	9,971	1.4	17	Christiansted, VI	24	1.9
18	Morgan City, LA	7,830	1.1	18	Freeport, TX	24	1.9
19	Corpus Christie, TX	7,679	1.1	19	Pascagoula, MS	22	1.7
20	Beaumont, TX	7,669	1.1	20	Texas City, TX	21	1.6
21	Gramercy, LA	7,070	1.0	21	Wilmington, DE	18	1.4
22	Boston, MA	6,143	0.9	22	Charleston, SC	18	1.4
23	Christiansted, VI	5,799	0.8	23	Savannah, GA	17	1.3
24	Wilmington, DE	5,684	0.8	24	Oakland, CA	16	1.3
25	Port Hueneme, CA	4,822	0.7	25	Seattle, WA	15	1.2
	All other ports	92,618	12.9		All other ports	314	24.6
	Total, top 25 ports	**625,830**	**87.0**		**Total, top 25 ports**	**962**	**75.1**
	Total, waterborne trade	718,448	100.0		Total, waterborne trade	1,276	100.0

NOTE: Data do not include in-transits, shipments transiting U.S. ports but not part of U.S. official merchandise trade.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on special tabulations from U.S. Department of Transportation, Maritime Administration, May 2002; and U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, May 2002.

before September 11, when compared with the same months in 2000, there were 19 percent fewer such containers in September 2001 than in September 2000. The declines continued in October, November, and December 2001 compared with the corresponding months in 2000.

Three of the top five container ports in the United States are on the West Coast (table 11). Between 1995 and 2001, the Ports of Los Angeles and Long Beach grew the most in terms of container traffic, reflecting increased trade with Pacific Rim

Table 11
Top 10 U.S. Maritime Container Ports: 1995–2001
(Thousands of TEUs)

Port	1995	1996	1997	1998	1999	2000	2001	Average number of TEUs per day (2001)	Change, 1995–2001 (%)	Average annual growth rate (%)
Los Angeles, CA	1,849	1,873	2,085	2,293	2,552	3,228	3,425	9,384	85.2	10.8
Long Beach, CA	2,137	2,357	2,673	2,852	3,048	3,204	3,199	8,765	49.7	7.0
New York, NY/NJ	1,537	1,533	1,738	1,884	2,027	2,200	2,332	6,388	51.7	7.2
Charleston, SC	758	801	955	1,035	1,170	1,246	1,156	3,166	52.5	7.3
Oakland, CA	919	803	843	902	915	989	960	2,630	4.5	0.7
Norfolk, VA	647	681	770	793	829	850	885	2,424	36.7	5.4
Seattle, WA	993	939	953	976	962	960	824	2,257	–17.0	–3.1
Savannah, GA	445	456	529	558	624	720	813	2,226	82.6	10.6
Houston, TX	489	538	609	657	714	733	778	2,132	59.1	8.0
Miami, FL	497	505	624	602	618	684	717	1,964	44.2	6.3
All other ports	3,057	4,308	3,777	3,005	3,106	3,124	2,993	8,200	–2.1	–0.4
Total, top 10 ports	**10,271**	**10,486**	**11,779**	**12,552**	**13,458**	**14,814**	**15,088**	**41,337**	**46.9**	**6.6**
Top 10, % of total	77.1	70.9	75.7	80.7	81.2	82.6	83.4			
Total, all ports[1]	13,328	14,794	15,556	15,556	16,564	17,938	18,081	49,537	35.7	5.2

[1] Includes all container ports in the 50 U.S. states and Puerto Rico.

NOTE: TEUs = 20-foot equivalent units. One 20-foot container equals 1 TEU, while 1 40-foot container equals 2 TEUs. The data in this table include only loaded containers engaged in U.S. international maritime activity. Data include U.S. imports, exports, and transshipments. Transshipments neither originate nor are destined for the United States but pass through it from one foreign country to another. For example, an automobile component shipped from Japan and destined for Mexico, may pass through the Ports of Los Angeles and Long Beach before being trucked to Mexico. Therefore, the trade levels will be greater than those reported in U.S. international trade statistics, which exclude transshipments. The data also exclude military shipments.

SOURCE: U.S. Department of Transportation, Maritime Administration, May 2002; based on *Journal of Commerce,* Port Import/Export Reporting Service (PIERS), 2001 PIERS data.

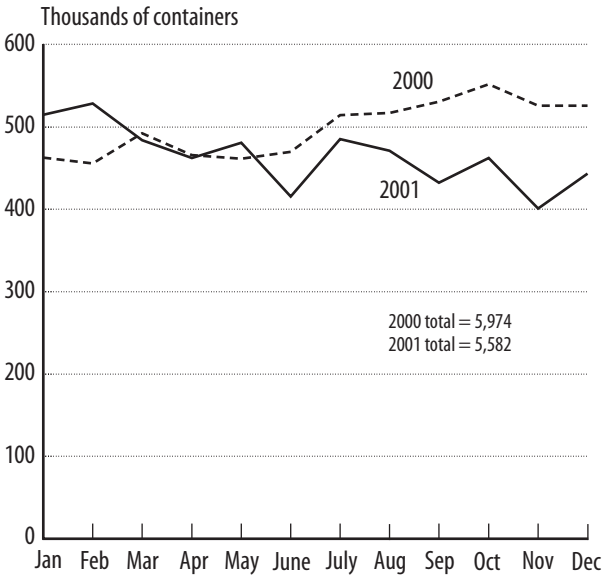
countries. Los Angeles and Savannah, Georgia, showed the largest average annual growth rate. High growth rates for Savannah, Miami, and Houston reflect the strong activity in U.S. container trade with Latin American countries.

The first use of containers for commercial intermodal sea-land movements was in the United States in 1956 (between Newark, New Jersey, and Houston). Since then, containers have greatly affected the movement of U.S. international trade, port operations, and the distribution of ports' share of total maritime trade.[20] In the 1970s, the distribution of commodities

[20] Containers were first used for commercial intermodal ocean-land service by the McLean Trucking Company (now Sea-Land Service Inc.). The use of standard containers among multiple modes was revolutionary. Prior to this, containers or strong large-size boxes were used for truck and rail transportation within the United States and Europe (Muller 1999).

entering the United States started to shift, with West Coast ports surpassing East Coast ports, a trend that continues today and affects transportation activity within the United States. U.S.-Asian Pacific trade was modest in the 1970s, and East Coast ports handled the majority of international maritime trade. As trade with Asia grew, the East Coast ports' share of the value of trade declined while West Coast ports' share increased. Gulf of Mexico ports experienced a modest increase in their relative share as trade with Latin America grew.

Figure 7
Maritime Container Entries into the United States: 2000 and 2001



NOTE: The above figures do not solely represent TEUs (20-foot equivalent units) but rather containers of various capacities.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, April 2002; based on U.S. Department of Treasury, U.S. Customs Service, Mission Support Services, Office of Field Operations, *Operations Management Database CD,* December 2001.

Over half of U.S. containerized merchandise trade, measured in TEUs, passes through West Coast ports (table 12). Nearly 56 percent of containerized imports and 43 percent of the exports passed through these ports in 2001. California ports alone handled 48 percent of U.S. container imports and 32 percent of the container exports. As West Coast ports handled many more containers for import than export, those ports had a larger share of the oceanborne containerized trade deficit, in terms of export-import balance, than other regional ports. Hence, West Coast ports serve more as import gateways into the United States than export gateways to the rest of the world.

In contrast, East Coast ports handled more exports than imports. East Coast ports handled 37 percent of U.S. containerized imports and 41 percent of the exports in 2001. The port of New York-New Jersey handled 14 percent of the nation's container imports and 12 percent of the exports.

The critical role of maritime ports to U.S. international trade was seen in the fall of 2002. Operations at West Coast ports shut down due to a labor dispute between shipping lines/port operators and dockworkers negatively affecting the flow of maritime goods passing through these ports to the rest of the United States (box 2, p. 35).

Table 12
U.S. Containerized Exports and Imports by Coastal Port Regions: 2001

Coastal port regions	TEUs				Metric tons			
	Total	Exports	Imports	Balance	Total	Exports	Imports	Balance
United States	**18,081,155**	**6,812,808**	**11,268,347**	**–4,455,540**	**144,253,668**	**63,528,996**	**80,724,672**	**–17,195,676**
Pacific Coast	9,303,551	2,952,246	6,351,304	–3,399,058	68,382,357	28,933,746	39,448,611	–10,514,864
Atlantic Coast	7,329,706	3,152,859	4,176,847	–1,023,987	61,891,151	27,561,870	34,329,281	–6,767,410
Gulf Coast	1,447,794	707,694	740,100	–32,407	13,979,592	7,033,325	6,946,267	87,058
Great Lakes	104	8	96	–88	568	55	514	–459

Coastal port regions	TEUs (percent)			Metric tons (percent)		
	Total	Exports	Imports	Total	Exports	Imports
United States	**100**	**100**	**100**	**100**	**100**	**100**
Pacific Coast	51	43	56	47	46	49
Atlantic Coast	41	46	37	43	43	43
Gulf Coast	8	10	7	10	11	9
Great Lakes	<1	<1	<1	<1	<1	<1

NOTES: TEUs = 20-foot equivalent units. One 20-foot container equals 1 TEU while 1 40-foot container equals 2 TEUs. The data in this table include only loaded containers engaged in U.S. international maritime activity, including U.S. imports, exports, and transshipments. Transshipments are shipments neither originating nor destined for the United States but passing through it from one foreign country to another. For example, an automobile component shipped from Japan and destined for Mexico, may pass through the Ports of Los Angeles and Long Beach before being trucked to Mexico. Therefore, the trade levels will be greater than those reported in U.S. international trade statistics, which exclude transshipments. The data also exclude military shipments. Pacific Coast includes ports in Alaska and Hawaii. One metric ton equals 1.1 short tons.

SOURCE: U.S. Department of Transportation, Maritime Administration, May 2002; based on *Journal of Commerce,* Port Import/Export Reporting Service (PIERS), 2001 PIERS data.

Port Concentration

The distribution of maritime trade among U.S. port regions shows a greater concentration of traffic in a small number of ports, primarily because of the growth in container traffic and the demand for larger, faster, and more specialized vessels. Today, "Post-Panamax" super-freighter vessels[21] are longer than 2 football fields, can carry up to 6,500 TEUs, and can cruise at speeds over 25 knots. More of these larger vessels are calling at ports in the United States and around the world. Some of the next generation of mega ships under construction today could carry over 8,500 TEUs (Muller 1999).

To handle these newer vessels, ports have had to invest in larger cranes, berths, storage yards, improved information technology systems, and additional dredging. The large investments needed to accommodate these vessels have resulted in fewer port

[21] These vessels are too large to pass through the Panama Canal.

Box 2
West Coast Ports Shutdown

West Coast ports in Washington, Oregon, and California shut down operations for 10 days from September 29 to October 8, 2002, due to an unresolved labor dispute between the Pacific Maritime Association (PMA), a group representing shipping lines and port operators, and members of the International Longshore and Warehouse Union (ILWU). The ports reopened for business on October 9, 2002, after President George W. Bush invoked the Taft-Hartley Act and a federal judge ordered the ports reopened for an 80-day period.[1] Working with a federal mediator, both sides reached a final agreement on a six-year contract on November 24, 2002. Both sides then ratified a new six-year contract in January 2003.

Before the shutdown, PMA and ILWU had been without a contract since July 1, 2002. At issue was the desire of the shipping companies and port operators to introduce new computer technologies designed to streamline the loading and unloading of goods at the ports and the effects of these technologies on union jobs.

Since West Coast ports handle nearly half the value of U.S. maritime merchandise trade (over $300 billion in 2001), the shutdown had national economic implications for the United States. These ports move about $6 billion worth of goods per week and a sizeable proportion of the cargo passing through West Coast ports is destined for states east of the Mississippi River.

The lockout affected several sectors of the U.S. economy, particularly farms, automakers, and retailers. During the lockout, several tons of perishable agricultural products could not be transported and auto plants and retailers that rely heavily on just-in-time deliveries struggled with depleted inventories. The effects of the lockout also extended beyond the United States to Asian-Pacific countries, the predominant shippers to West Coast ports.

[1] The Taft-Hartley Act allows the President of United States to seek an injunction to end a lockout and require work to resume, when he determines this to be in the national interest. The injunction provides both sides of a labor dispute time to resolve their differences and pursue a permanent solution.

calls or even no port calls by mega ships at certain ports (USDOT 1999). A change in the pattern of port calls could lead to changes in freight flows in different geographic regions of the United States. For example, traffic in and out of ports able to handle the mega ships could grow, thereby increasing the demand for landside infrastructure facilities in adjacent local areas. Along the same lines, more coastwise traffic could arise in some areas, possibly leading to an expanded maritime hub-and-spoke network, where cargo unloaded at a larger port is separated and sent to smaller U.S. ports aboard smaller vessels.

While large investment needs are associated with mega ships, their increased use is thought to have improved the economics of containerization and brought some cost savings to the maritime industry. Larger ships make some of these gains

and labor costs savings possible, since above a given ship size, the number of crew needed to operate a vessel does not necessarily change, thereby lowering the operating cost per ton (Campbell 1993). Also, faster turnaround time in ports (now generally less than one day, and hours in some cases) leaves more time for moving cargo and increases the volume of cargo moved in a year.

Port Calls and Vessel Capacity

As container activity has become increasingly concentrated, so too have vessel port calls and capacity. In 2000, the top five container ports handled over half of the containership calls to U.S. ports and nearly two-thirds of the cargo capacity[22] of the calling vessels (table 13). Vessels calling at U.S. ports were also, on average, larger than those calling worldwide. The average size (per call) of container vessels calling at U.S. ports was nearly 38,000 deadweight tons (dwt) in 2000, up about 6 percent since 1998 (USDOT MARAD 2002a). In contrast, the average size of container vessels calling at ports worldwide was just 30,000 dwt. In 2000, three U.S. ports, San Francisco Bay Area ports, Los Angeles-Long Beach, and New York-New Jersey, ranked among the world's top 10 container ports in 2000, measured by average vessel size per call (table 14, p. 38).

Major Challenges

Two of the major challenges facing U.S. seaports that handle larger containerships are dredging and disposal of dredged material and landside access issues. Channel dredging is a leading issue for U.S. ports, because channels and berths need depths approaching 50 feet in order to accommodate the larger container vessels. Beyond the engineering requirements, there is also the environmental issue of storage of contaminated sediments. Once dredged, channels need continuing maintenance to be kept passable, but this can be challenging since many ports are located in or near environmentally sensitive areas such as wetlands, estuaries, and associated fisheries. In addition to

[22] Capacity equals the number of calls multiplied by the vessel deadweight tons.

Table 13
Top 20 U.S. Port Calls by Vessel Type: 2000
(Capacity in thousands of deadweight tons)

Ranked by container capacity	Port	Total calls	Total capacity	Containership		Containerships (percentage of total vessels)		Average vessel size per call (dwt)	
				Calls	Capacity	Calls	Capacity	All vessel types	Container-ships
1	Los Angeles/ Long Beach, CA	5,326	242,951	2,955	124,281	55.5	51.2	45,616	42,058
2	New York, NY/NJ	4,605	186,631	2,172	87,463	47.2	46.9	40,528	40,268
3	San Francisco Bay area, CA[1]	3,575	163,071	1,936	82,958	54.2	50.9	45,614	42,850
4	Charleston, SC	2,167	81,699	1,547	62,463	71.4	76.5	37,701	40,377
5	Hampton Roads area, VA[2]	2,496	110,417	1,557	61,943	62.4	56.1	44,238	39,784
6	Savannah, GA	1,769	62,629	739	31,506	41.8	50.3	35,404	42,633
7	Seattle, WA	1,150	45,569	794	31,182	69.0	68.4	39,625	39,272
8	Tacoma, WA	1,196	47,169	568	27,950	47.5	59.3	39,439	49,208
9	Miami, FL	1,212	34,553	766	25,522	63.2	73.9	28,509	33,319
10	Houston, TX	5,129	207,831	614	19,799	12.0	9.5	40,521	32,246
11	Baltimore, MD	1,636	55,476	409	14,669	25.0	26.4	33,910	35,866
12	San Juan, PR	1,344	27,449	610	11,490	45.4	41.9	20,423	18,836
13	Philadelphia, PA	2,739	129,204	468	11,315	17.1	8.8	47,172	24,177
14	New Orleans, LA	5,090	234,036	388	10,853	7.6	4.6	45,980	27,972
15	Columbia River, OR[3]	2,163	77,436	262	10,025	12.1	12.9	35,800	38,263
16	Honolulu, HI	676	26,900	339	8,987	50.1	33.4	39,793	26,510
17	Jacksonville, FL	1,291	35,532	305	7,989	23.6	22.5	27,523	26,193
18	Port Everglades, FL	814	27,834	211	5,890	25.9	21.2	34,194	27,915
19	Freeport, TX	641	35,737	46	766	7.2	2.1	55,752	16,652
20	Tampa, FL	779	23,628	6	127	0.8	0.5	30,331	21,167
	All other ports	14,157	874,089	709	20,441	5.0	2.3	61,743	28,831
	Total, top 20 U.S. ports	**45,798**	**1,855,752**	**16,692**	**637,178**	**36.4**	**34.3**	**40,520**	**38,173**
	Top 20, % of total	76.4	68.0	95.9	96.9				
	Total, all U.S. ports	**59,955**	**2,729,841**	**17,401**	**657,619**	**29.0**	**24.1**	**45,531**	**37,792**

[1] Includes the ports of Oakland and San Francisco.
[2] Includes, e.g., Norfolk and Newport News.
[3] Includes, e.g., Vancouver, Portland, and Astoria.

KEY: dwt = deadweight tons.

NOTES: Data include oceangoing vessels of 1,000 gross tons and above. Capacity = dwt multiplied by calls and represents the vessel capacity handled by a port. Port geography in this table is defined by Lloyd's Maritime Information Services and differs from that in tables 10 and 11 where "U.S. ports" are based U.S. Customs designations.

SOURCE: U.S. Department of Transportation, Maritime Administration; based on Lloyd's Maritime Information Services, *Vessel Movements,* available at http://www.marad.dot.gov/Marad_Statistics/Porcalls_us.htm, as of Apr. 24, 2002.

Table 14
Top 25 World Port Calls by Container Vessels: 2000

Rank by capacity	Port	Calls	Capacity (thousands of dwt)	Average vessel size per call (dwt)	Rank by average vessel size
1	Hong Kong	12,462	412,264	33,082	12
2	Singapore	11,286	354,686	31,427	15
3	Kaohsiung, Taiwan	5,808	199,284	34,312	9
4	Busan, South Korea	5,217	164,795	31,588	14
5	**Los Angeles/ Long Beach, CA**	**2,955**	**124,281**	**42,058**	**4**
6	Kobe, Japan	3,325	116,447	35,022	8
7	Rotterdam, The Netherlands	2,528	110,192	43,589	1
8	Port Klang, Malaysia	3,950	109,883	27,818	20
9	Yokohama, Japan	3,298	103,399	31,352	16
10	Tokyo, Japan	2,987	102,198	34,214	10
11	Keelung, Taiwan	4,344	94,522	21,759	23
12	Nagoya, Japan	2,699	91,331	33,839	11
13	**New York, NY/NJ**	**2,172**	**87,463**	**40,268**	**6**
14	**San Francisco, CA[1]**	**1,936**	**82,958**	**42,850**	**2**
15	Le Havre, France	2,013	82,329	40,899	5
16	Antwerp, Belgium	2,111	76,312	36,150	7
17	Hamburg, Germany	1,745	74,067	42,445	3
18	Osaka, Japan	2,030	57,659	28,403	17
19	Laem Chabang, Thailand	2,600	49,820	19,162	24
20	Shanghai, China	1,763	47,449	26,914	22
21	Santos, Brazil	1,547	42,749	27,633	21
22	Taichung, Taiwan	1,998	33,604	16,819	25
23	Durban, South Africa	1,043	29,088	27,889	19
24	Houston, TX	614	19,799	32,246	13
25	New Orleans, LA	388	10,853	27,972	18
	All other ports	97,947	2,728,640	27,858	
	Top 25 ports	**82,819**	**2,677,433**	**32,329**	
	Top 25, % of total	45.8	49.5		
	Total, all ports	180,766	5,406,073	29,906	

[1] Includes the ports of San Francisco and Oakland.

KEY: dwt = deadweight tons.

NOTES: Original selection of ports was based on the total number of calls to that port by all vessel types. Of this set of ports, rankings were then determined by the average container vessel size. Data include ocean-going vessels of 1,000 gross tons and above. Capacity = dwt multiplied by calls. Port geography in this table is defined by Lloyd's Maritime Information Services and differs from that in tables 10 and 11 where "U.S. ports" are based U.S. Customs designations.

SOURCE: U.S. Department of Transportation, Maritime Administration; based on Lloyd's Maritime Information Services, *Vessel Movements*, available at http://www.marad.dot.gov/Marad_Statistics/PortCalls_World.htm, as of Mar. 28, 2002.

dredging, other port-related environmental concerns include waste and pollution generated from facilities and ships, congestion, noise, and other quality of life impacts on nearby communities.

Landside access issues affect ports and terminals of all types and container ports in particular. For example, bottlenecks due to insufficient highway and rail connections from ports and marine terminals to distribution centers could become more of a concern if the current growth rate of international trade continues with no marked access improvements. Major landside bottlenecks include traffic congestion on the roads and rails nearest the ports and terminals, at-grade rail crossings, and rail access impediments such as bridge clearance and distance from terminals. A Federal Highway Administration report on the National Highway System Intermodal Freight Connectors found that Interstate highway connectors going to the nation's seaports had more mileage with pavement deficiencies than highway connectors to airports, in part due to the high priority given to airport access (USDOT FHWA 2000). The report also found that problems with inadequate turning radii and travel lanes and heavy traffic were the most common causes of congestion on highway connectors to ports.

A major effort to improve landside access to two of the nation's busiest seaports is the Alameda Corridor freight rail expressway in California, opened in April 2002 (USDOT OST 2002b). The Alameda Corridor, a $2.4 billion project funded by private and public investments, connects the ports of Los Angeles and Long Beach to the railyards near downtown Los Angeles and the national railroad network.[23] The project consolidates 90 miles of branch rail tracks into one 20-mile railroad expressway. The project eliminated about 200 street-level railroad crossings, thus allowing trains to travel more quickly and easing highway traffic congestion. Several other objectives of the Alameda Corridor project included the improvement of direct access to terminals and docks, the reduction of cargo handling and dwell time at the ports due to improved rail lines that decrease transit times, and the reduction of air and noise pollution from idling trains, trucks, and cars at highway rail crossings.

[23] The Alameda Corridor project took about 20 years to plan and 5 years to construct, and consists of bridges, underpasses, overpasses, and street improvements that separate freight rail, passenger rail, and street traffic (ACTA 2002).

Some intermodal connector projects aimed at improving landside access to ports include: 1) the FAST Corridor project (Freight Action Strategy for Seattle-Tacoma-Everett) in Washington state to streamline the movement of freight through the Puget Sound region of the state; 2) the Portway project in New Jersey to improve truck access to Port Newark, Port Elizabeth, and northern New Jersey; and 3) the Cross Harbor Freight Movement project study in New York City, which is currently evaluating alternatives to improve freight access to the New York and northern New Jersey metropolitan area (USDOT FHWA 2000).

International Air Freight

Air cargo is transported by both all-cargo carriers and carriers that also transport passengers. In 2001, U.S. airports handled $519 billion of international merchandise trade for both types of carriers, down from $593 billion in 2000 (table 15). Air transportation's share of the value of total trade also declined slightly from 30 percent to 28 percent, due in part to the September 11 terrorist attacks. Because the commodities moved by air tend to be higher in value per ton (e.g., electronics, clothing, and high-value perishable goods such as flowers) than those transported by other modes, air freight's share of U.S. trade by weight was less than 1 percent (about 6 million short tons) in 2001.

Table 15
Value of U.S. Merchandise Trade by Air Transportation: 2000 and 2001

	Total trade		Exports		Imports	
	Billions of $	Percent	Billions of $	Percent	Billions of $	Percent
2000						
Total, all modes	1,997	100.0	780	100.0	1,217	100.0
Air	593	29.7	284	36.4	309	25.4
2001						
Total, all modes	1,873	100.0	731	100.0	1,142	100.0
Air	519	27.7	251	34.4	267	23.4
Percentage change, 2000–2001	–12.5		–11.6		–13.5	

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, May 2002; based on data from U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Exports of Merchandise CD* and *U.S. Imports of Merchandise CD,* December 2000 and 2001.

Despite the decline in 2001, the value of international trade moved by air transportation has grown tremendously over the past three decades, from $10 billion in 1970 to $519 billion in 2001, growing at an average annual rate of 14 percent per year (in current dollars). Air cargo grew at the fastest rate in the 1970s, averaging over 20 percent per year (table 16). The period with the slowest growth rate was

between 1980 and 1985, due in part to the economic recession of the early 1980s. Also, high aviation fuel prices at the time dampened U.S. international air cargo movements. By the late 1990s, the growth rate for U.S. international air cargo was about half the rate in the 1970s. Overall, during this period, imports grew faster than exports, accounting for the current air trade imbalance.

In 2001, the top U.S. air cargo trading partner by value was Japan, followed by the United Kingdom, Germany, France, and Canada (table 17). Western European and Asian Pacific countries dominate air cargo trade to and from the United States, although the United States has many other air trade partner countries. In 2001, the top five air trading partners accounted for 38 percent of the value of air trade, compared with 54 percent for the top five partners for all U.S. merchandise trade. By virtue of geography, air transportation is more prevalent with overseas trade partners than with the NAFTA countries. While air transportation accounted for about 7 percent of the value of U.S. trade with Canada and about 5 percent of trade with Mexico in 2001, it accounted for 87 percent of trade with Ireland, 56 percent with the United Kingdom, and 35 percent with Japan.

Among the top 25 U.S. air trade partners, the value per ton of all merchandise (both imports and exports) ranged from a high of over $280,000 for trade with Ireland to a low of $41,000 for trade with Spain. For imports only, the value per ton of merchandise from Ireland, which includes commodities such as cashmere clothing and telecommunications equipment, was valued at almost $500,000 per ton.

Table 16
Value of U.S. Merchandise Trade by Air Transportation: 1970–2001

	Total air trade	Exports	Imports
	(Billions of current dollars)		
1970	10	6	3
1975	24	15	9
1980	74	46	28
1985	104	52	51
1990	201	111	91
1995	355	181	174
2000	593	284	309
2001	519	251	267
	Average annual growth rate in percent		
1970–1975	20.5	20.0	21.2
1975–1980	25.2	24.8	25.8
1980–1985	6.9	2.6	12.9
1985–1990	14.2	16.1	12.1
1990–1995	12.0	10.4	13.9
1995–2000	10.8	9.4	12.1
1970–2001	**14.3**	**13.2**	**15.7**
2000–2001	**–12.5**	**–11.6**	**–13.5**

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, May 2002. **Data for 2000 and 2001—**U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Exports of Merchandise CD* and *U.S. Imports of Merchandise CD,* December 2000 and 2001. **Data for other years—**based on U.S. Department of Commerce, U.S. Census Bureau, *Statistical Abstract of the United States* (Washington, DC: Annual years).

Table 17
Top 25 U.S. Merchandise Trade Partners for Air Transportation: 2001
(Ranked by trade value)

Rank in 2001	Country	Value			Value per ton		
		Total trade (million $)	Imports (million $)	Exports (million $)	Total trade (thousand $)	Imports (thousand $)	Exports (thousand $)
1	Japan	63,667	34,110	29,556	103.2	120.2	88.7
2	United Kingdom	45,980	21,520	24,460	97.2	105.0	91.3
3	Germany	35,733	17,839	17,894	79.0	67.1	95.9
4	France	27,744	14,233	13,512	100.8	86.9	121.2
5	Canada	24,999	9,836	15,163	76.4	128.4	60.6
6	Taiwan	24,165	13,981	10,184	102.5	92.2	121.1
7	South Korea	23,805	13,347	10,458	122.9	117.4	130.7
8	Ireland	21,978	16,815	5,163	280.7	499.5	115.7
9	Singapore	21,766	11,505	10,261	144.9	165.3	127.3
10	Malaysia	20,217	13,249	6,967	170.6	163.6	185.7
11	China	20,173	12,957	7,216	46.7	36.9	88.8
12	Italy	15,131	9,461	5,670	68.2	59.8	88.9
13	Switzerland	14,956	6,806	8,151	181.1	134.6	254.3
14	Netherlands	14,339	3,683	10,656	70.8	35.2	108.6
15	Israel	14,267	9,378	4,890	176.4	184.2	163.2
16	Mexico	11,997	5,291	6,706	86.7	85.3	87.8
17	Philippines	11,976	6,486	5,490	185.6	140.5	299.3
18	Hong Kong[1]	11,477	3,198	8,279	83.5	54.9	104.7
19	Brazil	10,061	2,784	7,278	58.9	33.9	82.1
20	Belgium	9,834	4,920	4,914	118.9	194.2	85.7
21	Thailand	7,150	3,933	3,217	95.2	72.7	153.3
22	India	5,867	4,065	1,803	68.4	64.9	77.7
23	Australia	5,797	1,499	4,298	74.0	66.8	76.9
24	Sweden	5,348	3,195	2,152	79.8	70.5	99.1
25	Spain	3,072	1,103	1,969	41.2	28.7	54.4
	Total, top 25 air trading partners	**471,500**	**245,192**	**226,307**	**95.9**	**92.3**	**100.2**
	Total, all countries	518,602	267,107	251,494	84.1	77.1	93.0
	Total, top 25 air partners as % of all countries	90.9	91.8	90.0			

[1] Hong Kong has officially been a part of China since 1997. However, the United States continues to publish merchandise trade statistics separately for Hong Kong.

NOTE: Numbers may not add to totals due to rounding.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, May 2002; based on data from U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Exports of Merchandise CD* and *U.S. Imports of Merchandise CD,* December 2001.

In 2001, among the top 25 overall air trading partners, the United States had a positive air trade balance (exports minus imports) with 10 countries. U.S. trade with the Netherlands showed the largest air trade surplus of about $7 billion, followed by Canada and Hong Kong with $5 billion each. U.S. air trade with Ireland showed the largest deficit of about $12 billion, followed by Malaysia and China with $6 billion each.

Top Air Freight Gateways

In 2001, the leading U.S. airport for international merchandise trade by value was New York's John F. Kennedy (JFK) International Airport (table 18). JFK handled 23 percent of the value ($117 billion) of U.S. air trade moving into and out of the United States.

Two of the top five U.S. air cargo airports by value of trade are located on the West Coast: Los Angeles ($64 billion) and San Francisco[24] ($62 billion). These 2001 levels represent declines from previous years, as the Asian economic crisis of the late 1990s, along with the general economic slowdown and the effects of September 11, affected air cargo handled by both of these airports.[25]

Overall, the United States imports more than it exports by air, but there is much variation among airports. At Miami International Airport, the value of exports exceeded imports by $8 billion, reflecting trade with Latin America. At the opposite extreme, imports were $16 billion more than exports at New York's JFK airport[26] (figure 8, p. 45).

In tonnage terms, Anchorage handled the most international air cargo, nearly 2 million short tons (23 percent) of the total air cargo weight in 2000[27] (table 19, p. 46). Miami International Airport and New York's JFK followed with over 1 million short tons each. Between 1990 and 2000, the weight of U.S. international air cargo grew an average of 7 percent per year, reaching over 8 million short tons in 2000. During this period, Memphis International Airport grew the most as Federal Express expanded its hub operations there. With Federal Express moving freight from locations throughout the country to its Memphis hub before final shipment to foreign locations worldwide, Memphis moved up the tonnage ranking for international cargo handled from

[24] San Francisco includes the San Francisco International Airport and other smaller regional airports.

[25] In 1997, Los Angeles handled $69 billion worth of international air cargo and San Francisco handled $75 billion.

[26] JFK was followed by Ancorage, AK, and airports in Chicago, IL.

[27] These airport gateway figures, from the Bureau of Transportation Statistics' Office of Airline Information, reflect carrier data reported by both U.S. and foreign carriers. Data also include transshipments. Therefore, these data are not directly comparable to shipper-based merchandise trade data for international air activity. Detailed air cargo weight data by airports were not available for 2001 at the time this report was prepared.

Table 18

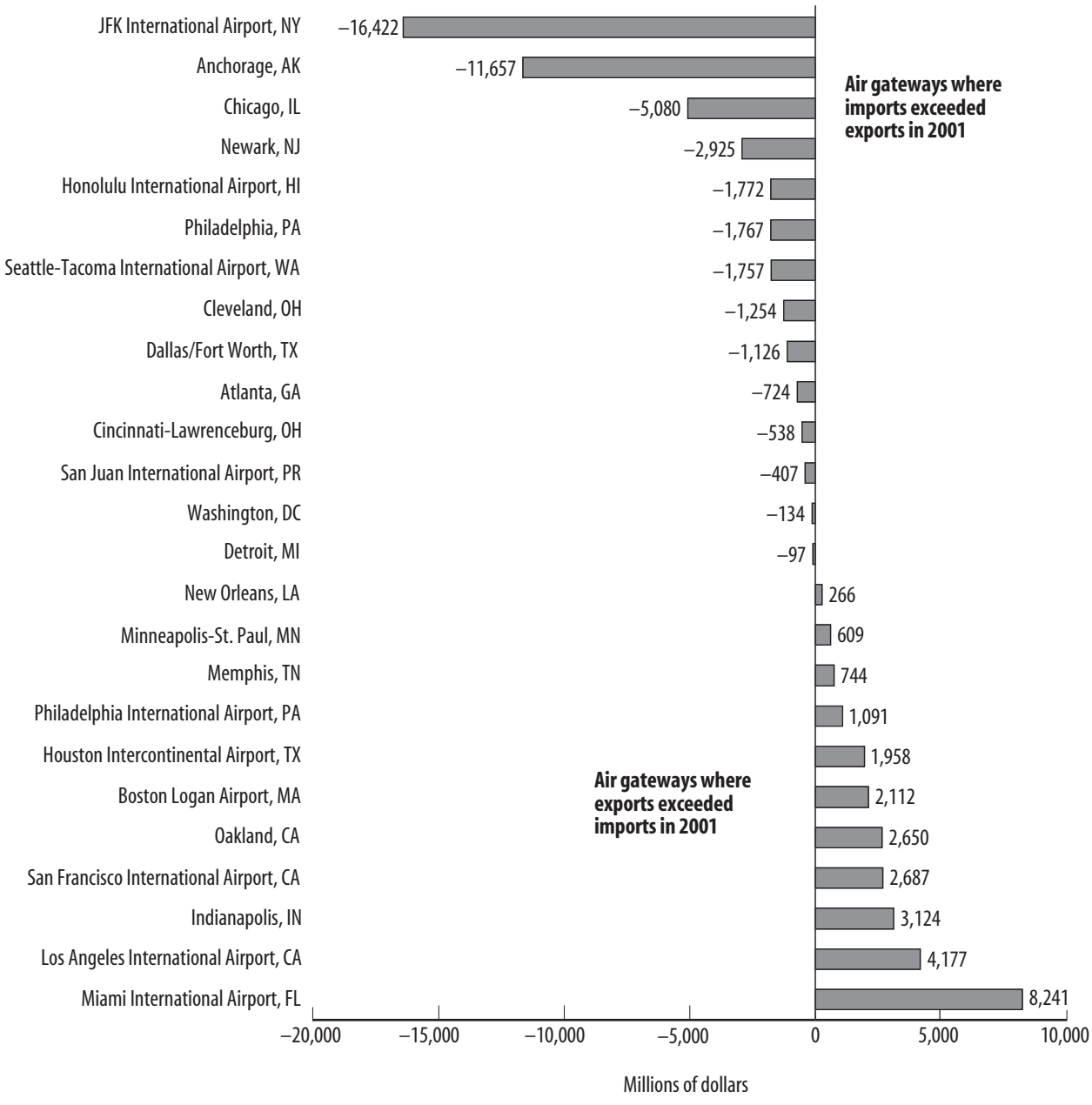
Top 25 U.S. Air Gateways for U.S. International Merchandise Trade by Value: 2001
(Millions of dollars)

Rank by total	U.S. ports	Total trade	Exports	Imports	Exports minus imports
1	JFK Internatl. Airport, NY	116,581	50,079	66,502	–16,422
2	Los Angeles Internatl. Airport, CA	63,882	34,030	29,853	4,177
3	San Francisco Internatl. Airport, CA	61,953	32,320	29,633	2,687
4	Chicago, IL	44,916	19,918	24,998	–5,080
5	New Orleans, LA	27,353	13,810	13,544	266
6	Miami Internatl. Airport, FL	22,565	15,403	7,162	8,241
7	Anchorage, AK	21,874	5,109	16,765	–11,657
8	Cleveland, OH	19,679	9,213	10,467	–1,254
9	Dallas/Fort Worth, TX	18,797	8,836	9,961	–1,126
10	Atlanta, GA	15,848	7,562	8,286	–724
11	Newark, NJ	9,414	3,245	6,170	–2,925
12	Boston Logan Internatl. Airport, MA	9,216	5,664	3,552	2,112
13	Seattle-Tacoma Internatl. Airport, WA	8,849	3,546	5,303	–1,757
14	Philadelphia Internatl. Airport, PA	8,799	4,945	3,854	1,091
15	San Juan Internatl. Airport, PR	7,779	3,686	4,093	–407
16	Houston Intercontinental Airport, TX	7,690	4,824	2,866	1,958
17	Washington, DC	5,985	2,926	3,059	–134
18	Indianapolis, IN	3,387	3,256	131	3,124
19	Memphis, TN	3,375	2,059	1,315	744
20	Oakland, CA	2,960	2,805	155	2,650
21	Cincinnati-Lawrenceburg, OH	2,787	1,124	1,662	–538
22	Detroit, MI	2,623	1,263	1,360	–97
23	Honolulu Internatl. Airport, HI	2,282	255	2,027	–1,772
24	Minneapolis-St. Paul, MN	2,159	1,384	775	609
25	Philadelphia, PA	2,071	152	1,919	–1,767
	All other airports	25,778	14,082	11,696	2,386
	Total, top 25 airports	**492,823**	**237,412**	**255,411**	**–17,999**
	Total, top 25 airports as % of all airports	95.0	94.4	95.6	
	Total, all airports	518,602	251,494	267,107	–15,613

NOTE: Data for all airports are based on U.S. Customs port classifications and include a low level (generally less than 2%–3% of the total value) of small user-fee airports located in the same region. Air gateways not identified by airport name (e.g., Chicago, IL, and others) include major airports in that geographic area in addition to small regional airports. In addition, due to U.S. Census Bureau confidentiality regulations, data for courier operations are included in the airport totals for JFK International Airport, New Orleans, Los Angeles, Cleveland, Chicago, Miami, and Anchorage.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, special tabulations, May 2002.

Figure 8
U.S. International Air Merchandise Trade, Exports Minus Imports: 2001



NOTE: Data for all airports are based on U.S. Customs classifications and include a low level (generally less than 2%–3% of the total value) of small user-fee airports located in the same region. Air gateways not identified by airport name (e.g., Chicago, IL, and others) include major airport(s) in that geographic area in addition to small regional airports. In addition, due to U.S. Census Bureau confidentiality regulations, data for courier operations are included in the airport totals for JFK International Airport, New Orleans, Los Angeles, Cleveland, Chicago, Miami, and Anchorage.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, special tabulations, May 2002.

Table 19
Top 20 U.S. Gateways for International Freight by Weight: 1990, 1995, and 2000
(Short tons)

Rank in 1990	Rank in 2000	U.S. airport	1990	1995	2000	Average annual growth rate, 1990–2000
1	1	Anchorage, AK	908,543	1,068,558	1,967,370	8.0
3	2	Miami, FL	742,000	1,326,403	1,250,494	5.4
2	3	New York JFK, NY	896,547	972,369	1,020,932	1.3
4	4	Los Angeles LAX, CA	347,722	513,046	641,501	6.3
5	5	Chicago O'Hare, IL	271,455	408,680	556,048	7.4
6	6	San Francisco SFO, CA	185,349	296,292	366,372	7.1
11	7	Newark, NJ	74,627	173,238	353,066	16.8
9	8	Atlanta Hartsfield, GA	85,709	150,085	249,742	11.3
48	9	Memphis, TN[1]	14	93,623	198,630	160.1
17	10	Fairbanks, AK	27,351	130,107	175,186	20.4
7	11	Honolulu, HI	158,691	134,844	154,037	–0.3
16	12	Washington Dulles, VA	36,536	88,332	140,975	14.5
12	13	Dallas-Fort Worth, TX	69,020	69,485	133,518	6.8
19	14	Philadelphia, PA	18,041	48,804	124,317	21.3
10	15	Houston Intercontinental, TX	82,144	90,755	121,121	4.0
13	16	Seattle, WA	61,052	72,449	116,763	6.7
8	17	Boston, MA	97,968	86,562	112,446	1.4
18	18	Detroit, MI	22,409	61,650	85,605	14.3
15	19	Guam Island	36,892	39,659	69,238	6.5
27	20	Huntsville/Decatur, AL	6,167	8,019	64,253	26.4

[1] The extreme change in tonnage handled reflects the expansion of the Federal Express hub in Memphis.

NOTE: These data are based on nonstop bidirectional air trade by U.S. and foreign carriers by weight between the United States and other countries and, as such, will differ from U.S. Census Bureau international air freight weight data. For additional information, see notes for table 20, p. 47.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information data, May 2002.

48th position in 1990 to 9th position in 2000. Other U.S. international airports emerged as world leaders in air cargo, particularly Philadelphia, which grew by 21 percent per year, and Fairbanks, Alaska, which grew by 20 percent per year.[28]

U.S. international air cargo originating from and destined for U.S. gateway airports are transported along major air routes. In 2000, 5 of the top 10 gateway pairs by weight included Anchorage.[29] Anchorage-Tokyo ranked first in bidirectional international air cargo, handling over 500,000 short tons of freight (table 20). Regional specialization also characterizes

[28] Between 1990 and 2000, air cargo passing through other major air cargo hubs also grew: DHL through Cincinnati, OH, by 670 percent, and UPS through Louisville, KY, by 3,040 percent.

[29] Similar data are not available for value of the cargo.

Table 20
Top 20 Airport Pairs for U.S. International Air Freight by Weight: 1990, 1995, and 2000
(Thousands of short tons)

Rank in 2000	U.S. airport	Foreign airport	1990	1995	2000	Average annual growth rate, 1990–2000
1	Anchorage	Tokyo, Japan	616	466	523	–1.6
2	Anchorage	Seoul, South Korea	54	189	471	24.2
3	Anchorage	Taipei, Taiwan	55	165	404	22.0
4	Anchorage	Osaka, Japan	U	38	211	U
5	Miami	Bogota, Colombia	141	257	157	1.1
6	Anchorage	Hong Kong	5	47	137	39.8
7	New York JFK	Brussels, Belgium	64	80	126	7.0
8	New York JFK	London Heathrow	81	109	126	4.5
9	New York JFK	Frankfurt, Germany	86	91	104	1.9
10	San Francisco SFO	Tokyo, Japan	99	113	103	0.4
11	Los Angeles LAX	Seoul, South Korea	76	71	100	2.8
12	Chicago O'Hare	Frankfurt, Germany	51	59	93	6.1
13	Los Angeles LAX	Tokyo, Japan	65	64	79	2.0
14	San Francisco SFO	Seoul, South Korea	3	40	78	38.7
15	Chicago O'Hare	London Heathrow	0.3	36	77	74.3
16	Miami	Buenos Aires, Argentina	14	28	76	18.1
17	Los Angeles LAX	London Heathrow	20	40	68	13.0
18	New York JFK	Paris De Gaulle	57	43	67	1.5
19	Miami	San Jose, Costa Rica	53	79	67	2.3
20	Miami	Santiago, Chile	20	60	66	12.8

KEY: U = unavailable.

NOTE: This table shows carrier data reflecting nonstop bidirectional air trade by U.S. and foreign carriers by weight between the United States and other countries and, as such, will differ from U.S. Census Bureau shipper-based merchandise trade statistics. Data for airports in this table also reflect actual U.S. airports, while data in tables 15, 16, 17, 18, and figure 9 reflect U.S. Customs ports at which air freight activity was reported. Sometimes these Customs ports correspond to the actual airport (e.g., JFK), while in other cases the U.S. Customs port refers to a broader administrative area (e.g., Chicago, which includes O'Hare, Midway, and smaller regional airports).

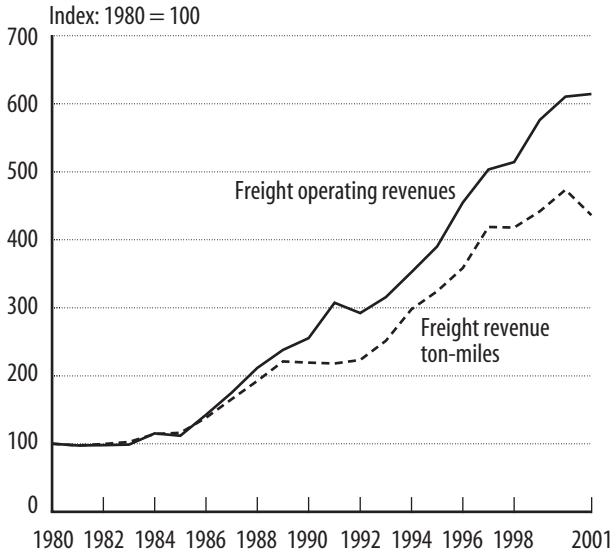
SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information data, May 2002.

airport pairs and major U.S. air gateways. All five gateway pairs involving Anchorage were in Asian Pacific countries: Japan (two gateways), South Korea, Taiwan, and Hong Kong. The top gateway pairs with West Coast airports, San Francisco and Los Angeles, were also with Asian Pacific airports. Miami International Airport's top gateway pairs were with Latin American airports in Colombia, Argentina, Costa Rica, and Chile. New York's JFK and Chicago O'Hare were the major gateways to European airports, including those in Belgium, the United Kingdom, Germany, and France.

U.S. International Air Cargo Revenues and Capacity

Air cargo is an increasingly important source of revenue for the air transportation services industry, and the financial performance of U.S. air carriers influences their competitiveness in international markets. Between 1980 and 2001, freight operating revenues for U.S. international air cargo, moved by both the all-cargo and passenger carrier sectors of the industry, more than quadrupled from $1 billion to over $6 billion (in current dollars).[30] U.S. international freight operating revenues grew at a faster average annual rate (9.5 percent per year) than U.S. domestic freight operating revenues, which grew at 8.4 percent per year. During this period, growth in U.S. international air cargo revenues closely mirrored the increases in overall U.S. air freight revenue ton-miles, a measure of the utilization of air freight service[31] (figure 9). However, in 2001, while international revenue ton-miles by U.S. carriers declined, international air cargo operating revenues by U.S. carriers held steady, due in part to changes made immediately after the September 11 attacks.

Figure 9
U.S. International Air Operating Revenues and Revenue Ton-Miles: 1980–2001



NOTE: A revenue ton-mile is equal to one ton carried one mile and measures utilization of air freight services. Data reflect U.S. carriers only.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information data, May 2002.

Available revenue ton-miles (the level of useable freight capacity) and unused ton-miles (the difference between available ton-miles and revenue ton-miles used) are two other measures indicating the utilization of air freight services. The availability of excess cargo capacity enables shippers to quickly arrange transportation of small quantities of goods to meet market demands, while maintaining low inventories. Between 1980 and 2001, the U.S. international available air ton-miles grew rapidly as the industry added capacity by acquiring new aircraft. International revenue

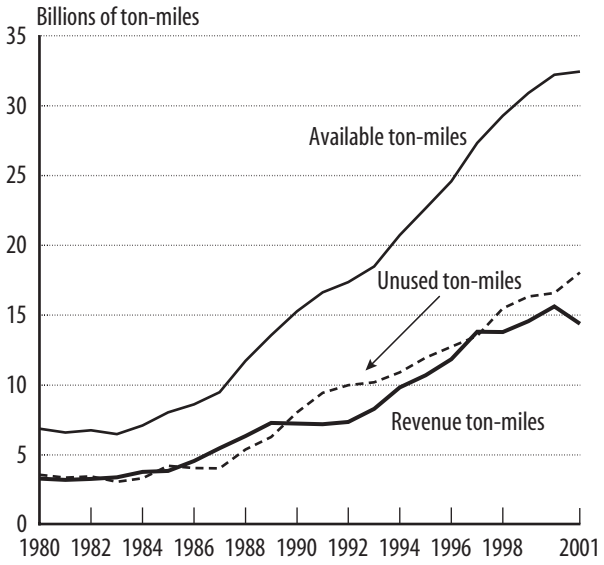
[30] Based on special tabulations from BTS Office of Airline Information data, May 2002. By comparison, U.S. international passenger service operating revenues grew from over $5 billion to over $24 billion.

[31] A revenue ton-mile is equal to one ton carried one mile and measures use of freight services.

ton-miles by U.S. carriers grew at a slower rate than the available capacity and the gap between used and available ton-miles widened[32] (figure 10). Also during this period, U.S. international air cargo load factors (the ratio of used to available ton-miles) declined from 48 percent in 1980 to 44 percent in 2001.

The air cargo industry continually modifies its services to take into account new methods of goods manufacturing and distribution. A heightened challenge is cargo security. As suppliers and manufacturers integrate new production processes worldwide, the need to provide door-to-door security for merchandise could affect choices about business inventory and supply chain costs and influence future air cargo growth.

Figure 10
U.S. International Air Cargo Availability and Use
(Freight revenue ton-miles by U.S. air carriers: 1980–2001)



NOTE: A revenue ton-mile is equal to 1 ton that is carried 1 mile and measures utilization of air freight services. For those planes that carry both freight and passengers, available freight ton-miles are calculated by subtracting available seat-miles times 0.1 from total available ton-miles. The data include both transborder and foreign flights by U.S. carriers, but do not include any flights by foreign carriers. The drop in 2001 reflects the impact of the terrorist attacks of Sept. 11, 2001, on aviation, including several days in which commercial air operations were suspended.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington, DC: May 2002).

North American Trade and Transportation

The North American Free Trade Agreement, which entered into force on January 1, 1994, aims to reduce trade barriers and liberalize trade policies among the United States, Mexico, and Canada. As NAFTA reduced some of the obstacles to the movement of freight across the borders (including restrictions on transportation services), trade among the three countries soared. Between 1994 and 2001, the value of U.S.-NAFTA trade increased 79 percent from $343 billion to $614 billion (in current dollars), growing at an average annual rate of 9 percent, faster than the rate for U.S. merchandise trade with all other countries (table 21). The growth of U.S. trade with Canada and Mexico highlights the importance of north-south transportation corridors,

[32] Changes in the level of spare capacity might be an indicator of the timely availability of air services. For example, a shipper with a sudden need for air service will be more likely to obtain a better flight when spare capacity is higher. Space limitations affect not only the timeliness but also the availability of air freight services (USDOT BTS 2002b).

Table 21
Value of U.S. Merchandise Trade with Canada and Mexico Compared with U.S. Trade with All Other Countries: 1994–2001
(Billions of current U.S. dollars)

	Total U.S. international trade	Total U.S. trade with NAFTA partners	U.S. land trade with NAFTA partners	Ratio of U.S. NAFTA trade to all U.S. trade (percent)
1994	1,176	343	312	29.2
1995	1,328	380	338	28.6
1996	1,420	421	377	29.7
1997	1,557	475	426	30.5
1998	1,594	503	452	31.5
1999	1,718	559	501	32.5
2000	1,997	653	576	32.7
2001	1,873	614	547	32.8
Percentage change, 1994–2001	59.3	78.9	75.6	
Annual growth rate	6.9	8.7	8.4	

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, May 2002; based on **total trade, air, and water data—**U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *FT920 U.S. Merchandise Trade 2000 to 2001* (Washington, DC: 2000–2001); **all land modes—**U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, as of January 2002.

the role of key land gateways, and the emergence of dominant flows (e.g., between Detroit, Michigan, and Laredo, Texas), which will continue to alter the pattern of freight movement within the United States.

Once the NAFTA provisions are fully implemented and freight operators licensed in one country are allowed broader access in another, freight services and operations will change (box 3). Differences in arrangements for transporting freight across the three countries could affect the movement and flow of this traffic on the transportation networks of the United States. It also will increase vehicle inspection activity at U.S. borders and heighten the need for improved security for the millions of containers and trailers that enter the United States from Canada and Mexico.

U.S.-NAFTA: Overall Trade

In 2001, merchandise trade with Canada and Mexico represented one-third of the value of all U.S. international trade or $614 billion, with Canada accounting for about 20 percent and Mexico about 13 percent. Surface modes transported the

Box 3
Current Status of NAFTA Motor Carrier Provisions

In November 2002, President George W. Bush took actions aimed at implementing the trucking provisions of the North American Free Trade Agreement (NAFTA).[1] Under NAFTA, Mexican motor carriers were to gain access to U.S. border states by December 1995 and access to the rest of the United States by January 1, 2000.[2] However, the United States delayed implementation of these provisions for safety reasons. The fiscal year 2002 Transportation and Related Agencies Appropriations Act, signed into law on December 18, 2001, established 22 requirements that must be satisfied before the U.S. Department of Transportation (USDOT) could certify that the NAFTA trucking provisions can be implemented without undue safety risks to the American public. To implement this law, the Federal Motor Carrier Safety Administration (FMCSA) of the USDOT, the agency charged with overseeing and implementing trucking safety in the United States, established a detailed application process for Mexican carriers seeking to operate in the United States, as well as a comprehensive safety-monitoring program that met each of the 22 requirements.

President Bush's November 2002 action modified the existing moratorium on granting operating authority to Mexican motor carriers for transporting international freight to and from the U.S. interior. Mexican motor carriers must first submit applications to FMCSA. FMCSA will review the applications, conduct safety audits, and then grant provisional authority to qualified carriers to operate beyond the designated commercial border zone.[3] These carriers will receive a USDOT license number distinguishing them from U.S. and Canadian trucks and from Mexican trucks authorized to operate only in the commercial border zone.

To obtain this provisional authority, Mexican carriers must submit proof of U.S. insurance, pass a safety audit, and its vehicles must pass safety inspections performed by either U.S. or Mexican government officials. Mexican vehicles that pass the safety inspection will receive Commercial Vehicle Safety Alliance (CVSA) decals certifying that they have met safety standards. These decals must be renewed every three months. The carriers will be subject to an additional 18 months of intensive safety monitoring.[4]

[1] NAFTA entered into force Jan. 1, 1994.

[2] Canadian carriers can provide service anywhere in the United States provided they comply with U.S. regulations and are transporting international cargo. U.S. carriers' access to Canada mirrors Canadian carriers' access to the United States. With implementation of the NAFTA provisions, U.S. carriers are supposed to receive reciprocal access rights in Mexico.

[3] Commercial zones along the U.S. southern border generally extend 3 to 20 miles past the corporate limits of cities, depending on population. FMCSA also registers Mexican carriers for operating authority in these zones. Even with the implementation of the NAFTA trucking provisions, FMCSA expects that most carriers from Mexico will be certified for operating only in the commercial border zones.

[4] FMCSA issued regulations governing Mexican carrier operations on March 19, 2002.

(Box 3 continued on next page)

majority of the value of U.S.-NAFTA trade, over 89 percent in 2001, nearly the same proportion as in 1994.[33] Maritime trade accounted for 5 percent while air freight held a 6 percent share.

U.S. surface trade with Canada and Mexico fell in 2001 for the first time since the inception of NAFTA in 1994, with the greatest decline occurring after September 11 (table 21). Surface trade was lower for most of 2001, showing a 1.5 percent drop between January and August, compared with the same period

[33] Surface trade includes merchandise moved by truck, rail, pipeline, and other modes. It excludes trade moved by water and air.

(Box 3 continued)

Mexican carriers operating beyond the commercial border zone will only be allowed to enter the United States at border crossings where certified safety inspectors are on duty. As with U.S. carriers, they are required to be part of a program that includes random drug and alcohol testing and be in compliance with federal hours-of-service requirements for commercial drivers. Mexican carriers that receive and maintain a satisfactory safety rating after a compliance review will be given permanent operating authority at the end of their 18-month provisional authority.

Mexican carriers that receive operating authority as a result of this process will be permitted to deliver and back-haul international cargo to and from the United States. The change in the moratorium affects only international cargo between the United States and Mexico. A reciprocal prohibition on the provision of point-to-point service *within* the United States and Mexico remains in place.

As of early January 2003, FMCSA had received over 180 applications from Mexican carriers requesting authority to operate in the United States beyond the commercial zone. The agency is providing educational and technical assistance to Mexican carriers and has held free seminars for Mexican carriers to acquaint them with the new rules governing application for operating authority.

In January 2003, a federal appeals court judge ordered the government to study the potential environmental effects prior to implementing the March 19, 2002 regulations. For additional information on Mexican and Canadian truck and bus operations in the United States, visit FMCSA's website at www.fmcsa.dot.gov.

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in 2000, and a decline of 11.6 percent between September and December 2001. Surface exports declined more steeply (7 percent) than imports (3 percent) for the year.

Despite the drop seen between 2000 and 2001, the value of U.S.-NAFTA surface trade grew between 1997 and 2001, with an increase of 29 percent from $426 billion to $547 billion. However, surface exports grew more slowly than surface imports during this 5-year period, 18 percent compared with 37 percent (table 22).

U.S.-NAFTA Trade: Modal View

Nearly two-thirds of the value of overall U.S.-NAFTA merchandise trade in 2001 was moved by trucks, similar to their share in 1997. By value, trucking was followed by rail with about 15 percent, then air, water, and pipeline (table 23, p. 54). From a tonnage perspective, waterborne modes moved the majority of

Table 22
Value of U.S. Merchandise Trade with NAFTA Partners by Mode: 1997–2001
(Billions of dollars)

	1997	1998	1999	2000	2001	Percentage change, 2000–2001	Percentage change, 1997–2001	Average annual growth rate, 1997–2001
	Total U.S. trade with Canada and Mexico							
Truck	323	350	385	429	395	–7.8	22.3	5.2
Rail	70	68	78	94	93	–1.7	32.6	7.3
Air	28	30	34	45	37	–17.7	33.3	7.5
Water	22	21	23	33	29	–10.1	35.4	7.9
Pipeline	14	11	12	24	26	12.0	87.0	16.9
Other[1]	19	23	25	29	33	12.4	75.6	15.1
Total trade	**475**	**503**	**559**	**653**	**614**	**–6.1**	**29.1**	**6.6**
Subtotal, land	426	452	501	576	547	–4.9	28.5	6.5
Land, % of total	89.6	89.9	89.7	88.1	89.2			
	U.S. exports to Canada and Mexico							
Truck	167	175	190	212	192	–9.6	15.1	3.6
Rail	19	18	17	23	23	–0.3	23.6	5.4
Air	17	19	21	27	22	–18.7	25.4	5.8
Water	6	7	7	9	9	–5.0	48.0	10.3
Pipeline	0.2	0.2	0.3	0.5	1	11.7	107.9	20.1
Other[1]	12	14	15	16	19	18.3	53.8	11.4
Total exports	**222**	**233**	**251**	**288**	**265**	**–8.0**	**19.7**	**4.6**
Subtotal, land	198	208	223	252	235	–6.9	18.4	4.3
Land, % of total	89.5	89.2	88.7	87.5	88.4			
	U.S. imports from Canada and Mexico							
Truck	157	175	195	216	204	–6.0	30.0	6.8
Rail	51	49	61	71	69	–2.1	36.0	8.0
Air	10	11	13	18	15	–16.2	46.7	10.1
Water	16	14	16	23	21	–12.1	30.6	6.9
Pipeline	14	11	12	23	26	–12.0	86.6	16.9
Other[1]	6	9	10	13	14	5.4	116.7	21.3
Total imports	**254**	**270**	**308**	**365**	**348**	**–4.6**	**37.2**	**8.2**
Subtotal, land	228	244	279	324	313	–3.4	37.3	8.2
Land, % of total	89.7	90.5	90.5	88.7	89.8			

[1] Other includes "flyaway aircraft" (i.e., aircraft moving from the manufacturer to a customer and not carrying any freight), vessels moving under their own power, pedestrians carrying freight, and miscellaneous.

NOTE: Shipments that neither originate nor terminate in the United States (i.e., in-transit or in-bond shipments) are not included here, although they use the U.S. transportation system. These shipments are usually part of Mexico-Canada trade and simply pass through the United States. Merchandise trade data exclude export shipments valued at less than $2,500 and import shipments valued at less than $1,250. Individual modal totals may not sum to exact export or import totals due to rounding.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, May 2002; based on **total trade, air, and water data**—U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *FT920 U.S. Merchandise Trade 2000 to 2001* (Washington, DC: 2000–2001); and **all land modes**—U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, as of January 2002.

U.S.-NAFTA trade in 2001 (figure 11). The relatively higher tonnage share for waterborne modes is due to the trade in bulk commodities, particularly petroleum products in the Gulf of Mexico.

The September 11 terrorist attacks caused immediate drops in U.S.-NAFTA activity, particularly for the truck and air sectors. Trade by truck fell over 15 percent in September 2001, compared with 2000, and continued drops over the remainder of 2001 resulted in the first annual decline in U.S. truck trade since NAFTA's inception. Of all the modes, air freight experienced the steepest fall in 2001—nearly 18 percent—due largely to the immediate impact of September 11 on the North American aviation services and system. Although the overall value of rail trade fell slightly in 2001, it was less dramatically affected than other modes, due partly to the fact that immediately after September 11, railroads continued moving freight across borders because the industry already had an effective cargo preclearance system in place for major shippers engaged in NAFTA trade.

Table 23
U.S. Merchandise Trade with Canada and Mexico by Mode: 2000 and 2001
(In percent)

	Value		Weight	
Mode	**2000**	**2001**	**2000[R]**	**2001**
Truck	65.6	64.4	32.8	31.5
Rail	14.4	15.1	16.3	17.0
Pipeline	3.6	4.3	13.8	13.9
Air	6.9	6.0	0.2	0.1
Water	5.0	4.8	36.9	37.4
Other and unknown	4.5	5.4	0.1	0.2
NAFTA trade, total	**100.0**	**100.0**	**100.0**	**100.0**
Truck	63.5	61.7	36.4	35.3
Rail	15.4	15.8	20.8	21.6
Pipeline	5.7	6.9	19.1	19.4
Air	7.8	6.6	0.2	0.1
Water	2.2	2.4	23.6	23.5
Other and unknown	5.3	6.7	0.1	0.2
U.S. trade with Canada, total	**100.0**	**100.0**	**100.0**	**100.0**
Truck	69.1	68.9	24.7	23.3
Rail	12.7	13.9	6.1	6.9
Pipeline	0.1	0.1	2.0	1.8
Air	5.4	5.2	0.1	0.1
Water	9.5	8.6	67.0	67.7
Other and unknown	3.1	3.2	0.2	0.2
U.S. trade with Mexico, total	**100.0**	**100.0**	**100.0**	**100.0**

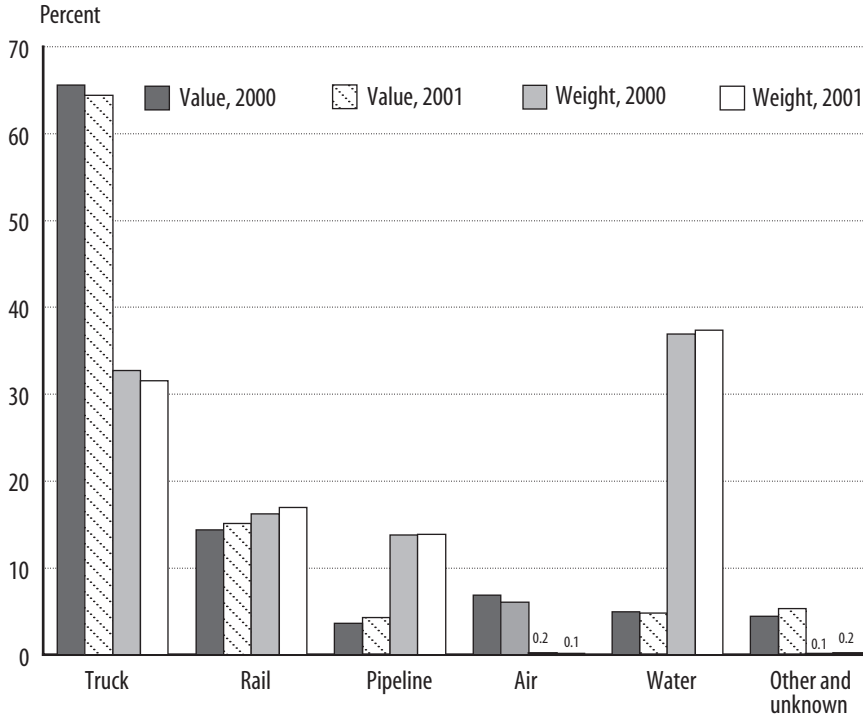
KEY: R = revised.

NOTE: Due to data revisions, 2000 modal shares for overall NAFTA trade differ from previously published data.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, May 2002; based on **total trade, air, and water data**—U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *FT920 U.S. Merchandise Trade 2000 to 2001* (Washington, DC: 2000–2001); and **all land modes**—U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, as of January 2002.

Despite many of the modal declines seen in 2001 U.S.-NAFTA trade, there has been relative stability in modal shares between 1997 and 2001. However, some modes have grown at a more rapid pace during the five-year period. For example, although pipeline accounted for a relatively small percentage of the value of U.S.-

Figure 11
Modal Share of U.S. NAFTA-Partner Merchandise Trade by Value and Weight: 2000 and 2001



SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, May 2002; based on **total trade, air, and water data**—U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *FT920 U.S. Merchandise Trade 2000 to 2001* (Washington, DC: 2000–2001); **all land modes**—U.S. Department of Transportation. Bureau of Transportation Statistics, Transborder Surface Freight Data, as of January 2002.

NAFTA trade in 2001 (about 4 percent), it grew at a faster rate than any other mode—an average annual rate of 17 percent between 1997 and 2001—due largely to greater petroleum product imports to the United States (table 22).

In addition to overall U.S.-NAFTA modal trends, there are some notable modal differences between U.S.-Canada and U.S.-Mexico trade. Although trucks carry over 60 percent of the value of U.S. trade with both Canada and Mexico, it is possible that when greater cross-border access for commercial trucking carriers is implemented between the United States and Mexico, trucking's share of the value of U.S.-Mexico trade could increase further.

Rail plays a critical role in particular corridors and for certain commodities in U.S.-NAFTA trade. Rail trade with Canada is greater than with Mexico, especially for U.S. imports. Although smaller proportionately, U.S.-Mexican rail trade has

grown since 1997, both by value and weight, allowing rail to capture higher modal shares. This could increase further if there are notable efficiencies arising from Mexico's rail privatization (begun in the 1990s) and the resulting development of rail alliances by U.S., Mexican, and Canadian carriers.[34]

Overall, U.S.-NAFTA waterborne trade plays a critical role particularly for trade in bulk commodities in the Great Lakes and Gulf of Mexico. In 2001, waterborne trade accounted for the majority of both U.S.-Canada and U.S.-Mexico trade by weight. However, waterborne trade plays a relatively greater role, both by weight and value, in U.S.-Mexico trade primarily due to large volumes of petroleum-related products.

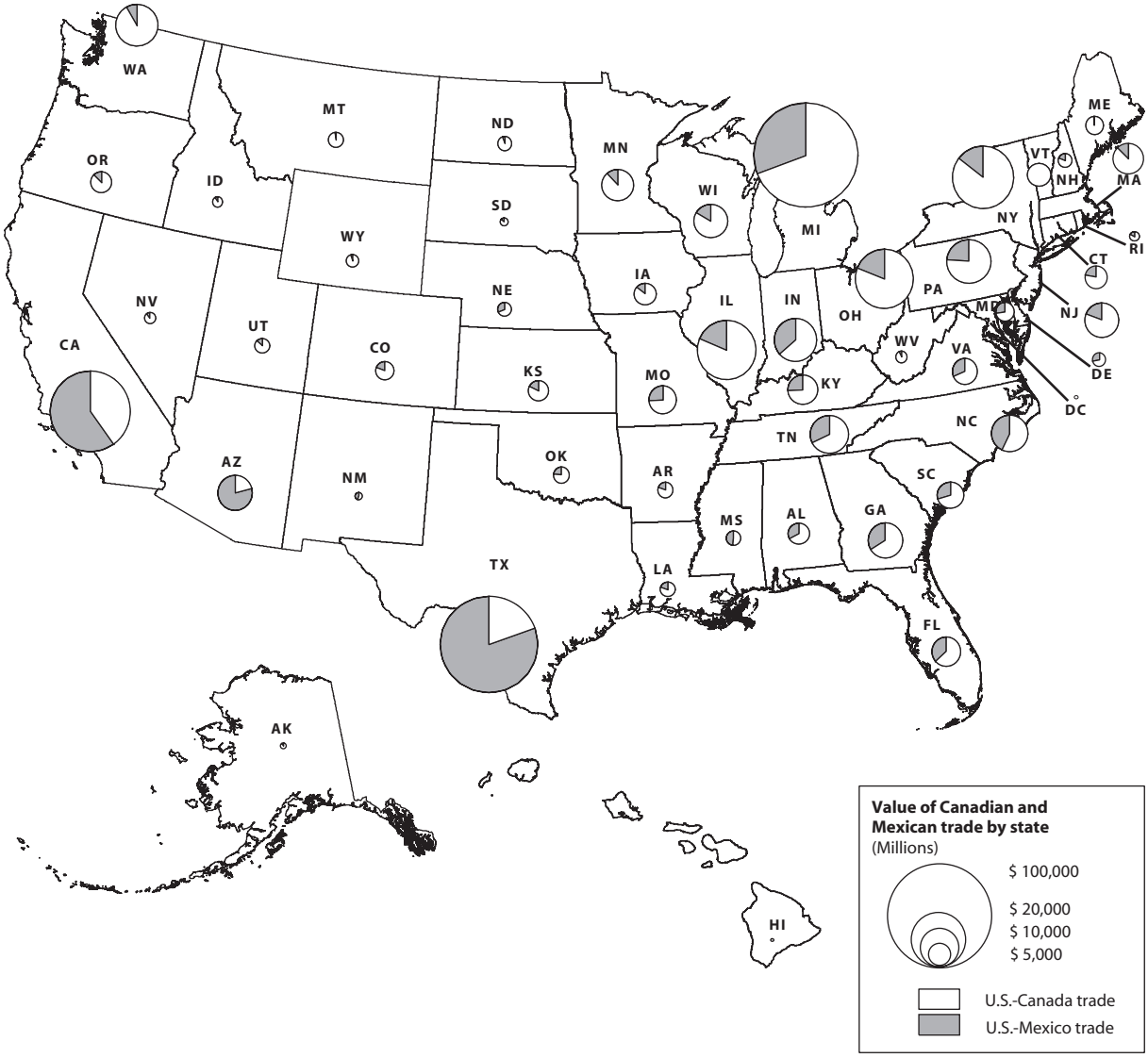
NAFTA Trade and U.S. States

Key freight access and infrastructure issues in the United States are influenced by the distribution of NAFTA trade among U.S. states. Concern exists about future shifts in freight flows within the United States as NAFTA trade grows. While existing highway, rail, and water links allow all U.S. states to trade with Canada and Mexico, U.S. trade with Canada is heavily concentrated in the industrialized northeast and midwest and the states of California, Washington, and Texas. U.S. trade with Mexico is even more concentrated geographically with a few southern border states, although Mexican trade with Michigan, source of much automotive trade, is quite large. The transportation networks of these states could be especially affected by growth in NAFTA trade.

Several factors affect the distribution of NAFTA trade among U.S. states, including the location of dominant border ports, the size of a state's population and its economy, and its manufacturing activities (figure 12). In 2001, Michigan, Texas, California, New York, and Ohio accounted for 51 percent of the value of NAFTA surface trade. Michigan, Texas, and California alone, all of which are large in terms of economy, population, and manufacturing activities, and are close to either Canada or Mexico, accounted for 40 percent of the value of NAFTA trade.

[34] U.S. freight railroads, including Kansas City Southern and Union Pacific, won concession rights for some of the privatized rail lines in northeast and northwest Mexico. They have partnered with other Mexican and Canadian rail companies to improve service offerings, infrastructure investment, and operating efficiencies on lines in Mexico and have linked such lines to others in the United States and Canada (KCS 2002).

Figure 12
Value of North American Merchandise Trade by U.S. State—All Surface Modes: 2001

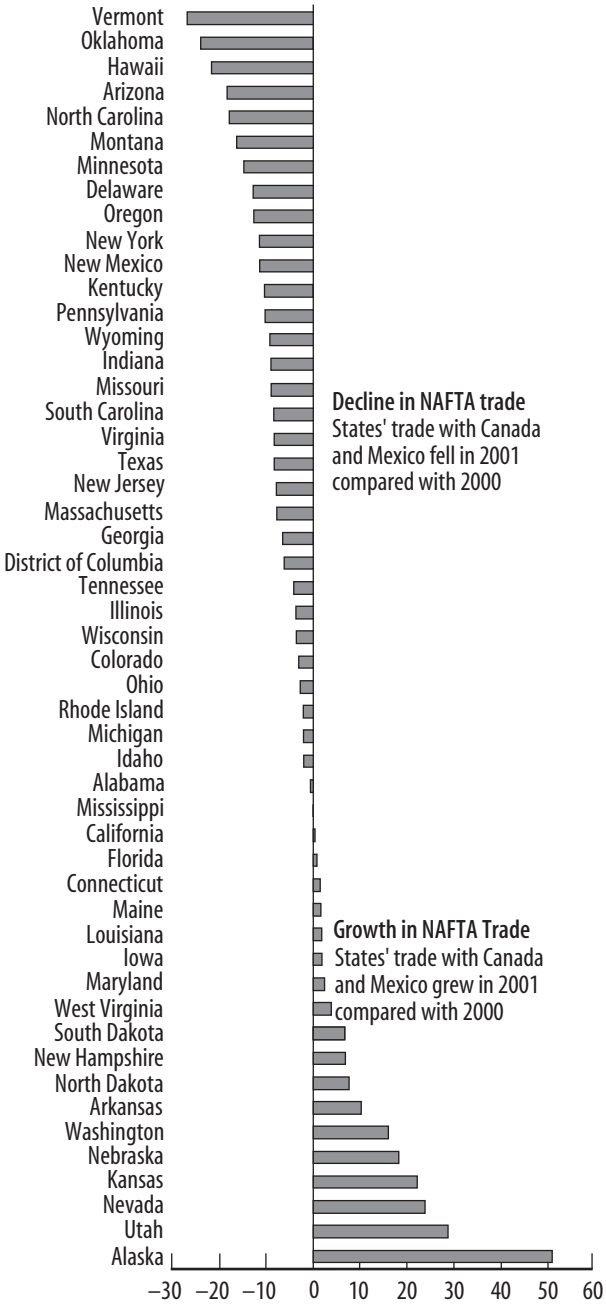


SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, as of January 2002.

As with trade levels, U.S. inbound truck crossings are heavily concentrated in a few states. Just four states (Michigan, Texas, New York, and California) handled over three-quarters (or 8.4 million) of the inbound truck crossings in 2001.

Overall surface trade with Canada and Mexico declined in 2001 compared with 2000, although trade with a few states grew (figure 13). Among the top five states for U.S.-NAFTA surface trade, New York had the largest decline in the value of

Figure 13
Percentage Change in the Value of U.S. NAFTA-Partner Land Trade by State: 2000–2001



NOTE: U.S. state surface trade value equals imports to the U.S. destination state, plus exports from the U.S. state of origin. The destination state reflects the state of the importer of record, which may not always represent the final physical destination of shipments. The U.S. state of origin typically reflects the state where the goods were grown, manufactured, or otherwise produced. In some instances, it may not reflect the actual state of physical origin. Shipments for Hawaii are intermodal and are included in this dataset because a portion of the shipment moves by a land mode from either its origin or final destination.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, as of January 2002.

trade, nearly 12 percent, followed by Texas with 8 percent. Other border states, such as Vermont, experienced even steeper declines (27 percent).

The majority of U.S.-NAFTA trade by value is trucked across national and state boundaries. Because of their gateway role, border states carefully monitor trade activity by this mode, both by value and number of crossings. Many states experienced declines in 2001 truck crossings—Texas, Washington, and Michigan all saw drops of over 5 percent from 2000 levels. Other border states experienced lesser drops, while crossings in Alaska and North Dakota rose.

Land Ports and Border Crossings

Although there are over 75 land ports along the U.S.-Canadian border and over 25 along the U.S.-Mexican border, the freight traffic at the border is heavily concentrated at a few major gateway ports. Such concentration affects traffic and congestion at the border, as well as the growth of major trade corridors. In 2001, the top land ports for U.S.-NAFTA surface trade by value were Detroit, Laredo, and Buffalo-Niagara Falls (table 24). Together, these three ports accounted for over 35 percent of the value of all U.S.-

Table 24
Top 10 U.S. Land Ports by Value of U.S.-NAFTA Surface Trade: 2000 and 2001
(Value in millions of current U.S. dollars)

Rank in 2001	U.S. port	All surface modes 2000	All surface modes 2001	All surface modes % change	Truck 2000	Truck 2001	Truck % change	Rail 2000	Rail 2001	Rail % change
	U.S.-North American trade	**575,713**	**547,312**	**–4.9**	**428,700**	**395,425**	**–7.8**	**94,198**	**92,617**	**–1.7**
1	Detroit, MI	94,442	91,982	–2.6	85,468	79,762	–6.7	8,598	11,909	38.5
2	Laredo, TX	83,674	79,607	–4.9	60,047	55,298	–7.9	23,465	24,179	3.0
3	Buffalo-Niagara Falls, NY	70,132	60,478	–13.9	54,659	47,196	–13.7	14,473	10,497	–27.5
4	Port Huron, MI	59,704	55,648	–6.8	32,770	29,955	–8.6	24,645	22,914	–7.0
5	El Paso, TX	39,376	37,931	–3.7	36,008	34,697	–3.6	1,433	1,575	9.9
6	Otay Mesa, CA	18,773	19,401	–3.3	18,760	19,385	3.3	0	0	NA
7	Champlain-Rouses Pt., NY	17,260	16,163	–6.4	15,326	14,271	–6.9	1,041	1,098	5.5
8	Nogales, AZ	13,631	12,509	–8.2	11,046	9,964	–9.8	2,576	2,543	–1.3
9	Hidalgo, TX	12,594	12,423	–1.4	12,444	12,211	–1.9	0	0	NA
10	Blaine, WA	12,303	11,687	–5.0	10,692	9,914	–7.3	1,536	1,724	12.3
	Top 10 as % of total	**73.3**	**72.7**		**78.7**	**79.1**		**82.6**	**82.5**	
	U.S.-Canada trade	**365,118**	**346,515**	**–5.1**	**257,642**	**234,824**	**–8.9**	**62,646**	**60,171**	**–4.0**
1	Detroit, MI	94,347	91,906	–2.6	85,375	79,687	–6.7	8,597	11,908	38.5
2	Buffalo-Niagara Falls, NY	70,004	60,341	–13.8	54,531	47,059	–13.7	14,473	10,497	–27.5
3	Port Huron, MI	59,622	55,539	–6.8	32,689	29,846	–8.7	24,644	22,914	–7.0
4	Champlain-Rouses Pt., NY	17,237	16,137	–6.4	15,303	14,246	–6.9	1,041	1,098	5.5
5	Blaine, WA	12,303	11,687	–5.0	10,692	9,914	–7.3	1,536	1,724	12.3
6	Alexandria Bay, NY	11,987	10,621	–11.4	11,981	10,615	–11.4	0	0	NA
7	Pembina, ND	10,577	8,886	–16.0	9,661	8,252	–14.6	180	107	–40.7
8	Sweetgrass, MT	7,773	8,269	6.4	6,446	6,888	6.9	470	564	19.9
9	Portal, ND	6,596	6,799	3.1	4,376	4,426	1.2	2,193	2,341	6.8
10	Eastport, ID	2,711	6,513	140.3	1,580	1,222	–22.6	907	819	–9.7
	Top 10 as % of total	**80.3**	**79.9**		**90.3**	**90.3**		**86.3**	**86.4**	
	U.S.-Mexico trade	**210,595**	**200,797**	**–4.7**	**171,058**	**160,600**	**–6.1**	**31,552**	**32,446**	**2.8**
1	Laredo, TX	83,674	79,607	–4.9	60,047	55,298	–7.9	23,465	24,179	3.0
2	El Paso, TX	39,376	37,931	–3.7	36,008	34,697	–3.6	1,433	1,575	9.9
3	Otay Mesa, CA	18,773	19,401	3.3	18,760	19,385	3.3	0	0	NA
4	Nogales, AZ	13,631	12,509	–8.2	11,046	9,964	–9.8	2,576	2,543	–1.3
5	Hidalgo, TX	12,594	12,423	–1.4	12,444	12,211	–1.9	0	0	NA
6	Brownsville-Cameron, TX	12,108	10,911	–9.9	11,307	10,139	–10.3	746	735	–1.5
7	Calexico East, CA	8,320	7,348	–11.7	8,238	7,207	–12.5	81	140	72.4
8	Eagle Pass, TX	7,285	6,739	–7.5	4,135	3,599	–13.0	3,140	3,129	–0.3
9	Del Rio, TX	2,387	2,375	–0.5	2,387	2,375	–0.5	0	0	NA
10	San Luis, AZ	1,226	1,007	–17.8	1,226	994	–18.9	0	0	NA
	Top 10 as % of total	**94.7**	**94.7**		**96.8**	**97.1**		**99.7**	**99.6**	

KEY: NA = not applicable.

NOTE: Truck and rail will not sum to total land trade by port, because not all land modes are included here. Other land modes include pipeline, mail, unknown, and miscellaneous. Ports are ranked by totals for all surface trade.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, as of January 2002.

NAFTA trade in 2001 and 46 percent of U.S.-NAFTA surface trade.

Many of the top U.S.-NAFTA ports are national and regional trade gateways, while others serve local markets. For example, only about 20 percent of the value of shipments passing through Buffalo-Niagara Falls originate or terminate in New York. A similar figure is seen for Laredo. For Detroit, the biggest U.S.-Canadian border port, 70 percent of the value of shipments start or end outside of Michigan. In contrast, over 90 percent of the shipments passing through Otay Mesa, the largest California port, originate or end up in California.

The top U.S.-NAFTA land gateways handle thousands of truck crossings each day. In 2001, there were almost 11.1 million commercial truck crossings into the United States from Canada and Mexico, translating to 30,000 daily truck crossings.[35] This was up 44 percent from 1994, but down 4.3 percent from 2000. The majority of these crossings occurred on the U.S.-Canadian border (61 percent), although the growth rate in truck crossings, as with trade, has been more rapid on the U.S.-Mexican border (table 25). As with trade levels, truck crossings are concentrated among a few ports. In 2001, the top three ports (Detroit, Laredo, and Buffalo-Niagara Falls) handled nearly 40 percent of all truck crossings (table 26).

Although trucking accounts for the majority of U.S.-NAFTA trade at the major land ports, several ports serve as important U.S.-NAFTA rail gateways, carrying long-haul freight to origins and destinations in several states. Over half of the value of U.S.-NAFTA rail trade passes through just two gateways, Laredo and Port Huron, Michigan, and these two ports, along with Eagle Pass, Texas, have seen explosive growth in the value of rail cargo since 1994, in part due to rail privatization in Mexico and new North American rail alliances. In the 1990s, rail lines, such as Kansas City Southern, focused on acquisitions, joint ventures, and strategic marketing alliances with other rail lines to form what has become known as the NAFTA Railway (KCS 2002). These rail alliances provide service from the central United States into Mexico and Canada. In conjunction with

[35] Data for vehicle and equipment crossings (truck and rail) are collected by the U.S. Customs Service and are only available for inbound crossings into the United States. In addition, the crossing numbers *do not* represent the number of unique vehicles. For example, one truck may cross the border multiple times in one day.

Table 25
Top 20 NAFTA Border Truck Crossings into the United States: 1994, 2000, and 2001
(Thousands of crossings)

Rank in 2001	U.S. port	1994	2000	2001	1994 %	2001 %	Percentage change, 1994–2001	Average annual growth rate, 1994–2001
1	Detroit, MI	1,155	1,769	1,642	15.0	14.8	42.1	5.1
2	Laredo, TX	668	1,493	1,404	8.7	12.7	110.2	11.2
3	Buffalo-Niagara Falls, NY	887	1,198	1,124	11.5	10.1	26.7	3.4
4	Port Huron, MI	609	839	829	7.9	7.5	36.1	4.5
5	Otay Mesa/San Ysidro, CA	440	688	708	5.7	6.4	61.1	7.1
6	El Paso, TX	574	720	661	7.4	6.0	15.1	2.0
7	Blaine, WA	324	517	472	4.2	4.3	45.6	5.5
8	Champlain-Rouses Pt., NY	273	391	382	3.5	3.4	40.1	4.9
9	Hidalgo, TX	165	374	368	2.1	3.3	123.4	12.2
10	Alexandria Bay, NY	190	278	277	2.5	2.5	45.8	5.5
11	Calexico East/Calexico, CA	U	279	257	U	2.3	U	U
12	Brownsville, TX	267	299	252	3.5	2.3	–5.9	–0.9
13	Nogales, AZ	192	255	249	2.5	2.2	29.9	3.8
14	Pembina, ND	127	214	220	1.6	2.0	72.7	8.1
15	Calais, ME	112	154	144	1.5	1.3	28.2	3.6
16	Derby Line, VT	81	139	141	1.1	1.3	74.1	8.2
17	Sweetgrass, MT	90	146	140	1.2	1.3	56.6	6.6
18	Jackman, ME	99	128	139	1.3	1.3	40.3	5.0
19	Sumas, WA	84	123	134	1.1	1.2	59.0	6.8
20	Houlton, ME	82	133	126	1.1	1.1	54.0	6.4
	Subtotal, top 20 ports	**6,419**	**10,138**	**9,668**	**83.2**	**87.2**	**50.6**	**6.0**
	Total, all ports	7,719	11,574	11,082	100.0	100.0	43.6	5.3
	Total, from Mexico	2,763	4,526	4,305	35.8	38.8	55.8	6.5
	Total, from Canada	4,956	7,048	6,777	64.2	61.2	36.7	4.6

KEY: U = unavailable.

NOTE: Data represent the number of truck crossings, not the number of unique vehicles, and include both loaded and unloaded trucks. Data for the port of Calexico are typically reported as a combined total with Calexico East.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, March 2002; based on data from U.S. Customs Service, Mission Support Services, Office of Field Operations, *Operations Management CD,* 2001.

other large rail lines, such as Groupo Transportacion Ferrovia Mexicana, S.A. de C.V. (TFM), the Texas Mexican Railway, and Canadian National, shipments can move easily with a single rate throughout North America. Growth in rail cargo has also been accompanied by increases in crossings of trains, as well as full and empty containers. In 2001, over 40,000 trains carrying about 2.4 million containers entered the United States from Canada and Mexico, equaling approximately 112 trains and 6,500 daily container entries (table 26).

Table 26
Top 5 U.S. Land Ports for North American Merchandise Trade by Truck and Rail: 2001
(With crossing and entry detail)

TRUCK

Rank in 2001	U.S. port	Annual truck trade value (millions of $)	Value per day (millions of $)	Annual incoming truck crossings	Truck crossings per day
	U.S.-North American trade	**395,425**	**1,083**	**11,081,868**	**30,361**
1	Detroit, MI	79,762	219	1,642,042	4,499
2	Laredo, TX	55,298	152	1,403,914	3,846
3	Buffalo-Niagara Falls, NY	47,196	129	1,123,971	3,079
4	El Paso, TX	34,697	95	660,583	1,810
5	Port Huron, MI	29,955	82	828,802	2,271

RAIL

Rank in 2001	U.S. port	Annual rail trade value (millions of $)	Value per day (millions of $)	Annual incoming rail containers	Rail container entries per day
	U.S.-North American trade	**92,617**	**254**	**2,361,997**	**6,471**
1	Laredo, TX	24,179	66	273,935	751
2	Port Huron, MI	22,914	63	449,299	1231
3	Detroit, MI	11,909	33	304,591	834
4	Buffalo-Niagara Falls, NY	10,497	29	150,525	412
5	International Falls-Ranier, MN	4,012	11	205,430	563

NOTE: Rail containers represent the number of container entries, not the number of unique containers. Truck data represent the number of truck crossings, not the number of unique vehicles, and include both loaded and unloaded trucks. Port rank is based on trade value for 2001. Truck and rail value data include both import and export trade.

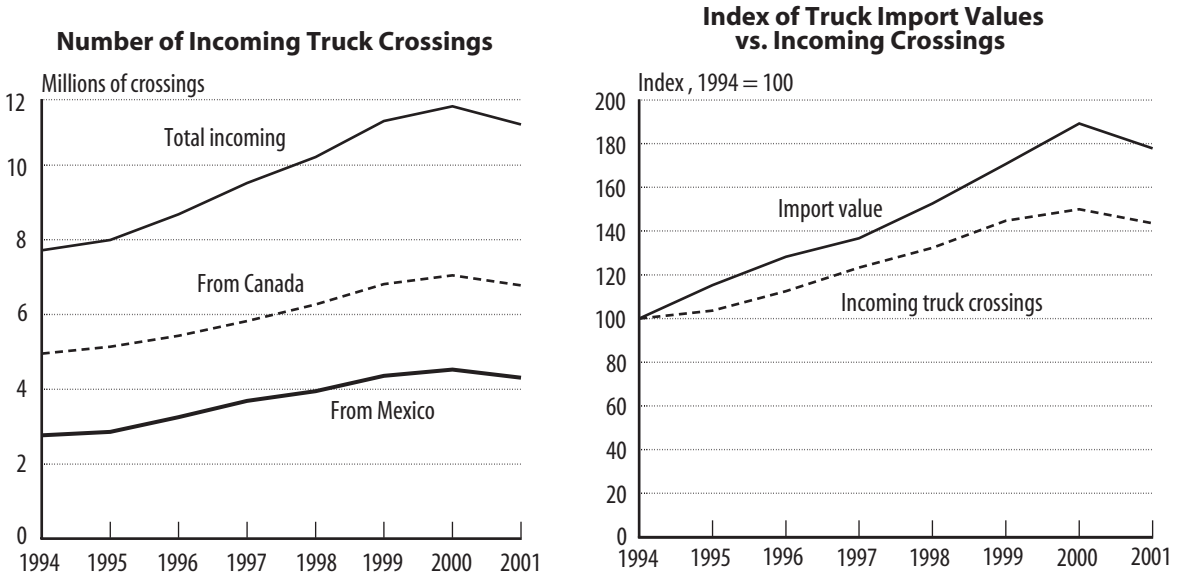
SOURCES: **Truck crossings and rail containers**—U.S. Department of Transportation, Bureau of Transportation Statistics, June 2002; based on data from U.S. Customs Service, Mission Support Services, Office of Field Operations, *Operations Management CD*, 2001. **Truck and rail trade value**—U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, as of June 2002.

Trade flows and vehicle and equipment crossings at key land gateways have fluctuated since the inception of NAFTA, generally characterized by a steady rise through 2000, followed by modest downturns in 2001, due to economic slowdowns throughout North America, the September 11 terrorist attacks on the United States, and the accompanying fall in trade between the United States, Canada, and Mexico. During the 1990s, traffic and flows at these gateways were influenced by notable differences in the geography and direction of trade flows, as U.S. trade expanded more rapidly with Mexico than Canada and import flows from Canada and Mexico grew more quickly than U.S.-NAFTA exports. In addition, key gateways are affected by the mix of commodities passing through these ports as well as changes in carrier efficiencies. For example,

changes in commodity mix and other factors help to explain why growth in the value of truck import shipments mirrors that of incoming truck crossings between 1994 and 2001 (figure 14).

Despite the overall rise in trade levels for U.S.-NAFTA land gateways during the 1990s, notable changes were seen in 2001. Surface trade levels at most of the major U.S.-NAFTA gateways fell between 2000 and 2001, with Buffalo-Niagara Falls experiencing the steepest decline (13.9 percent) of the top 10 land ports. Together the top three U.S.-NAFTA ports (Detroit, Laredo, and Buffalo-Niagara Falls) saw surface trade values fall 6.5 percent over 2000 levels. Of the top gateways, on the U.S.-Mexican border, Otay Mesa, California, was the only U.S. land port that saw a rise in trade in 2001 (3.3 percent). This rise was outpaced by a small U.S.-Canadian port, Eastport, Idaho, which experienced a 140 percent increase in 2001 because of the opening of a new pipeline and a resulting $4 billion increase in pipeline imports (USDOT BTS 2002a).

Figure 14
U.S.-NAFTA Imports by Truck : 1994–2001



NOTE: Data represent the number of truck crossings, not the number of unique vehicles, and include both loaded and unloaded trucks.

SOURCES: **Truck crossings**—U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, April 2002; based on U.S. Department of Treasury, U.S. Customs Service, Mission Support Services, Office of Field Operations, *Operations Management Database CD*. **Truck import value**—U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, as of June 2002.

MULTIMODAL VIEW: TOP GATEWAYS

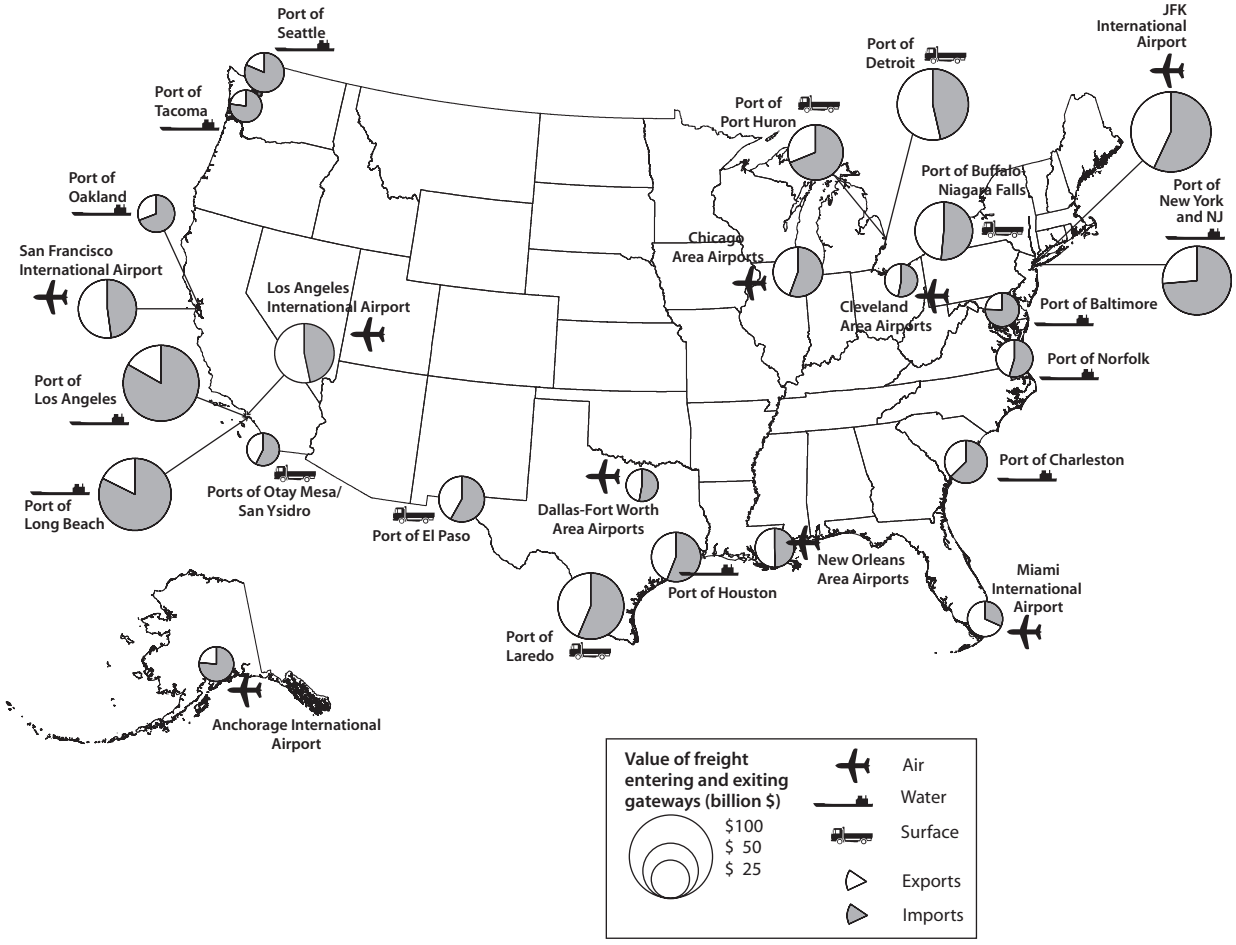
Water, air, and land modes[36] and their associated services and infrastructures are all used to transport goods in U.S. international trade. Whether goods are exported or imported, substantial domestic transportation activity is needed to move goods to and from U.S. air and land gateways and seaports. Often, several modes of transportation are involved. Figure 15 shows the nation's top ports of entry and exit for U.S. international trade shipments by value in 2001. In 2001, the top five gateways represented air, water, and land modes. The leading gateway overall in 2001 was New York's John F. Kennedy International Airport with $117 billion of air cargo. The maritime ports of Los Angeles and Long Beach, the land gateway of Detroit, and the maritime port of New York-New Jersey followed JFK.

These ports handled both exports and imports, with some serving primarily as gateways for imports *into* the United States, while others were predominately gateways for exports *from* the United States to destinations around the world (table 27, p. 66). Among the top 10 gateways, only the land port of Detroit, Los Angeles International Airport, and San Francisco International Airport handled more exports than imports.

Continuing growth in U.S.-Asian Pacific trade, further integration of North American manufacturing, variations in commodity mix, and many other factors will continue to affect the top gateways as well as the movements of international trade shipments to, from, and within the United States. Additionally, these gateways could be affected and their relative roles may shift as the United States embraces new freight security measures to protect against the use of freight conveyances for terrorist acts.

[36] Land modes here include truck, rail, and pipeline. Although many international trade shipments involve multiple modes of transportation, it is not possible to report on intermodal or multimodal activity due to the way in which U.S. international trade statistics are collected.

Figure 15
Top 25 U.S. International Freight Gateways by Shipment Value: 2001



NOTES: See table C-17 on page 134 for the data. **All data**—Trade levels reflect the mode of transportation as a shipment enters or exits a border port. Flows through individual ports are based on reported data collected from U.S. trade documents. Trade does not include low-value shipments (in general, these are imports valued at less than $1,250 and exports that are valued at less than $2,500). **Air**—Data for all air gateways include a low level (generally less than 2%–3% of the total value) of small user-fee airports located in the same region. Air gateways not identified by airport name (e.g., Chicago) include major airports in that geographic area as well as small regional airports. In addition, due to U.S. Census Bureau confidentiality regulations, data for courier operations are included in the airport totals for JFK International Airport, New Orleans, Los Angeles, Cleveland, Chicago, Miami, and Anchorage. **Water**—Data are preliminary.

SOURCES: **Air**—U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, special tabulation, May 2002. **Water**—U.S. Department of Transportation, Maritime Administration, Office of Statistical and Economic Analysis, personal communication, May 2002. **Land**—U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, 2002.

Table 27
Top 10 U.S. International Freight Gateways by Shipment Value: 2001
(Billions of current U.S. dollars)

Rank in 2001	U.S. port	Mode	Total U.S. trade	Exports	Imports	Export as % of total	Balance of trade (exports minus imports)
	Total, all airports		**519**	**251**	**267**	**48.5**	**–16**
	Total, all maritime ports		**718**	**199**	**520**	**27.3**	**–327**
	Total, all land ports		**547**	**235**	**313**	**42.9**	**–78**
1	JFK Int. Airport	Air	117	50	67	43.0	–16
2	Los Angeles, CA	Water	104	17	87	16.7	–69
3	Long Beach, CA	Water	95	17	78	17.7	–61
4	Detroit, MI	Land	92	49	43	53.5	6
5	New York/New Jersey	Water	86	23	63	26.4	–41
6	Laredo, TX	Land	80	35	45	43.6	–10
7	Los Angeles Int. Airport	Air	64	34	30	53.3	4
8	San Francisco Int. Airport	Air	62	32	30	52.2	3
9	Buffalo-Niagara Falls, NY	Land	60	29	31	48.6	–2
10	Port Huron, MI	Land	56	17	38	31.0	–21

NOTE: **All data**—Trade levels reflect the mode of transportation as a shipment enters or exits a U.S. Customs port. Flows through individual ports are based on reported data collected from U.S. trade documents. Trade does not include low-value shipments or intransit shipments. **Air**—Data for all airports are based on U.S. port classifications and include a low level (generally less than 2%–3% of the total value) of small user-fee airports located in the same region. In addition, due to U.S. Census Bureau confidentiality regulations, data for courier operations are included in the airport totals for JFK and Los Angeles International Airports. **Water**—Data are preliminary.

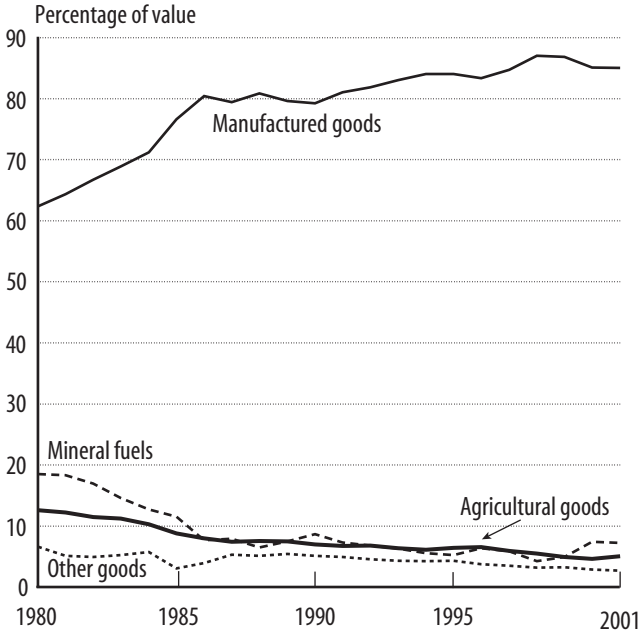
SOURCES: **Air**—U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, special tabulation, May 2002. **Water**—U.S. Department of Transportation, Maritime Administration, Office of Statistical and Economic Analysis, personal communication, May 2002. **Land**—U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, as of May 2002.

TRENDS IN MAJOR COMMODITIES

The commodity mix of U.S. international merchandise trade has changed appreciably during the past two decades and continues to shift in response to changes in U.S. consumer preferences and global economic integration. Since 1980, manufactured goods' share of U.S. international merchandise trade has increased,[37] influencing the growth in containerization and the demand for intermodal transportation. Manufactured goods' portion of the value of U.S. international merchandise trade jumped from 62 percent in 1980 to 85 percent in 2001[38] (figure 16).

Meanwhile, natural resources and raw materials' share of the value of U.S. merchandise trade declined, even though the United States continues to produce, export and import, and consume vast quantities of such products. Between 1980 and 2001, agricultural goods' share of the value of trade fell from 13 percent to 5 percent. Mineral fuels' (oil and petroleum products) share declined from 19 percent to 7 percent, in part due to relative declines in oil prices. While the commodity mix changed, the volume of U.S. trade in manufactured and other goods and the transportation required to carry it grew, affecting the shipment tonnage carried by all the freight modes.

Figure 16
U.S. International Merchandise Trade by Commodity Type: 1980–2001



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, Bureau of Economic Analysis, Balance of Payments data, available at http://www.ita.doc.gov/td/industry/otea/usfth/aggregate/H01T03.html, as of June 2002.

Just five commodities, valued at about $1 trillion, accounted for over half (54 percent) of the value of U.S merchandise trade in 2001, and these five commodities have remained fairly stable since 1990.[39] Table 28 shows the top 20 traded commodities and their relative annual growth rates

[37] Merchandise trade encompasses all trade. Manufactured goods are one type of commodity group and are a subset of overall merchandise trade.

[38] It is not possible to determine these shares by weight, because data on the weight of U.S. exports by land modes are not collected.

[39] Based on the Harmonized Tariff Schedule-2 (HTS2) commodity classification code.

Table 28
U.S. Total Merchandise Trade by 2-Digit Commodity Code: 1990, 1995, and 2001
(Billions of current U.S. dollars)

Rank in 1990	Rank in 2001	Commodity code	Commodity description	1990	1995	2001	Annual growth rate, %
1	1	84	Nuclear reactors, boilers, machinery, and parts[1]	141	236	306	7.3
3	2	85	Electrical machinery, equipment, and parts	103	206	277	9.4
2	3	87	Vehicles other than railway	107	155	218	6.7
4	4	27	Mineral fuels, oils, and waxes	77	70	136	5.3
6	5	90	Measuring and testing instruments	31	50	79	8.9
5	6	88	Aircraft, spacecraft, and parts	37	32	66	5.4
7	7	98	Special classification provisions	25	36	60	8.2
8	8	29	Organic chemicals	20	32	51	9.1
10	9	39	Plastics	18	32	46	8.8
9	10	71	Pearls, stones, metals, and imitation jewelry	18	26	41	7.6
11	11	62	Not knitted or crocheted apparel	16	26	34	7.3
19	12	61	Knitted or crocheted apparel	9	17	31	11.4
21	13	94	Furniture, lamps, and prefabricated buildings	9	15	29	11.7
36	14	30	Pharmaceutical products	4	9	28	18.8
12	15	48	Paper and paperboard	14	22	26	6.0
16	16	95	Toys, games, and sports equipment	10	16	24	7.9
17	17	73	Articles of iron or steel	10	15	22	7.4
15	18	44	Wood and articles	12	17	20	5.1
18	19	64	Footwear	10	13	16	4.3
22	20	40	Rubber and articles	8	13	16	6.4
			All other commodities	209	290	346	4.7
			Top 20 commodities	**680**	**1,037**	**1,527**	**7.6**
			Top 20, percentage of all commodities	76.5	78.2	81.6	
			Total, all commodities	**889**	**1,327**	**1,873**	**7.0**
Imports							
2	1	84	Nuclear reactors, boilers, machinery, and parts[1]	67	123	161	8.4
1	2	87	Vehicles other than railway	75	102	159	7.1
4	3	85	Electrical machinery, equipment, and parts	58	114	155	9.3
3	4	27	Mineral fuels, oils, and waxes	65	59	123	6.0
7	5	98	Special classification provisions	12	18	35	10.2
Exports							
1	1	84	Nuclear reactors, boilers, machinery, and parts[1]	75	113	145	6.2
2	2	85	Electrical machinery, equipment, and parts	45	92	123	9.5
3	3	87	Vehicles other than railway	32	52	59	5.6
4	4	88	Aircraft, spacecraft, and parts	31	26	45	3.5
5	5	90	Measuring and testing instruments	18	27	44	8.8

[1] The majority of trade under commodity code 84 is computer-related machinery and parts. Machinery for nuclear reactors and parts is a very small portion of trade under commodity code 84.

NOTE: Commodity code is the 2-digit harmonized schedule (HS) for internationally traded goods.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, U.S. Treasury, and U.S. International Trade Commission, http://dataweb.usitc.gov/scripts/REPORT.asp, as of April 2002.

since 1990. Only measuring and testing instruments (i.e., optical, photographic, precision, and parts) entered the top five during the 1990s, pushing aircraft, spacecraft, and parts down into the sixth slot in the process. Other than this category, the top commodities for exports and imports were similar during this period. However, aircraft, spacecraft, and parts are among the leading exports.

Between 1990 and 2001, the value of all the major traded commodities grew at average annual rates of 4 percent to 19 percent. Higher value goods grew more rapidly than lower value goods, most notably pharmaceutical products and furniture, furnishings, and lighting products (commodity code 94), which moved from outside the top 20 in 1990 to the 14th and 13th positions, respectively, in 2001. The strong growth in U.S. trade of pharmaceuticals and furniture is indicative of a general increase in the U.S. trade of high-value commodities. The growth in trade of high-value commodities in turn has contributed to the rise in air transportation's share of U.S. international trade value, since it is generally more cost-effective to transport smaller, higher value, and lower weight goods by air. Another notable change in the commodity mix was a drop in the ranking for cereal grain and iron and steel. In 1990, cereal grain and iron and steel were ranked 13th and 14th, respectively. By contrast in 2001, iron and steel was ranked 21st and cereal grain, 28th. Such changes in commodity mix could affect the volume of bulk cargo handled by U.S. ports.

The commodity mix of U.S.-NAFTA surface trade is somewhat different from that of U.S. international trade overall due to transborder shipments of the automotive industry and trade in raw and semi-processed materials. Motor vehicles, parts, and accessories (commodity code 87) were the leading commodity for U.S. trade with Canada and Mexico, followed by electrical machinery and equipment (table 29). An overwhelming proportion of these commodities moved by surface modes. In 2001, motor vehicles, parts, and accessories were transported mostly by truck ($60 billion) and rail ($55 billion). The movement of commodities in this category by rail accounted for 59 percent of all U.S.-NAFTA rail trade. Raw and semi-processed commodities (e.g., paper products, wood products, and articles of iron and steel, aluminum, and rubber) are more important components in U.S.-NAFTA trade than they are in overall U.S. international

Table 29
Top 15 Commodities in U.S. Merchandise Trade with NAFTA Partners by All Modes Compared with Total U.S. Trade: 2001
(Millions of current U.S. dollars)

Rank in 2001[1]	Comm. code	Commodity description	Total U.S. trade (all modes)	Total U.S. NAFTA trade (all modes)	Land trade with NAFTA partners			
					Total	Truck	Rail	Other[2]
1	87	Vehicles other than railway	218,091	118,231	115,893	59,858	54,696	1,339
2	85	Electrical machinery, equipment, and parts	277,152	89,369	76,924	73,140	885	2,899
3	84	Nuclear reactors, boilers, machinery, and parts	306,392	82,279	70,598	64,230	4,435	1,933
4	27	Mineral fuels, oils, and waxes	135,881	51,551	34,216	2,339	1,467	30,410
5	98	Special classification provisions	59,824	25,126	22,216	15,897	383	5,936
6	39	Plastics	45,984	21,554	21,271	17,297	3,509	465
7	48	Paper and paperboard	25,905	16,719	16,101	11,749	4,103	249
8	90	Measuring and testing instruments	79,098	16,141	12,814	12,171	184	460
9	94	Furniture, lamps, and prefabricated buildings	29,337	12,684	12,517	12,091	75	351
10	44	Wood and articles	20,245	12,559	12,190	7,350	4,682	158
11	73	Articles of iron or steel	22,212	10,315	10,056	8,995	557	503
12	88	Aircraft, spacecraft, and parts	65,804	9,464	7,572	2,017	35	5,520
13	76	Aluminum and articles	13,455	7,962	7,807	5,847	1,893	67
14	40	Rubber and articles	15,988	6,889	6,806	6,098	422	286
15	62	Not knitted or crocheted apparel	34,281	6,554	5,969	5,900	8	60
		All other commodities	523,338	126,238	114,362	90,446	15,282	8,634
		Total, top 15 commodities	**1,349,647**	**487,398**	**432,950**	**304,979**	**77,335**	**50,636**
		Top 15 as a % of all commodities	72.1	79.4	79.1	77.1	83.5	85.4
		Total, all commodities	**1,872,985**	**613,635**	**547,312**	**395,425**	**92,617**	**59,270**
		Transportation-related goods	**289,863**	**130,545**	**125,817**	**63,336**	**55,591**	**6,889**
	87	Vehicles other than railway	218,091	118,231	115,893	59,858	54,696	1,339
	88	Aircraft, spacecraft, and parts	65,804	9,464	7,572	2,017	35	5,520
	86	Railway locomotives and parts	2,863	1,744	1,729	854	857	18
	89	Ships, boats, and floating structures	3,105	1,106	622	607	2	13
		Transportation-related goods as a % of all commodities	**15.5**	**21.3**	**23.0**	**16.0**	**60.0**	**11.6**

[1] Commodity ranking is based on total U.S.-NAFTA trade.

[2] Includes pipeline and miscellaneous such as "flyaway aircraft" (i.e., aircraft moving under its own power from manufacturer to a customer and not carrying freight).

NOTE: Land trade includes truck, rail, pipeline, and miscellaneous and unknown. Commodity code is based on the 2-digit harmonized schedule (HS) for internationally traded goods.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, 2001; and U.S. International Trade Commission, available at http://dataweb.usitc.gov/scripts, as of April 2002.

trade. The reverse is true for finished and processed goods (e.g., optical, photographic, and precision instruments; chemicals; and pharmaceutical products), which factor more highly into total U.S. international trade than in U.S.-NAFTA trade.

During the past decade, changes in the demand for and supply of particular commodities affected both the geographic pattern of U.S. trade and our top trading partners. For example, in 1990, Japan was the leading U.S. trade partner for commodity code 84 (primarily machinery and mechanical appliances), the most traded commodity group by value. By 2001, Canada had become the top U.S. trading partner for this commodity group, while Japan dropped to second. A similar switch occurred with electrical machinery and equipment (commodity code 85). In 1990, Japan was the leading trade partner with $23 billion, followed by Canada and Mexico. By 2001, Mexico had taken the lead with $58 billion, followed by Japan and Canada with $31 billion each (USITC 2002). For mineral fuels (commodity code 27), Canada has maintained its top position during the last decade, but trade with other countries for this commodity has shifted. For example, Venezuela passed Saudi Arabia to the second position in 2001. Such changes affect the volume of crude petroleum and related products handled by U.S. East Coast and Gulf Coast ports. A change also occurred in trade in motor vehicles and parts and optical and precision instruments (commodity code 90). For both of these catagories of goods, Mexico passed Germany to move into the third position, behind Canada and Japan. Such changes in trade or leading commodities affect transportation modes, services options, and system requirements.

Trade in Transportation-Related Goods

In 2001, the U.S. traded $290 billion worth of transportation-related commodities (e.g., cars, trains, and airplanes) with its partners, nearly twice the value of these commodities traded in 1990.[40] Despite this overall increase, the share of transportation-related goods relative to all U.S. traded commodities fell slightly from 16.5 percent in 1990 to 15.5 percent in 2001 (table 30). While motor vehicles and parts constitute by far the largest share of U.S. international trade in transportation-related goods, trade in aircraft, spacecraft, and parts was valued at $66 billion in 2001 (figure 17, p. 73).

[40] This includes merchandise trade only. Transportation-related services are discussed in the next section.

Table 30
U.S. Trade in Transportation-Related Goods by Commodity: 1990, 2000, and 2001
(Millions of current U.S. dollars)

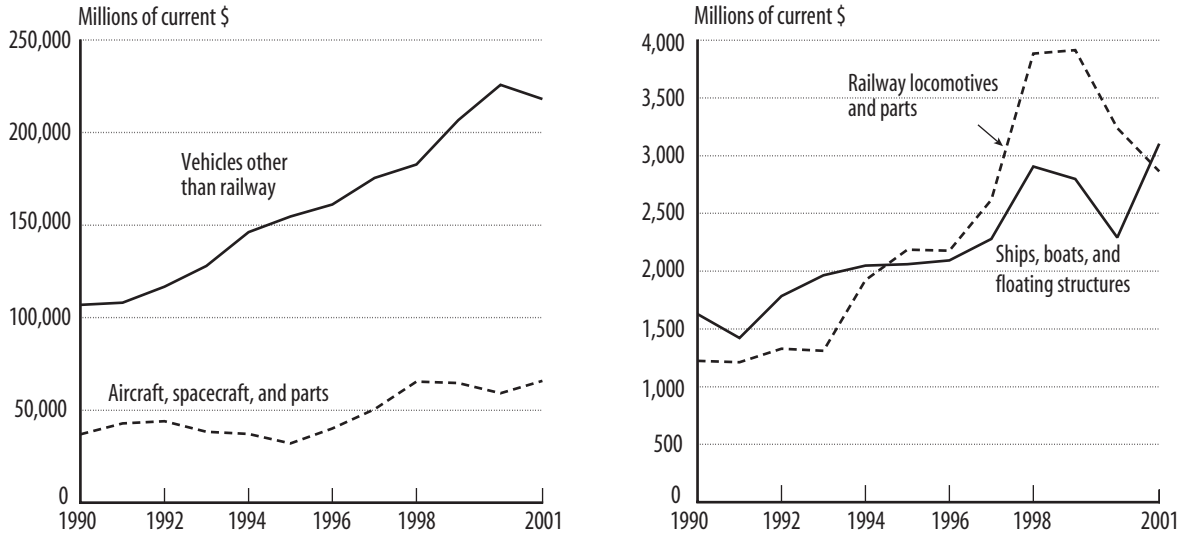
Comm. code	Description	1990	2000	2001
Overall (exports plus imports)				
87	Vehicles other than railway	106,939	225,782	218,091
88	Aircraft, spacecraft, and parts	36,953	59,143	65,804
89	Ships, boats, and floating structures	1,629	2,292	3,105
86	Railway locomotives and parts	1,223	3,240	2,863
	Total, transportation-related goods	**146,744**	**290,456**	**289,863**
	Transportation goods share of total (%)	16.5	14.5	15.5
	Total, all commodities	**889,004**	**1,997,306**	**1,872,985**
Imports				
87	Vehicles other than railway	74,685	163,854	159,341
88	Aircraft, spacecraft, and parts	6,385	18,167	21,098
89	Ships, boats, and floating structures	330	1,178	1,206
86	Railway locomotives and parts	701	1,828	1,357
	Total, transportation-related goods	**82,101**	**185,027**	**183,003**
	Transportation goods share of total (%)	16.6	15.2	16.0
	Total, all commodities	**496,028**	**1,216,888**	**1,141,959**
Exports				
87	Vehicles other than railway	32,254	61,928	58,750
88	Aircraft, spacecraft, and parts	30,567	40,976	44,705
89	Ships, boats, and floating structures	1,299	1,114	1,899
86	Railway locomotives and parts	522	1,412	1,506
	Total, transportation-related goods	**64,642**	**105,429**	**106,860**
	Transportation goods share of total (%)	16.4	13.5	14.6
	Total, all commodities	**392,976**	**780,419**	**731,026**
Balance (exports minus imports)				
87	Vehicles other than railway	–42,431	–101,927	–100,592
88	Aircraft, spacecraft, and parts	24,182	22,809	23,607
89	Ships, boats, and floating structures	969	–65	693
86	Railway locomotives and parts	–179	–416	149
	Balance, transportation-related goods	**–17,459**	**–79,598**	**–76,143**
	Balance, total trade for all commodities	–103,053	–436,469	–410,933

NOTE: Commodity code is the 2-digit harmonized schedule for internationally traded goods. Commodity detail data are not available in inflation-adjusted terms.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, based on data from U.S. Department of Commerce, U.S. International Trade Commission,available at http://dataweb.usitc.gov/, as of August 2002.

As is the case with overall international trade, the United States had a merchandise trade deficit in transportation-related exports and imports, totaling $76 billion in 2001. The deficit arose from the over $100 billion U.S. trade deficit for automotive vehicles and parts, which represented the second-largest deficit of total traded commodities and accounted for nearly one-quarter of the total U.S. merchandise trade deficit of $411

Figure 17
Value of Transportation-Related U.S. Merchandise Trade for Selected Categories: 1990–2001

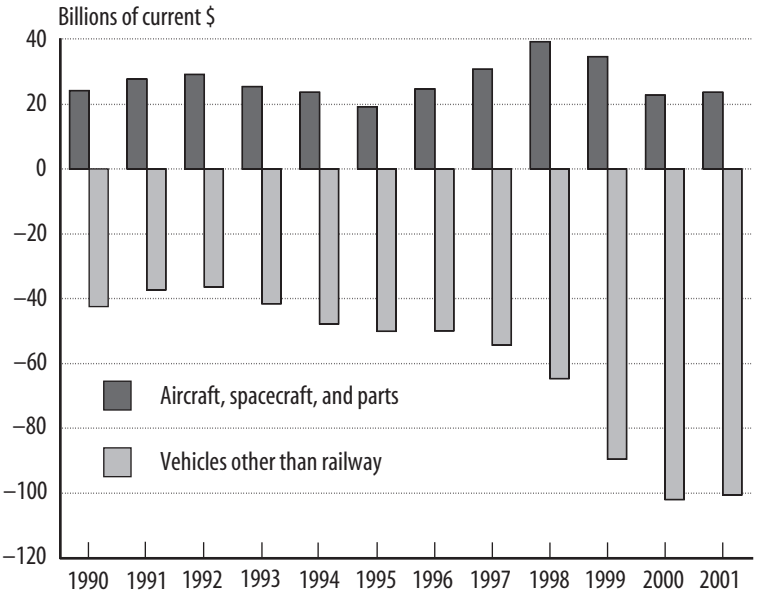


SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. International Trade Commission, available at http://dataweb.usitc.gov/scripts, as of December 2002.

billion[41] (figure 18). Over one-third of the automotive vehicles and parts deficit involved U.S. trade with Japan, while about one-fifth was with Canada.

In contrast, the United States had trade surpluses in 2001 in other transportation-related commodities. The $24 billion surplus in aircraft, spacecraft, and parts trade was the single highest surplus of any commodity in U.S. international trade (figure 18) and was due to surpluses with several trading partners, particularly the United Kingdom. The only deficits for

Figure 18
Balance of Trade for Transportation-Related Merchandise Goods: 1990–2001



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. International Trade Commission, available at http://dataweb.usitc.gov/scripts, as of December 2002.

[41] Mineral fuels, oils, and waxes, including crude oil and petroleum products, had the largest trade deficit of $110 billion in 2001.

aircraft products were with France and Canada, both countries that have large aviation manufacturing sectors (see appendix table C-18, p. 136). The U.S. international trade surplus for ships, boats, and floating structures was $693 million and for railway locomotives and parts it was $149 million in 2001. The trade surplus for railway locomotives and parts was in sharp contrast to the $416 million deficit in 2000 and was the first surplus since 1990. The 2001 surplus can largely be attributed to the United States supplying railcars and parts to Canada, the largest U.S. trade partner for railway products. The U.S. trade surplus in railway locomotives and parts was $257 million with Canada alone.

TRANSPORTATION SERVICES TRADE

In addition to international trade in merchandise, the United States exports (sells) and imports (buys) a variety of services, including freight transportation and port services[42] (box 4). In 2001, total U.S. services trade accounted for about 21 percent of U.S. overall international trade, a slight decline from 23 percent in 1990. Between 1990 and 2001, merchandise trade's share averaged about 78 percent (figure 19). While overall services trade accounted for about one-fifth of U.S. international trade, services maintained the largest share of U.S. gross domestic product for many years.

[42] In this report, transportation services include freight services provided by transportation carriers as well as by port facilities (e.g., airports, seaports, and terminals). The other transportation services—travel and passenger fares—are not discussed here. BTS discusses them in a companion report, *U.S. International Travel and Transportation Trends*.

Box 4
Components of International Services Trade

Defining services trade is a complex issue, tied to how governments calculate their balance of payments. International services trade, as reported by the U. S. Department of Commerce, Bureau of Economic Analysis' current account, includes private and public transactions. Public or government transactions mainly cover operations of the U.S. military and embassies abroad (e.g., transporting supplies from the United States to a military base in a foreign country). Because these public sector transactions are not considered to reflect U.S. service industries' competitiveness and may introduce fluctuations from events such as peacekeeping missions, this report discusses only private sector services trade.

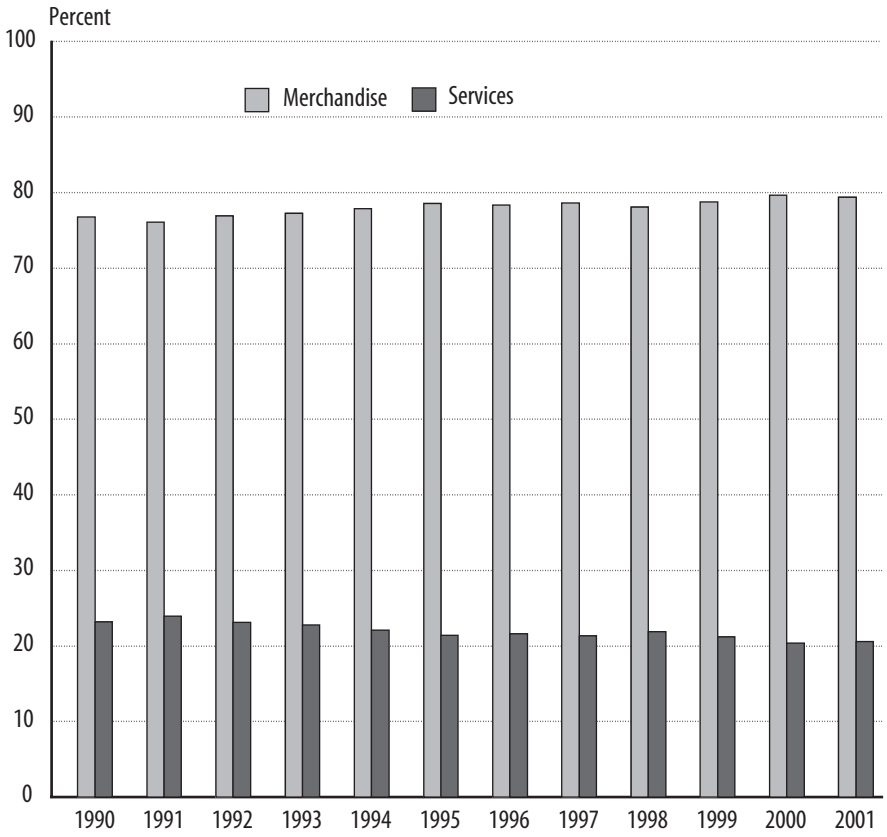
Services are traded internationally through two primary channels. The first channel involves sales of services by residents of one country to residents of another country. These sales—cross-border trade—include both trade within multinational companies (intrafirm trade) and trade between unaffiliated parties. Services trade is recorded for both countries: as exports for the seller's country and as imports for the buyer's country. The second channel of delivery is sales through foreign affiliates of multinational companies. From the U.S. perspective, these are sales to foreigners by foreign affiliates of U.S. companies. For example, if a Japanese citizen buys a car in Japan that is produced by a General Motors affiliate in Thailand, this sale will not be considered a U.S. international transaction, because it is a transaction between foreigners. Cross-border and affiliates trade have different effects on the U.S. economy. For example, U.S. cross-border exports have a greater beneficial effect than equivalent sales through foreign affiliates, because the income from this trade accrues to U.S.-supplied labor and capital. This report only discusses cross-border services trade.

Cross-border services trade is classified into five broad categories: travel, passenger fares, other transportation (i.e., freight transportation and port services), royalties and license fees, and other private services. (See box source for coverage and definitions of the categories.) This report focuses on freight transportation and port services because they directly relate to the movement of merchandise. The freight and port services category covers freight charges and receipts for transportation of goods by ocean, air, land (truck, rail, and pipeline), and inland water carriers to and from the United States and between two foreign points. It also includes the value of goods (e.g., fuel) and services purchased by foreign carriers in U.S. ports and vice versa. Travel and passenger fares are discussed in a BTS companion report, *U.S. International Travel and Transportation Trends*.

SOURCE

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

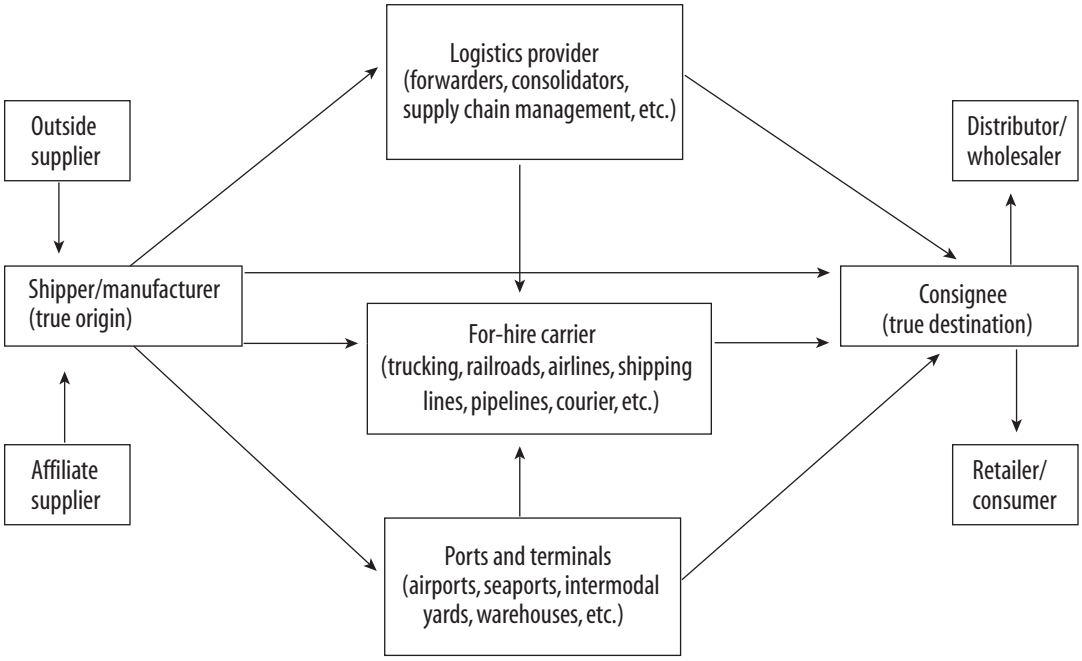
Figure 19
Overall U.S. International Trade in Merchandise and Services by Sector: 1990–2001



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, Bureau of Economic Analysis, Balance of Payments data, available at http://www.ita.doc.gov/td/industry/otea/usfth/aggregate/H01t01.html, as of June 2002.

Trade in freight and port services generates substantial revenues for U.S. businesses in terms of receipts to U.S. carriers and ports. These services also result in payments by U.S. companies to foreign freight carriers and ports. 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

Figure 20
Components of a Trade Flow Between Shipper and Consignee



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, August 2002.

port services occur when a U.S. carrier purchases services and goods at ports in foreign countries[43] (USDOC BEA 2001).

The freight transportation and port services sectors comprise many industries, including carriers, ports and terminals, and logistics providers, among other businesses (figure 20). These industries interact to manage the product supply chain and transport internationally traded goods. Because of the widespread use of just-in-time (JIT) inventory management, manufacturers, distributors, retailers, and other firms involved in international trade often rely on a combination of carriers and logistics providers (e.g., freight forwarders, arrangers, and consolidators) to transport goods globally from multiple suppliers.[44] For example, Hewlett-Packard uses a complex logistics and

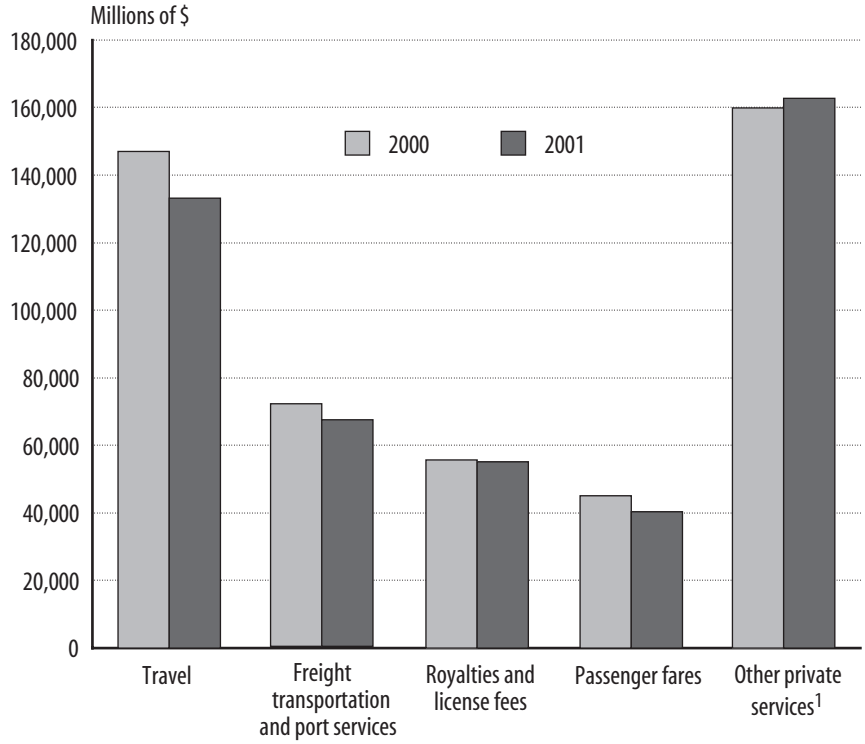
[43] Note that the value of port services reported by the Bureau of Economic Analysis also includes services procured by foreign passenger carriers at U.S. ports and by U.S. passenger carriers at foreign ports.

[44] JIT involves keeping materials on hand for only a few days or sometimes only a few hours of operation. In JIT inventory management, materials are delivered as needed in the manufacturing process and final products are shipped to distributors, wholesalers, and retailers as they are demanded by customers.

transportation management system to supply inkjet printers to its North American market from suppliers in Vancouver, Washington, and Singapore (Armbruster 2001). Many American companies, such as Caterpillar Inc., Ford Motor Company, Frito-Lay, and Campbell Soup, use both in-house and third-party transportation service providers to manage the inflow of raw materials and outflow of finished products by multiple transportation modes on a time-definite basis (*PR Newswire* 2001 and *Logistics Management Distribution Report* 2000). Since JIT puts a premium on transportation system reliability and speed, the performance of freight carriers and ports directly influences the competitiveness of U.S. businesses engaged in international trade.

In 2001, U.S. trade in freight transportation and port services was $67 billion, down 6 percent from $72 billion in 2000 (figure 21). This annual decline was only the second since

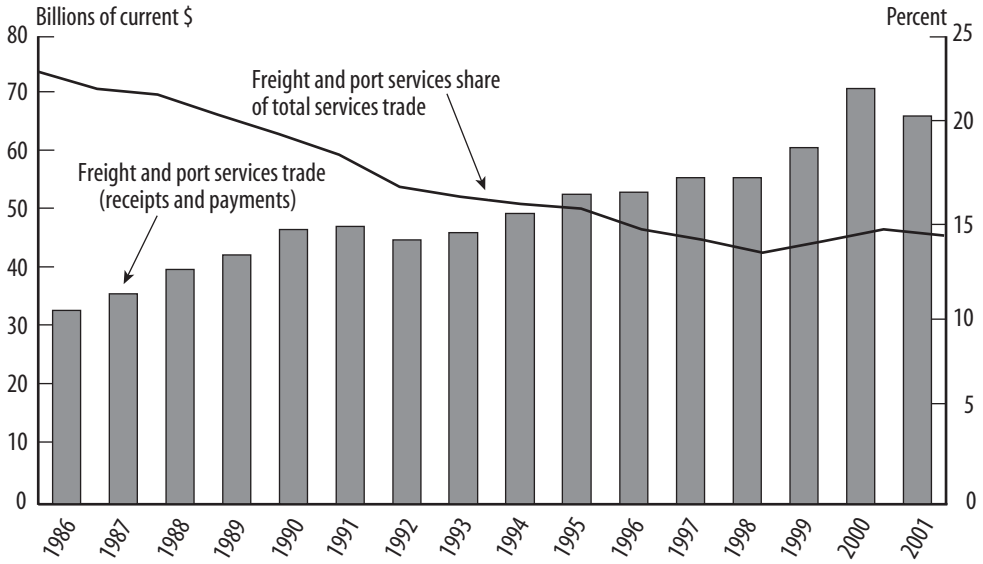
Figure 21
U.S. Trade in Services: 2000 and 2001



[1] Includes finance, insurance, telecommunications, education, business and professional services, and others.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, Bureau of Economic Analysis, U.S. International Transactions Data, available at http://www.bea.doc.gov/bea/international/bp_web/list.cfm?anon=381, as of January 2003.

Figure 22
U.S. International Freight and Port Services Trade and Share of Total Services: 1986–2001



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, Bureau of Economic Analysis, U.S. International Transactions Data, available at http://www.bea.doc.gov/bea/international/bp_web/list.cfm?anon=381, as of January 2003.

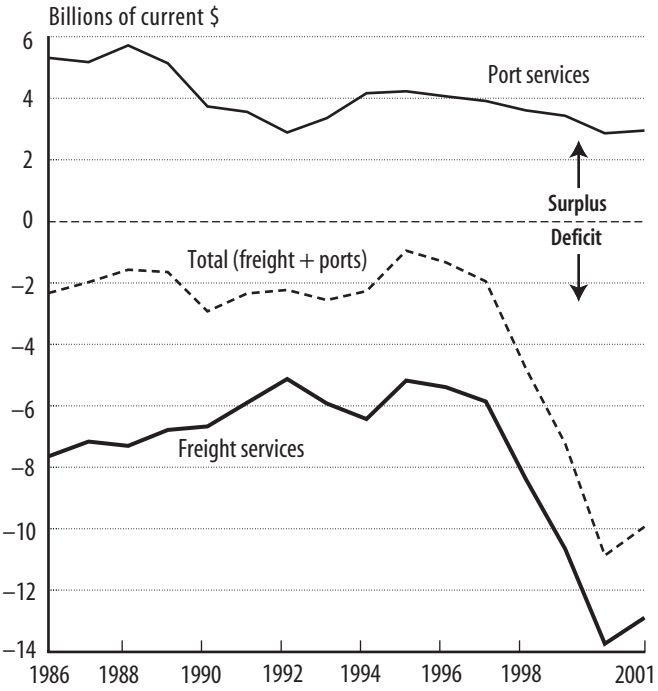
1986, the first year for which the Bureau of Economic Analysis (BEA) reported consistent data on services trade.[45] Of the $67 billion, 56 percent was for freight services and the remainder was for port services.[46] The 2001 declines were in both exports (receipts) and imports (payments), mostly due to the lower volume of air traffic immediately after September 11.

Despite the decline in 2001, U.S. international freight and port services trade grew between 1986 and 2001 as the volume of merchandise transported internationally increased. During this period, U.S. total trade (receipts plus payments) for these services doubled from $33 billion to $67 billion, growing at an average annual rate of 4.8 percent. U.S. exports (receipts) grew at a 4.1 percent annual rate, whereas imports (payments) grew 5.3 percent per year, mirroring trends in goods trade. Figure 22 shows that while U.S. international freight and port services trade increased, its relative share of the U.S. total private sector

[45] There was a 5 percent decline in 1992, following the U.S. economic recession of 1991.

[46] Includes services for both freight and passenger operations at ports. BEA's international transactions current account does not split out receipts for goods and services purchased at U.S. ports by foreign carriers into revenues for freight and for passenger services. For example, when a foreign air carrier buys fuel and services at a U.S. airport, that air carrier could use the purchased goods and services for both its passenger and freight operations.

Figure 23
Balance of Trade for U.S. International Freight and Port Services: 1986–2001
(Receipts minus payments)



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, Bureau of Economic Analysis, U.S. International Transactions Data, available at http://www.bea.doc.gov/bea/international/bp_web/list.cfm?anon=381, as of January 2003.

services trade declined from 23 percent in 1986 to about 15 percent in 2001. This occurred because other services' share, particularly telecommunications and Internet-related services, increased much faster in the 1990s.

In 2001, the U.S. experienced a surplus in overall services trade, contrasting with the deficit for merchandise trade. At the same time, however, a nearly $14 billion deficit was seen in freight services while port services showed a $3 billion surplus, leading to an overall deficit of $11 billion for freight and port services combined (figure 23 and appendix table C-20, p. 138). The 2001 freight services deficit continued a trend seen since 1986, the first year for which data are available. As the amount of U.S. merchandise imports increased, so too did the payments to foreign carriers transporting many of these goods. In contrast, during the same 15-year period, the United States maintained a surplus in port services as foreign carriers that transported increasing amounts of U.S. import cargo also purchased increasing amounts of services from U.S. ports.

The United States engages in services trade with numerous countries worldwide. Many of these countries are also the top merchandise trading partners of the United States. Overall in 2001, Japan was the top U.S. services trade partner in freight transportation and port services combined, with over $9 billion, about 40 percent of this for receipts to U.S. carriers and ports and 60 percent in payments to Japanese carriers and ports[47] (see appendix table C-21, p. 139). Japan was followed by Canada and the United Kingdom.

[47] Although the receipts and payments cover transshipments, it is not possible to disaggregate available data in order to separate out revenues from transshipped goods.

In 2001, U.S. exports (receipts) of freight and port services were $28 billion, with Japan accounting for almost 12 percent of this activity. For freight services exports alone, Canada was the leading U.S. trade partner, primarily because of the $1.6 billion paid to U.S. carriers for transporting goods to Canada by surface modes. Japan was second, with two times more paid to U.S. air carriers than U.S. ocean carriers. In contrast, for port services exports, Japan was the leading U.S. trade partner with $2 billion in activity; 62 percent of this was for the use of U.S. maritime port services.

Japan was also the leading U.S. trade partner for imports (payments) of freight and port services, accounting for 14 percent of the $39 billion total in 2001. For freight services imports alone, Japan also was the largest U.S. partner followed by Canada with $2.5 billion, where over 90 percent of these payments were to Canadian trucking and rail companies. Japan also led U.S. port service imports (or payments to Japanese air and maritime ports) with $2.1 billion, followed by the United Kingdom with $1.6 billion (appendix table C-21, p. 139).

Transportation Services Trade by Mode

In 2001, declines in overall freight and port services trade were experienced by all the modes, but air cargo services were affected the most.

- Air freight services declined by about 11 percent (from $11 billion to $9 billion) reflecting a drop in air cargo transported.
- Ocean freight services decreased about 5 percent (from $25 billion to $24 billion) due to declines in maritime trade volume and maritime rates for all ocean services (liner, tanker, and bulk). In particular, weak demand for bulk items, such as coal, iron ore, and grain, was responsible for this drop.
- Surface freight services fell by 7 percent (from $5.1 billion to $4.7 billion) as some modal shifts and rate changes occurred in the aftermath of September 11.
- Overall port services (primarily airport and seaport) decreased nearly 6 percent to $30 billion, mainly because of

sizeable declines in air carrier activity following September 11. Part of this decline was also due to lower jet fuel prices in 2001 (USDOC BEA 2002b).

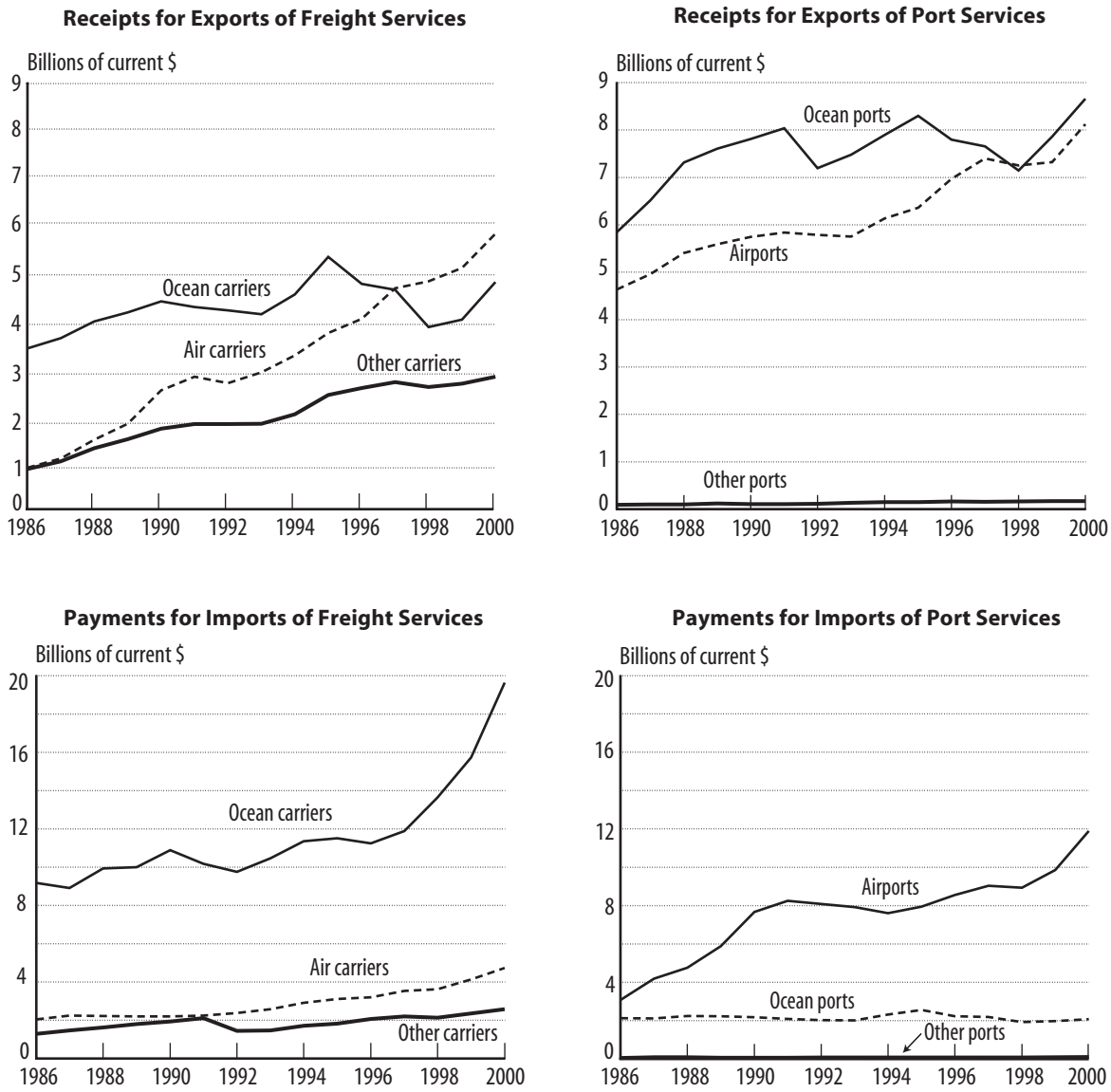
Prior to the 2001 overall declines, there had been some notable modal changes in freight and port services trade since 1986.[48] U.S. air carriers now export the majority of U.S. freight services (i.e., receive the most receipts), having overtaken ocean carriers in 1997[49] (figure 24). Increases in air cargo revenues helped U.S. airlines offset relatively higher fuel prices during most of this period. Since 1986, exports by U.S. surface freight carriers for transporting goods to Canada and Mexico by truck and rail also rose, with most of the revenues representing services to Canada (USDOC BEA 2001). U.S. imports (payments for freight services to foreign carriers) rose between 1986 and 2000, reflecting the strong growth in the volume of merchandise imports and higher freight rates during this period, particularly for liner vessel freight imports from Asia and tanker freight rates for most regions.

For port services, the gap between U.S. exports of maritime port and airport services narrowed between 1986 and 2000, with U.S. airports providing more exports (receipts) in 1998 before maritime port services once again increased. Airport and seaport receipts rose as increases in both the volume of goods and passengers resulted in greater port expenditures by foreign air carriers and maritime vessels. U.S. payments for port services also went up for airport services between 1986 and 2000, as a result of growth in air cargo and passenger activity (USDOC BEA 2001). Payments for airport services far exceed those for either surface or ocean modes.

[48] 1986 is the first year for which detailed services trade data are available from BEA.

[49] In 1997, U.S. air freight receipts were $4.6 billion while ocean carrier receipts were $4.5 billion.

Figure 24
Receipts and Payments for U.S. International Freight and Port Services Trade: 1986–2000



NOTE: Other carriers include truck, rail, and pipeline. Other ports include land ports for truck and rail, and payments for imports of these port services were generally less than $100 million for the time period.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, Bureau of Economic Analysis, International Accounts Data, available at http://www.bea.doc.gov/bea/di/1001serv/intlserv.htm, as of June 2002.

FACTORS OF CHANGE AND CONTINUITY

Changes in trade patterns as well as direct investment between nations have deepened trading relationships with several countries and the United States. Alterations in trade patterns, in turn, affect the choices of transportation modes used in this country. For the exports of several countries, the United States is a leading destination. This is also the case, to a lesser extent, for imports (table 31). In 2000, 64 percent of all Canadian imports originated in the United States, up slightly from 62 percent in 1991. The United States was the destination for 87 percent of all Canadian exports, up from 76 percent in 1991. Much of the trade between the United States and Canada is due to the integration of North American automotive production. The remainder of the trade is either raw or semi-processed materials (e.g., lumber and petroleum products) from Canada and the exchange of other manufactured products facilitated by strong bilateral relations and the proximity of the two countries.

During the same period, Mexico received 74 percent of its imports from the United States. In 2000, 89 percent of all Mexican merchandise exports were destined for the United States, up from 80 percent in 1991. Today, a notable share of the trade with Mexico is in automotive products and electronics that are exported to Mexico for assembly in maquiladora factories[50] and re-imported into the United States as finished products.

Between 1997 and 2000, U.S. trade with Asian Pacific countries grew, although, those countries' imports from and exports to the United States represent a smaller share of their total trade than our North American neighbors. For example, although China ranked fourth as a major U.S. trading partner in 2000, its imports from the United States accounted for only 9 percent of total Chinese imports, down from 13 percent in 1991. However, the United States was the destination for 21 percent of all Chinese exports, up from 9 percent in 1991. As U.S. exports to Asian countries grow, containerized cargo transiting West Coast ports is likely to increase, creating more demands for efficient intermodal services.

[50] Maquiladoras are manufacturing plants primarily concentrated on the northern Mexican border that specialize in assembling goods from imported components for re-export to the United States. In 2000, there were about 3,600 maquiladora manufacturing plants operating in Mexico.

Table 31
U.S. Share of Top 25 Trading Partners' Total Merchandise Imports and Exports: 1991, 1995, and 2000
(In percent)

Rank in		U.S. share of partner's imports			U.S. share of partner's exports		
2001	Country	1991	1995	2000	1991	1995	2000
1	Canada	62.3	66.7	64.4	75.8	80.4	87.4
2	Mexico	73.9	74.5	73.5	79.5	83.6	88.7
3	Japan	22.7	22.6	19.1	29.3	27.5	30.2
4	China	12.5	12.2	9.4	8.6	16.6	20.9
5	Germany	6.6	7.1	8.6	6.2	7.5	10.3
6	United Kingdom	11.6	12.2	12.3	10.9	12.2	15.8
7	Korea	23.1	22.5	19.7	25.7	19.4	22
8	Taiwan	U	U	18.0	U	U	23.5
9	France	9.5	7.5	7.4	6.2	5.8	8.7
10	Italy	5.6	4.8	5.3	6.9	7.3	10.4
11	Singapore	15.8	15.1	15.1	19.7	18.3	17.3
12	Malaysia	15.3	16.3	16.6	16.9	20.8	20.5
13	Brazil	23.2	21.2	23.1	20.2	18.9	23.8
14	Netherlands	7.8	8.9	10.2	3.9	3.6	4.4
15	Ireland	15	17.9	16.3	8.7	8.4	17
16	Hong Kong	7.6	7.7	6.8	22.7	21.8	23.3
17	Belgium[1]	4.8	5.4	7.5	3.8	3.6	5.9
18	Venezuela	47.8	42.6	36	53.5	50.5	50.8
19	Thailand	10.5	11.5	11.7	21.1	17.6	22.5
20	Israel	19.3	18.7	18.1	29.7	29.9	36.8
21	Switzerland	7.3	6.4	10.2	8.3	8.7	13.1
22	Saudi Arabia	20.2	21.4	20.7	22.8	17	17.3
23	Philippines	20.2	18.5	19.7	35.7	35.8	29.9
24	Australia	24.4	21.9	20.0	10.0	6.3	9.9
25	India	9.7	9.7	8.2	16.4	17.4	22.7

[1] 1995 data for Belgium include Luxembourg; 2000 data do not.

KEY: U = unavailable.

NOTE: U.S. share equals a nation's imports from or exports to the United States as a proportion of its imports or exports from the world. The top 25 trading partners are based on the total merchandise trade with the United States in 2001. However, 2001 data for U.S. share of countries' total trade is unavailable.

SOURCE: U.S Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, International Trade Administration, *U.S. Foreign Trade Highlights*, Table 44: U.S. Shares of Other Nations' Imports 1991–2000, available at http://www.ita.doc.gov/td/industry/otea/usfth/aggregate/h01t44.html, as of May 2002.

A major factor influencing U.S. trading relations with our partners is the outflow of U.S. direct investment abroad (USDIA) to businesses around the world and the inflow of foreign direct investment in the United States (FDIUS) from businesses located abroad.[51] Trends in both USDIA and FDIUS are important because investment by businesses could complement the flow of merchandise trade and affect transportation services carriers, such as shipping lines and airlines. Growth in USDIA and FDIUS also can result in increased intra-industry and intra-firm trade, as branch plants or supply chains are established by multinational companies.

In 2000, USDIA and FDIUS with all trading partners were nearly equal at $ 1.2 trillion, with a relatively small balance of $6 billion (table 32). Although almost identical in total value, the outflow and inflow of investments grew at different rates. Between 1997 and 2000, outgoing total USDIA grew by an average rate of 13 percent per year, while incoming investments rose at 22 percent per year. The top two partners for USDIA and FDIUS have not changed in many years. The United Kingdom remained the top country for both inflows and outflows of investments, accounting for about 19 percent in each case. Canada was the second leading destination for USDIA while Mexico ranked 10th.

In 2000, USDIA was slightly greater than FDIUS. In general, the United States invested relatively more in Latin American countries than they invested in the United States, resulting in a positive balance of investment with these countries. By contrast, European countries invested more in the United States than did the United States in Europe, resulting in a negative balance of investment with Europe (table 33). Since 1997, while the positive balance with the United Kingdom declined, the negative balance with Japan grew as Japanese businesses invested more in the United States.

[51] BEA defines USDIA as the ownership or control, directly or indirectly, by one U.S. person of 10 percent or more of the voting securities of an incorporated foreign business enterprise or the equivalent interest in an unincorporated foreign business enterprise. FDIUS is the reverse. The annual investment position data for USDIA represents the value of U.S. parent companies' equity in and net outstanding loans to their foreign affiliates, while that for FDIUS represents the value of foreign parent companies' equity in and net outstanding loans to their U.S. affiliates. The major direct investment items include capital flows (equity, intercompany debt, and reinvested earnings), income, royalties and license fees, and other services transactions.

Table 32
Top 10 Countries for U.S. Direct Investment Abroad and Foreign Direct Investment in the United States: 1997–2000
(Billions of current U.S. dollars)

Rank in 2000	Country	1997	1998	1999	2000	Percentage in 2000
U.S. direct investment abroad						
1	United Kingdom	154	183	212	233	18.8
2	Canada	97	98	111	126	10.2
3	Netherlands	69	90	106	116	9.3
4	Japan	34	41	49	56	4.5
5	Switzerland	31	38	49	55	4.4
6	Bermuda	38	42	47	54	4.3
7	Germany	41	48	51	54	4.3
8	France	37	42	40	39	3.1
9	Brazil	36	37	34	36	2.9
10	Mexico	24	27	32	35	2.8
	Total, all countries	**871**	**1,001**	**1,131**	**1,245**	**100.0**
	Europe	425	518	588	649	52.1
	Latin America and other Western Hemisphere	181	197	221	239	19.2
	Asia and Pacific	145	160	182	200	16.0
Foreign direct investment in the U.S.						
1	United Kingdom	129	137	167	230	18.5
2	Japan	125	134	153	163	13.2
3	Netherlands	85	92	126	152	12.3
4	Germany	69	93	112	123	9.9
5	France	50	60	82	119	9.6
6	Canada	65	73	77	101	8.1
7	Luxembourg	12	27	57	83	6.7
8	Switzerland	38	48	54	82	6.6
9	Sweden	11	17	21	27	2.2
10	Ireland	10	12	16	23	1.9
	Total, all countries	**682**	**778**	**966**	**1,239**	**100.0**
	Europe	429	519	670	891	71.9
	Asia and Pacific	146	154	175	194	15.7
	Latin America and other Western Hemisphere	34	28	38	43	3.4

NOTE: The Bureau of Economic Analysis defines U.S. direct investment abroad as the ownership or control, directly or indirectly, by 1 U.S. person of 10% or more of the voting securities of an incorporated foreign business enterprise or the equivalent interest in an unincorporated foreign business enterprise.

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, International Accounts Data, "U.S. Direct Investments Abroad" and "Foreign Direct Investment in the United States," available at http://www.bea.doc.gov/bea/di, as of May 2002.

Table 33
Balance of U.S. Direct Investment Abroad and Foreign Direct Investment in the United States: 1997–2000
(Billions of current U.S. dollars)

Country	1997	1998	1999	2000
Japan	–91	–93	–104	–108
France	–14	–18	–42	–80
Germany	–28	–46	–61	–69
Netherlands	–16	–2	–20	–37
Switzerland	–7	–10	–5	–27
United Kingdom	25	46	45	4
Canada	31	26	35	26
Mexico	21	25	31	33
Brazil	35	37	34	35
Bermuda	34	38	35	39
Total, all countries	**189**	**222**	**165**	**6**
Europe	–4	0	–82	–242
Latin America and other Western Hemisphere	147	169	183	197
Asia and Pacific	–1	6	7	6

NOTE: The Bureau of Economic Analysis defines U.S. direct investment abroad as the ownership or control, directly or indirectly, by 1 U.S. person of 10% or more of the voting securities of an incorporated foreign business enterprise or the equivalent interest in an unincorporated foreign business enterprise.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, Bureau of Economic Analysis, International Accounts Data, "U.S. Direct Investments Abroad" and "Foreign Direct Investment in the United States," available at http://www.bea.doc.gov/bea/di, as of May 2002.

Underlying Forces

Growth and changes in the U.S. population and economy. Two fundamental forces affecting U.S. international trade are growth and other demographic changes in the U.S. population, as well as structural changes in industrial manufacturing and distribution patterns. Over the past few decades, as the nation's population and income grew, merchandise trade and freight movements rose greatly. Shifts in age and geographic distribution, immigration, and participation in the workforce have combined to affect consumer tastes for foreign products, thus increasing the demand for traded goods and transportation services. If the U.S. population continues to grow at past rates and some of the observed shifts in geographic concentration persist, demand for transportation services can be expected to increase, affecting both local freight movements as well as longer distance flows.

Similarly as the U.S. economy expanded, public and private investments in the development of the nation's transportation infrastructure (roads, rails, waterways, and airports) helped facilitate U.S. merchandise trade. Increases in GDP made greater investment in transportation infrastructure possible and enabled industries to locate in more places while still specializing in goods for which they have a comparative advantage.[52] Public investment in the development of the nation's freight transportation system allowed regions within the United States the flexibility to engage in a diverse range of economic activities. While the U.S. transportation system expanded, the structural composition of U.S. GDP shifted toward more services and the nation's reliance on imports for manufactured goods increased. It is possible that these changes could continue to influence the volume of U.S. international trade and affect goods movement within the United States for many years to come.

Internationalization of the U.S. and world economies. Although societies have traded with each other for millennia, the pace and scale of integration of the world's economy during the past five decades may well be unparalleled in history (Dicken 1998). Today, the world economy continues to change in dramatic ways. Due in part to lower transportation costs, geographic distance no longer protects industries from international competition as much as it once may have. The global nature of much of manufacturing makes it difficult to determine if a computer is "American," a car "Japanese," or a television "Mexican." When component parts of manufactured goods are produced in multiple countries and brought together for assembly, determining the country of origin for trade purposes is a complex matter and this affects trade balances. Many expect globalization to continue to shape world economic activities, influence where and how goods are produced and distributed, and ultimately affect the transportation of goods into and out of the United States. Even if growth in the volume of freight moved were to taper off, ongoing changes in business logistics, outsourcing, and just-in-time inventory systems that characterize global production could increase the demand for more frequent and smaller shipments.

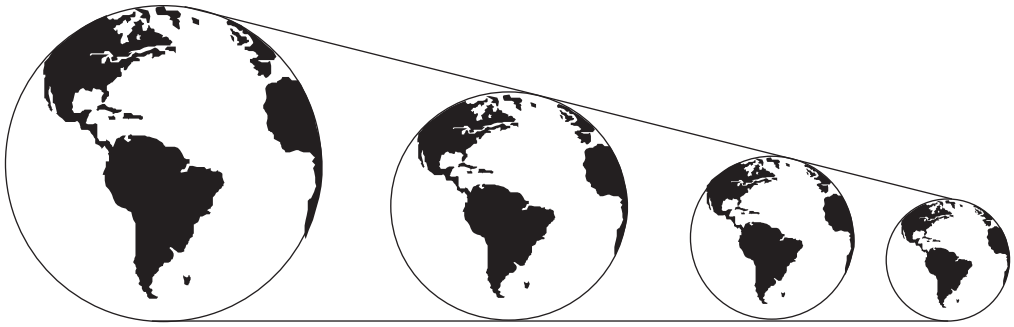
[52] Comparative advantage in trade among regions arises as trading partners seek to take advantage of differences in the costs of producing different goods and services (Krugman 1991).

Advances in transportation and telecommunications technology. Transportation and telecommunications technologies have contributed to the rapid growth of international trade and helped to overcome the resistance of space and time. They have allowed the unparalleled mobility of goods and people.

Although air and containerized cargo improved merchandise trade dramatically, earlier transportation innovations in physical infrastructure, such as suspension bridges, tunnels, railroads, the U.S. Interstate Highway System, modern airports, and marine terminals, were also critical (figure 25). Advances in both vehicles and infrastructure increased speed, reliability, and safety while reducing transportation costs and the time it takes to travel from one place to another.

For telecommunications, improvements in voice, text, and data technologies have allowed fundamental changes in services trade, including transportation services. Component parts of cars or aircraft might be designed in the United States; then the designs could be emailed to Japan, Taiwan, and Brazil for

Figure 25
Advances in Transportation Technology and the Shrinking of "Real" Distance



	1500–1840 Best average speed for horse-drawn coaches and sailing ships was 10 mph	**1850–1930** Steam locomotives averaged 65 mph and steamships averaged 36 mph	**1950s** Propeller aircraft able to fly 300–400 mph	**1960s–present** Large jet aircraft able to fly 500–700 mph
Infrastructure innovation	Trunk canals Turnpike roads	Railroads Ocean shipping	Highways Airports/airlines	Emergence of telecommunications
Vehicle innovation	Horse-powered coaches	Steam engines Steamships Railroad equipment Steel ships	Aircraft Automobiles Combustion engines Trucks Tractors	Jet engines Containerships Megaships Post-Panamax ships

SOURCE: Adapted from P. Dicken, *Global Shift: Transforming the World Economy* (New York, NY: The Guilford Press, 1998).

production; and the finished goods transported to the United States. Improvements in information technologies make it easier to seamlessly coordinate transportation operations across physically distributed transportation networks, facilitate intermodal and multimodal movements of international trade, enhance transportation solutions for freight shippers, and allow significant gains in transmitting preclearance cargo and crew information for security operations.

Changes in the international transportation market. During the past three decades, the U.S. government took several initiatives to reduce economic regulation of domestic transportation services. The deregulation legislation included the Airline Deregulation Act of 1978 for commercial aviation, the Motor Carrier Act of 1980 for interstate trucking, the Staggers Rail Act of 1980 for railroads, and the Shipping Act of 1984 and Ocean Shipping Reform Act of 1998 for ocean carriers. In most cases, the legislation spurred industry restructuring, increased productivity, and allowed U.S. transportation services providers to better compete in international freight markets (USDOT BTS 2000). In addition, changes in international regulatory structures, such as for trucking under the NAFTA motor carrier access provisions and for aviation under the "Open Skies" agreements, will continue to affect U.S. international freight movements (see box 3).

In the aviation industry, two forces influenced the changes in international regulatory structures: the reality of globalized markets and the need to better incorporate issues such as safety and environmental concerns in bilateral agreements (Lyle 1995). One effect of the internationalization of economies and markets is that air transportation services, whether passenger or cargo, can no longer be isolated within national borders. Alliances between airlines are key to maintaining international competitiveness. At the same time, nations have sought to expand the focus on safety. The existing regulatory system has

evolved from one with tight national restrictions to one that allows for bilateral "Open Skies" or the ability of air carriers to provide passenger and cargo services to and from other countries without restrictions.[53] As of October 2002, the United States had concluded Open Skies agreements with 59 countries,[54] but had yet to enter into one with the top three U.S. transportation services trade partners: Japan, Canada, and the United Kingdom.[55]

Reduction of trade barriers and liberalization of national economies. Since 1970, U.S. international trade more than quadrupled and expanded globally, in part because of substantial reductions in trade barriers resulting from changes in policy. Reduction in trade barriers was accompanied by the formation of regional economic groupings such as NAFTA, the European Union, and the MERCOSUR[56] in Latin America. As trade barriers were reduced, the relationships between national governments and businesses changed, creating economic conditions that enhanced access to global markets and resources. Significant changes that could affect the economic deregulation of international transportation services, multilateral Open Skies agreements, privatization of infrastructure, and general agreements among World Trade Organization member nations could further facilitate trade interactions.

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[53] The United States signed the first Open Skies agreement with the Netherlands in 1992 and more recently, with Jamaica in October 2002. The agreements facilitate scheduling of connecting flights, greater capacity in specific markets, and potentially lower prices and rates due to increased flight options.

[54] The United States and Uganda initialed the 57th agreement that, when formally concluded, will eliminate all restrictions on air services between the two nations (USDOT OST 2002a).

[55] The United States and Japan agreed on "all-cargo liberalization" in 1996. The United States and Canada renewed their air bilateral agreement (not an Open Skies agreement) in 1995.

[56] The MERCOSUR customs union was formed in 1995 between Argentina, Brazil, Paraguay, and Uruguay.

CONCLUSION: FREIGHT GROWTH AND CONCERNS

As U.S. international merchandise trade continues to grow, domestic transportation issues, including port access and cargo security, will need to be evaluated on a continuing basis. Landside access to U.S. ports, congestion on highways around major gateways, delays at border crossings, and environmental and community concerns may continue to affect the efficient movement of merchandise from, to, and within the United States. While the nation derives enormous benefits from international merchandise trade, increased freight traffic resulting from growth in trade could generate negative effects including air quality, noise, traffic, and safety issues, particularly for communities adjacent to major freight gateways and corridors. Also, as international trade continues its expected growth, the demand for improved intermodal access to U.S. ports will rise, particularly at containerized ports in urban areas. Issues and concerns include the condition of local roads for accessing ports, at-grade rail crossings, rail drayage time and costs, dredging and channel depths, and availability of truck-only lanes for access to ports.

Improved cargo security will also remain a daunting challenge as government and industry work together for solutions that will prevent terrorist attacks while maintaining an efficient flow of goods. Policy- and decisionmakers face several questions as they implement freight transportation security measures. For example, how will the new and evolving security requirements affect U.S. carriers and business supply chain management? What short-term impacts will industry adjustment to just-in-time and inventory management strategies have on freight volumes and flows? To what extent will industry be willing to provide the government with cargo and crew information far in advance to enhance security in this new environment? How will these measures affect demand and planning of transportation services? While the answers to these questions remain uncertain, they are likely to have major implications for U.S. international freight transportation in the short and long term.

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Appendices

Appendix A

Transportation Security and International Trade

Balancing security and international trade requirements has become a major concern of decisionmakers and private industry since the September 11, 2001, terrorist attacks. Immediately following the attacks, tightened security necessarily slowed traffic at U.S. borders, seaports, and airports. Trade flows at key transportation gateways and corridors were affected. Many private sector businesses relying on just-in-time delivery of traded goods were impacted. For example, U.S. automakers temporarily halted production at some facilities when delivery delays from Canada and Mexico disrupted their supply-chain system of maintaining low inventories (*Wall Street Journal* 2001).

The attacks highlighted how major transportation disruptions could affect manufacturers and the broader U.S. economy. During 2002, trade and freight activity levels started to recover. However, enhancing security and safety without hindering the efficient and cost-effective movement of goods and people into and out of the United States is still a challenge. Government and industry are now seeking to build on existing efforts and to develop new approaches to transportation and cargo security. A key component of this effort will be expanded information on crews and traded goods, such as the provision of advance and near real-time data.

Initial Responses to September 11, 2001

Immediately following the 2001 terrorist attacks, the many agencies with security missions implemented new and stricter procedures at U.S. ports and borders.[1] Increased scrutiny of cargo and people entering and exiting the United States was a

[1] Multiple federal agencies have responsibilities for U.S. border control and security. These include the following agencies, which will be consolidated under the new Department of Homeland Security: 1) the U.S. Customs Service, which checks cargo, vehicles, and passenger baggage at all U.S. ports of entry; 2) the U.S. Coast Guard, which polices seaports, coastlines, and waterways; 3) the Immigration and Naturalization Service, which is responsible for checking immigration documents at U.S. points of entry; and 4) the Transportation Security Administration, created in November 2001, which is in charge of security for all modes of transportation.

top focus. The U.S. Customs Service implemented intensive anti-terrorism operations under its highest alert level, particularly, providing a greater level of examination of cargo, conveyances, and passengers entering the United States. To support these efforts, additional personnel were deployed across the country and at major ports of entry. Customs also temporarily transferred about 100 inspectors from the southwestern border to the northern border (U.S Department of the Treasury 2001).

Complementing Customs' focus on cargo security, the U.S. Coast Guard focused on port and vessel security. The Coast Guard called up over 2,200 reservists to help patrol over 360 seaports and reoriented a majority of its resources to security, a focus that will remain high[2] (USDOT USCG 2001a). Coast Guard sea marshals began boarding vessels more frequently, and Port Security Units were deployed at four critical domestic ports to augment security forces. To improve information and risk analyses of vessels entering the United States, the Coast Guard started to require a 96-hour advance notice of vessel arrivals rather than just 24 hours, as well as crew and passenger lists in advance (USDOT USCG 2001b).

Air freight security was also an immediate focus. To better ensure the security of air cargo movements, the Federal Aviation Administration issued Emergency Amendment EA 109-01-01A, or the "known shipper" rule, on October 8, 2001. Under the new rule, the freight forwarder must verify the legitimacy of the shipper unless it had done business with the shipper prior to September 1, 1999, and had booked at least 24 shipments with them (BDP 2001).

The Transportation Security Administration (TSA), with security responsibility for all modes of transportation, was created through the Aviation and Transportation Security Act (Public Law 107-71), which President George W. Bush signed into law on November 19, 2001. Much of TSA's initial focus was on air security, particularly for passenger travel, as multiple deadlines were established in the Act for passenger and checked baggage screening. In addition, the Act established new provisions for air cargo, including the screening of all cargo that is not from a known shipper and the development of systems by

[2] In addition to homeland security focusing on ports and vessels, the U.S. Coast Guard also has missions in other areas, including maritime safety and mobility, national defense, and protection of natural resources.

integrated express carriers (e.g., Federal Express or United Parcel Service) for some level of screening and inspection of cargo that is transported in all-cargo aircraft. TSA also began working on enhanced cargo security initiatives for all modes of transportation.

On November 25, 2002, President George W. Bush signed into law the Homeland Security Act of 2002, creating a cabinet-level Department of Homeland Security that would integrate the government's border and security responsibilities.[3] The new department, which came into being in January 2003, will fully or partially consolidate components of the following agencies: the Coast Guard, TSA, Secret Service, Immigration and Naturalization Service, Border Patrol, U.S. Customs Service, Federal Emergency Management Agency, Animal and Plant Health Inspection Service, among others. The main missions of the new department are border and transportation security; emergency preparedness and response; chemical, biological, radiological, and nuclear countermeasures; and information analysis and infrastructure protection. One of the goals of the new department is to consolidate, coordinate, and share otherwise fragmented information, in order to better target and respond to any potential terrorist threats.

Longer Term Transportation Security Initiatives

While the September 11 terrorist attacks on the United States elicited immediate responses by the U.S. government, they also underscored the need for multifaceted strategies and initiatives in transportation security. In the area of cargo security, many of these are long-term efforts that will build on activities that were already underway prior to September 11. Others are new approaches. All will require government resources and partnerships with industry. Some of these efforts will focus on one piece of the security picture while others have broader objectives covering cargo, conveyance, and crew security. Underlying all of the initiatives, however, is the recognition that enhancements and new measures are needed to improve cargo and conveyance "visibility" (i.e., availability of information), equipment and infrastructure monitoring, and crew and staff access to secure areas.

[3] These responsibilities and missions are currently distributed across multiple agencies in several departments, including the Departments of Justice, Transportation, Agriculture, and Treasury, among others.

Cargo and Conveyance Visibility. Improving the visibility of cargo and conveyances is a critical component of improved transportation security. Visibility refers to secure access to information on goods, equipment, conveyances, and crews throughout an entire supply chain (e.g., for imports into the United States, having information about a shipment from the point of origin in a foreign country; through its loading and transport via a vessel, plane, truck, or train; to the U.S. port of entry and unlading; and finally to the U.S. point of destination). To achieve this objective, information would be required well before the foreign vessel and its goods have access to the U.S. domestic transportation system.

Several current security initiatives aim to improve cargo and conveyance visibility. Two major U.S. Customs Service programs are the Container Security Initiative (CSI) and the Customs-Trade Partnership Against Terrorism (C-TPAT). These two programs are private-public partnerships designed to secure goods from their origin at a foreign manufacturing facility through transit, until the goods arrive at U.S. ports.

The aim of the CSI plan is to establish strict screening standards at designated foreign ports for U.S.-bound shipments. Launched by the U.S. Customs Service in January 2002, one of the CSI goals is to provide U.S. authorities with more information on low-risk, prescreened cargo. One element in achieving this will be the deployment of U.S. Customs personnel at key foreign seaports to identify and prescreen U.S.-bound cargo before it is shipped to the United States.[4] Another CSI element is to provide advance cargo information for Customs' risk analysis. To support this ability, Customs issued new regulations on October 30, 2002, requiring sea carriers to provide cargo manifests 24 hours prior to the loading of the cargo in foreign ports for shipment to the United States[5] (U.S. Department of the Treasury 2002c).

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[4] On September 25, 2002, the Customs agencies of the United States and Japan signed a declaration of principle to participate in the CSI (U.S. Department of the Treasury 2002b). As of October 2002, the United States already had CSI declarations with Canada, the Netherlands, Belgium, Germany, France, Singapore, and Hong Kong. U.S. Customs is currently in discussions with several other nations.

[5] The new regulation applies to sea carriers only. Vessels carrying bulk cargo are exempt. In January 2003, Customs began holding public meetings with the trade community to discuss options for advance manifest filings for truck, rail, and air modes.

Under the C-TPAT, manufacturers, shippers, and carriers that implement secure practices can apply to U.S. Customs for fast-track cargo processing. The C-TPAT is a certification process for importers to use for their supply chains. Once the supply chain is certified, a company's low-risk cargo could move through U.S. Customs more easily[6] (U.S Department of the Treasury 2002a).

Both the CSI and C-TPAT programs underscore the need for accurate and near real-time information on internationally traded goods in order to secure a supply chain. For example, with real-time information gathered on an inbound container, including shipper, owner, origin, destination, transshipment points, carrier performance history, weight, value, commodity, and insurance, security staff will be better able to preselect shipments for physical inspection before the cargo arrives at a U.S. port. If the network from shipper to consignee is secure and Customs receives information about the inbound cargo far in advance, then less time could be spent inspecting these shipments and more time could be focused on higher risk freight.

An initiative on the U.S.-Canadian border, Free and Secure Trade (FAST), is also intended to improve cargo and conveyance visibility to security officials so that low-risk goods transported by truck can move efficiently between the United States and Canada. FAST is part of the Smart Border initiative between Canada and the United States begun in December 2001. Under the FAST program, motor carriers, importers, and truck drivers in both countries register with their governments and provide advance notice of the goods they intend to transport. Once Customs agents in each country have determined the safety of each shipment, the trucks can cross the border in special lanes, thereby reducing delay times at the major land ports (White House 2002).

Equipment and Infrastructure Monitoring. A key component of many security initiatives is enhanced equipment and infrastructure monitoring. Since a great deal of U.S. international trade is transported in containers, much attention is

[6] As of July 9, 2002, more than 230 importers had agreed to participate in the program, and by August 26, 2002, the U.S. Customs Service had begun accepting applications for C-TPAT certification. Applications are currently accepted from importers, brokers, freight forwarders, and nonvessel-operating common carriers. In January 2003, U.S. Customs began to expand C-TPAT to include port authorities, terminal and warehouse operators, and manufacturers.

focused on the implementation of electronic, real-time tracking of containers and the creation of tamper-resistant seals. In addition, the deployment of sensors to detect potentially toxic and/or explosive cargo is another focus. A challenge is to develop technologies that are not cost prohibitive for shippers and carriers, while maintaining equipment security. Another objective in this area is to further develop and implement technologies to facilitate improved security during the container loading process. For example, a range of new software is available with the potential to aid in the development of a secure loading plan or to check the hazardous materials compatibility of various cargoes.

One initiative focused on equipment and cargo monitoring is Operation Safe Commerce (OSC), a partnership between multiple federal agencies and the private sector. Its purpose is to explore commercially viable options that support cargo management systems that keep pace with expanding trade while protecting international shipments from a variety of threats. One of the objectives of the project is to develop procedures, practices, and technologies that help secure and monitor containers and cargo from point of origin to final destination. In August 2002, a pilot test of phase one of OSC was conducted with a focus on container tracking and effective security seals. Subsequent phases of the project are under development, including implementation of a supply chain grant program for the ports of Los Angeles, Long Beach, Seattle, Tacoma, and New York-New Jersey. The focus of the grant program is to develop approaches and technologies that will demonstrate a secure supply chain for international trade transactions. Persons and entities representing components of the international trade supply chain submit grant proposals and seek funding through these ports under the OSC program (USDOT TSA 2002).

Crew and Staff Access. A major component of new security enhancement plans is limiting access to cargo and conveyances to qualified and authorized personnel. This includes the development of standards for personnel for all system participants ranging from customs officials to crewmembers and third-party forwarders, both in the United States and abroad. Information and data would again play a central role, facilitating detailed background checks and providing officials with data points for risk analyses. Once staff members and crew are screened, their

access to sensitive cargo could be further controlled through identification technologies such as biometric retinal and iris scans, hand geometry, facial recognition, voice recognition, or dynamic signatures.

TSA is implementing a new Ports Security Grants Program to finance security enhancements at major seaports in the United States. The bulk of the over $90 million in grants will go to 77 seaports for increasing operational security, including facility access control and crew security. The grants also cover the development of security assessments and mitigation strategies for port and terminal security (USDOT OST 2002).

Cargo Security Initiatives

Security focus	Proposed enhancement measures
Cargo and conveyance visibility	- Tag cargo with trackable, electronic seals at loading points - Businesses create and implement processes to secure the supply chain - Foreign and U.S. officials screen U.S.-bound containers at select foreign ports - Provide U.S. officials with access to a multiagency information and intelligence database to identify low- and high-risk entries - Exchange trade data among countries for national security purposes
Equipment and infrastructure monitoring	- Implement electronic, real-time tracking of containers and vessels to determine which demand further attention - Install sensors to detect potentially toxic and/or explosive cargo
Crew and staff access	- Make historical data on shippers, passengers, and crew available to authorities through databases - Deploy advance passenger and crew screening systems - Use biometric identifiers to grant access to precleared, low-risk individuals - Use smart seals that provide electronic notification to indicate and deter cargo tampering

Future Security and Trade Flows

Balancing security requirements with the need for efficient and effective international freight flows will be a continuing challenge for the country as a whole and for the U.S. transportation system. The United States shares a 5,525-mile border with Canada, a 1,989-mile border with Mexico, and has 95,000 miles of open shoreline and navigable waterways. The task of fully

securing this physical boundary is compounded by the millions of people, hundreds of thousands of vehicles, aircraft, and vessels, and millions of containers carrying freight that enter the United States annually.

The U.S. domestic transportation network is changing in response to these evolving security and trade requirements. The exact implications of these changes for freight are, as yet, unknown. For example, if delivery times are delayed, will globally sourced companies rely more on domestic suppliers? Will companies begin to hold more inventories, thereby affecting the demand for transportation services? It is clear that initiatives focused on improved technology and information will be essential in this new trade and security environment. However, the exact balance between the flow of international goods and necessary security requirements will continue to evolve and new strategies seeking to improve this balance will continue to be sought.

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Appendix B

International Trade and Transportation: Data Issues and Challenges

International trade and transportation data are important to government and private sectors alike. These data are used for many purposes, including security analyses, trade corridor studies, transportation infrastructure planning, and marketing and logistics plans, to cite a few.

In the United States, multiple agencies are involved in the collection, processing, and dissemination of international trade and transportation data. No one dataset provides all information requirements needed by the transportation community and multiple sources were used for this report. The integration of these different data sources helps provide a more complete picture of U.S. international trade and transportation flows and trends. Several challenges arise when using multiple data sources, including variations in accuracy, reliability, time series, and data field definitions.

Merchandise Trade Statistics

The transportation community relies on merchandise trade statistics to perform a wide variety of multimodal transportation and trade data analyses. U.S. merchandise trade statistics are processed and released by the U.S. Census Bureau, Foreign Trade Division. Census-based merchandise trade data are captured as a result of international trade filing requirements of the Departments of Commerce and the Treasury, and primarily reflect information filed by shippers or their representatives rather than carriers. The U.S. Customs Service collects these documents at the port of entry or exit unless the information is filed electronically using the Automated Broker Interface (ABI) on imports or the Automated Export System (AES) on exports.

The Census Bureau releases overall merchandise trade and transportation statistics that include data elements on value, commodity, weight, country of origin and destination, U.S. port, and so forth. Other agencies obtain special extractions and tabulations

from the Census Bureau, and then perform additional quality assurance reviews and analyses for their own purposes and to meet the needs of their own customers. These include: North American land trade data (released to the Bureau of Transportation Statistics and disseminated as the Transborder Surface Freight Data); U.S. international maritime trade data (released to the Maritime Administration and the U.S. Army Corps of Engineers and disseminated in multiple formats); U.S. transportation-related goods data and overall trade data (released to the Bureau of Economic Analysis and disseminated in multiple formats, including balance of payments information).

Several challenges exist with Census-based merchandise trade statistics. Specifically, the absence of actual shipping weight measurements for surface exports is a critical problem in U.S. international trade data. Weight data are currently only collected for imports, due to the reporting requirements of the Census Bureau and the U.S. Customs Service.

Another key issue is acquiring reliable data on the domestic origin and destination of international trade. Origin-destination data may not always be reported correctly for a number of reasons. For example, Census requires the reporting of the state of origin for U.S. export shipments, which is supposed to be the physical location of origin for the export shipments. Reporting errors can occur, as intermediaries (e.g., freight forwarders or logistics providers) often complete the documentation for a particular shipment, and may not know the physical flow and geography of the goods. These intermediaries sometimes list their headquarters location as the point of origin or specify the location of the port of exit, which is not always where the goods began their journey. This occurs most frequently for data covering exports of farm products, minerals, and other bulk commodities.

Another key data gap in Census-based merchandise trade statistics is the lack of intermodal data. Internationally traded goods are commonly transported by more than one mode from origin to final destination. In merchandise trade statistics, the export mode of transportation is defined as the mode used when the U.S. international border is crossed. On the import side, the mode of transportation is defined as the last mode used when the freight was transported to the U.S. port of clearance or entry. Because of these reporting requirements, merchandise

trade statistics do not distinguish goods moved by intermodal combinations.

Yet another challenge with Census-based merchandise trade statistics is the accuracy of port statistics and the inability to identify the actual port or physical infrastructure of entry or exit. In some cases, the reported port is the customs district and port of duty filing, not the physical location of the port of entry or exit as defined in the regulation requirements. Electronic filing has increased the number of administrative port filings, thus reducing the ability to accurately ascertain where goods are physically entering and exiting the United States

Other Trade and Transportation Sources

Special studies, as well as other carrier-based sources, supplement Census-based merchandise trade statistics. These include: the BTS Office of Airline Information (OAI), the *Journal of Commerce's* Port Import Export Reporting Service (PIERS), and others. OAI air freight data is based on regulatory filing requirements for market and financial data from U.S. and foreign carriers operating in the United States. The PIERS database provides maritime trade statistics, based on information collected from vessel manifests, for maritime cargo entering and exiting the United States. Each of these sources, as with Census-based trade statistics, has its own gaps and limitations, and must be adequately assessed when linking multiple sources for analysis.

New Initiatives in International Trade and Transportation Data

Despite these limitations, strides are being made to improve future trade and transportation data. The U.S. Customs Service, in partnership with other federal agencies, is currently working to modernize its entire data-collection system through the development of the Automated Commercial Environment (ACE). This will replace the Automated Commercial System (ACS), which is comprised of the ABI and AES. Once in place, the new ACE system should increase functionality, streamline processes, and generate significant government and trade benefits. The goal of the ACE is to reduce processing loads, lower operating expenses, and focus efforts on risk analysis.

In conjunction with the ACE, the International Trade Data System (ITDS)—a federal information technology initiative led by the U.S. Customs Service—seeks to provide an integrated, governmentwide system for the electronic collection, use, and dissemination of both shipper- and carrier-based international trade and transportation data. An expected benefit will be more timely data availability. Federal operational and statistical agencies may have near real-time access to filings, which could shorten the overall time it takes to release reports and data. In addition, the ITDS will provide a broader set of more accurate data elements, because information will now be filed electronically by both shippers and carriers and then linked by a unique shipment identifier.

Appendix C

Statistical Tables

Table C-1
Value and Tonnage of U.S. Freight Shipments: 1997 and 2001

	1997		2001[1]	
	Value (billion $)	Tons (millions)	Value (billion $)	Tons (millions)
Domestic	6,742	12,925	8,265	14,603
Exports	688	554	731	481
Imports	870	1,007	1,142	1,162
Total	**8,300**	**14,486**	**10,138**	**16,246**
Shares	**Percent**		**Percent**	
Domestic	81.2	89.2	81.5	89.9
Exports	8.3	3.8	7.2	3.0
Imports	10.5	7.0	11.3	7.2
Total	**100.0**	**100.0**	**100.0**	**100.0**

[1] 2001 value and weight for exports and imports are official U.S. trade statistics. The **value** for 2001 domestic shipments is a projection from the 1997 Commodity Flow Suvey (CFS) data, based on the annual average growth rate of current U.S. gross domestic product (GDP) (5.2%) between 1997 and 2001. The **tonnage** for 2001 domestic shipments is a projection from 1997 CFS data, based on the annual average growth rate of domestic freight movements (3.4%) between 1993–1997, adjusted for the variation in GDP growth rate between 1993–1997 (5.8%) and 1997–2001 (5.2%).

The 2001 projections are subject to uncertainties, because they assume freight grew at an annual rate similar to GDP. Also, because the CFS is a survey, the data are subject to sampling and nonsampling errors.

NOTES: The 1997 domestic figures are estimates based on the CFS minus export shipments. CFS data published in other BTS publications include exports.

SOURCES: **Domestic data**—U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics (BTS), 1997 Commodity Flow Survey data. **Export and import data**—USDOT BTS, Transborder Surface Freight Data; and U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Exports and Imports of Merchandise CD,* December 1997 and 2001.

Table C-2
U.S. International Merchandise Trade and Real Gross Domestic Product (GDP): 1990–2001
(Billions of chained 1996 dollars)

	Real GDP	Total trade	Annual change in GDP (%)	Annual change in trade (%)
1990	6,708	891	1.8	5.3
1991	6,676	919	–0.5	3.1
1992	6,880	994	3.0	8.1
1993	7,063	1,062	2.7	6.9
1994	7,348	1,186	4.0	11.7
1995	7,544	1,308	2.7	10.3
1996	7,813	1,427	3.6	9.1
1997	8,160	1,631	4.4	14.3
1998	8,509	1,754	4.3	7.5
1999	8,857	1,911	4.1	8.9
2000	9,224	2,152	4.1	12.6
2001	9,334	2,068	1.2	–3.9
Percentage change, 1990–2001	**39.1**	**132.1**		
Average annual growth rate	3.0	8.0		

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Accounts, available at http://www.bea.doc.gov/bea/dn1.htm, as of August 2002.

Table C-3
U.S. International Merchandise Trade and Gross Domestic Product (GDP) : 1970–2001

	Current dollars (billions)		Indexed 1970 = 100		Chained 1996 dollars (billions)		Indexed 1987 = 100	
	GDP	Total merch. trade[1]	GDP	Total merch. trade	Real GDP	Real total merch. trade	Real GDP	Real total merch. trade
1970	1,040	85	100	100	3,578	U	59	U
1971	1,129	92	109	108	3,698	U	60	U
1972	1,240	109	119	127	3,898	U	64	U
1973	1,386	146	133	171	4,123	U	67	U
1974	1,501	206	144	241	4,099	U	67	U
1975	1,635	209	157	244	4,084	U	67	U
1976	1,824	242	175	284	4,312	U	71	U
1977	2,031	276	195	324	4,512	U	74	U
1978	2,296	323	221	378	4,761	U	78	U
1979	2,566	397	247	465	4,912	U	80	U
1980	2,796	474	269	556	4,901	U	80	U
1981	3,131	507	301	594	5,021	U	82	U
1982	3,259	466	313	545	4,919	U	80	U
1983	3,535	480	340	562	5,132	U	84	U
1984	3,933	562	378	658	5,505	U	90	U
1985	4,213	566	405	662	5,717	U	94	U
1986	4,453	596	428	698	5,912	U	97	U
1987	4,743	672	456	787	6,113	717	100	100
1988	5,108	778	491	911	6,368	787	104	110
1989	5,489	856	528	1,003	6,592	847	108	118
1990	5,803	907	558	1,061	6,708	891	110	124
1991	5,986	927	576	1,086	6,676	919	109	128
1992	6,319	994	608	1,163	6,880	994	113	139
1993	6,642	1,053	639	1,232	7,063	1,062	116	148
1994	7,054	1,186	678	1,389	7,348	1,186	120	165
1995	7,401	1,341	712	1,571	7,544	1,308	123	182
1996	7,813	1,427	751	1,671	7,813	1,427	128	199
1997	8,318	1,574	800	1,843	8,160	1,631	133	227
1998	8,782	1,611	845	1,887	8,509	1,754	139	245
1999	9,269	1,745	891	2,044	8,857	1,911	145	266
2000	9,873	2,031	950	2,378	9,224	2,152	151	300
2001	10,208	1,910	982	2,236	9,334	2,068	153	288

[1] Bureau of Economic Analysis (BEA) data for overall U.S. trade in current dollars will differ from figures reported by the U.S. Census Bureau, due to BEA adjustments in the data.

NOTE: U = data are unavailable.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Account, available at http://www.bea.doc.gov/bea/dn1.htm, as of August 2002.

Table C-4
U.S. Merchandise Trade and Production of Tradable Goods in Gross Domestic Product (GDP): 1970–2000
(Billions of dollars)

		GDP by sector[1]				Merchandise trade			Trade as share of GDP (percent)		
Year	Total GDP	Agriculture, forestry, & fishing	Mining	Manufac-turing	Total production of tradable goods	Merch. goods exports	Merch. goods imports	Total merch. goods (imports & exports)	Total merch. trade as % of GDP	Merch. exports as % of GDP	Merch. exports as % of goods production
Current $											
1970	1,040	30	19	250	299	45	41	85	8	4	15
1971	1,129	32	19	263	314	46	47	92	8	4	15
1972	1,240	37	20	290	348	52	57	109	9	4	15
1973	1,386	55	24	322	401	74	72	146	11	5	18
1974	1,501	53	37	337	427	101	105	206	14	7	24
1975	1,635	55	43	355	452	110	99	209	13	7	24
1976	1,824	54	48	406	507	118	125	242	13	6	23
1977	2,031	54	54	463	571	124	153	276	14	6	22
1978	2,296	63	62	518	642	145	177	323	14	6	23
1979	2,566	75	71	571	717	184	213	397	15	7	26
1980	2,796	67	113	587	767	226	249	474	17	8	29
1981	3,131	81	153	652	886	239	268	507	16	8	27
1982	3,259	77	150	651	878	215	251	466	14	7	24
1983	3,535	63	129	693	885	207	273	480	14	6	23
1984	3,933	84	136	783	1,002	226	336	562	14	6	23
1985	4,213	85	135	804	1,024	222	343	566	13	5	22
1986	4,453	82	88	829	1,000	226	370	596	13	5	23
1987	4,742	89	92	889	1,070	258	415	672	14	5	24
1988	5,108	89	99	980	1,168	326	452	778	15	6	28
1989	5,489	102	97	1,018	1,217	372	485	856	16	7	31
1990	5,803	108	112	1,041	1,261	399	508	907	16	7	32
1991	5,986	103	97	1,044	1,243	426	501	927	15	7	34
1992	6,319	112	88	1,082	1,281	449	545	994	16	7	35
1993	6,642	108	88	1,131	1,328	460	593	1,053	16	7	35
1994	7,054	118	90	1,223	1,432	510	677	1,186	17	7	36
1995	7,401	110	96	1,289	1,495	584	758	1,341	18	8	39
1996	7,813	130	113	1,316	1,560	618	808	1,427	18	8	40
1997	8,318	130	119	1,380	1,629	689	885	1,574	19	8	42
1998	8,782	128	100	1,431	1,660	681	930	1,611	18	8	41
1999	9,269	127	103	1,497	1,727	698	1,047	1,745	19	8	40
2000	9,873	136	127	1,567	1,829	786	1,245	2,031	21	8	43

[1] Industry groups based on 1987 Standard Industrial Classification. Bureau of Economic Analysis (BEA) data for overall U.S. trade in current dollars will differ from figures reported by the U.S. Census Bureau, due to BEA adjustments in the data.

(Table C-4 continued on next page)

(Table C-4 continued)

		GDP by sector[1]				Merchandise trade			Trade as share of GDP (percent)		
Year	Total GDP	Agriculture, forestry, & fishing	Mining	Manufac-turing	Total production of tradable goods	Merch. goods exports	Merch. goods imports	Total merch. goods (imports & exports)	Total merch. trade as % of GDP	Merch. exports as % of GDP	Merch. exports as % of goods production
Chained 1996 $[2]											
1987	6,113	110	99	1,046	1,255	271	446	717	12	4	22
1988	6,368	101	115	1,120	1,336	323	464	787	12	5	24
1989	6,592	111	103	1,112	1,326	363	483	847	13	6	27
1990	6,708	119	106	1,102	1,327	393	498	891	13	6	30
1991	6,676	121	101	1,066	1,289	421	498	919	14	6	33
1992	6,880	131	96	1,085	1,311	450	544	994	14	7	34
1993	7,063	123	101	1,123	1,347	463	598	1,062	15	7	34
1994	7,348	136	108	1,206	1,450	508	678	1,186	16	7	35
1995	7,544	123	113	1,285	1,521	569	739	1,308	17	8	37
1996	7,813	130	113	1,316	1,560	618	808	1,427	18	8	40
1997	8,159	144	117	1,387	1,648	708	923	1,631	20	9	43
1998	8,509	145	120	1,444	1,710	723	1,031	1,754	21	8	42
1999	8,857	153	112	1,532	1,797	751	1,159	1,911	22	8	42
2000	9,224	166	95	1,595	1,856	836	1,316	2,152	23	9	45

[2] 1987 is the earliest year for which the U.S. Department of Commerce, Bureau of Economic Analysis reports total merchandise trade figures adjusted for inflation in chained 1996 dollars.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Account (NIPA), available at http://www.bea.doc.gov/bea/dn1.htm, as of August 2002.

Table C-5
U.S. International Merchandise Trade by World Regions: 2001

	Total		Exports		Imports	
World regions	**Billion $**	**Percent**	**Billion $**	**Percent**	**Billion $**	**Percent**
Asia	**637**	**34.0**	**199**	**27.2**	**438**	**38.3**
Pacific Rim	439	23.4	131	17.9	308	27.0
Southeast and Southwest Asia	142	7.6	49	6.7	93	8.2
Middle East	56	3.0	19	2.6	36	3.2
Western Hemisphere	**738**	**39.4**	**323**	**44.2**	**415**	**36.3**
North America	612	32.7	265	36.2	348	30.4
Central and South America	106	5.6	48	6.5	58	5.1
Caribbean	20	1.1	11	1.5	9	0.8
Other Western Hemisphere[1]	1	0.04	1	0.1	<1	0.01
Europe	**435**	**23.2**	**182**	**24.8**	**254**	**22.2**
Western Europe	414	22.1	175	23.9	239	21.0
Eastern Europe	21	1.1	7	0.9	14	1.3
Africa	**38**	**2.0**	**12**	**1.7**	**25**	**2.2**
Australia and Oceania[2]	**22**	**1.2**	**13**	**1.8**	**9**	**0.8**
World total	**1,873**	**100.0**	**731**	**100.0**	**1,142**	**100.0**

[1] Includes Bermuda, Cuba, the Falkland Islands, French Guiana, Greenland, Guadalupe, Martinique, St. Pierre, and Miquelon Island.

[2] Includes New Zealand.

NOTE: The regional figures do not sum to the world total due to rounding.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. International Trade Administration, *U.S. Foreign Trade Highlights*, available at http://www.ita.doc.gov/td/industry/otea/usfth/tabcon.html, as of October 2002.

Table C-6
Value of U.S. International Merchandise Trade by Mode of Transportation: 2000 and 2001
(Millions of dollars)

Mode	2000	2001	Percentage change, 2000–2001
Imports and exports			
Water	739,963	718,448	–2.9
Air	592,999	518,602	–12.5
Truck	428,700	395,425	–7.8
Rail	94,198	92,617	–1.7
Pipeline	23,592	26,428	12.0
Other and unknown	117,855	121,466	3.1
Total	**1,997,306**	**1,872,985**	**–6.2**
U.S. imports			
Water	540,895	519,607	–3.9
Air	308,642	267,107	–13.5
Truck	216,485	203,507	–6.0
Rail	70,755	69,255	–2.1
Pipeline	23,129	25,910	12.0
Other and unknown	56,982	56,573	–0.7
Total	**1,216,888**	**1,141,959**	**–6.2**
U.S. exports			
Water	199,069	198,841	–0.1
Air	284,356	251,494	–11.6
Truck	212,215	191,918	–9.6
Rail	23,442	23,362	–0.3
Pipeline	463	517	11.7
Other and unknown	60,873	64,894	6.6
Total	**780,419**	**731,026**	**–6.3**

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, May 2002; based on: **total, water, and air data**—U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Exports of Merchandise CD* and *U.S. Imports of Merchandise CD*, December 2001; **truck, rail, pipeline, and other and unknown data**—U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, 2001; and special tabulations.

Table C-7
Top 25 U.S. Maritime Trade Partners by Value and Weight: 2001

RANKED BY TOTAL VALUE

		Value of maritime trade (millions of $)				Value per short ton ($)		
Rank	Country	Total	Imports	Exports	Balance	Total	Imports	Exports
1	Japan	115,204	89,027	26,177	–62,850	1,675	6,794	470
2	China	96,277	86,714	9,562	–77,152	1,825	2,535	515
3	Germany	42,067	33,625	8,442	–25,183	2,834	3,342	1,764
4	South Korea	30,819	21,125	9,694	–11,431	1,064	1,863	550
5	United Kingdom	26,214	15,927	10,287	–5,640	846	701	1,244
6	Taiwan	25,160	18,338	6,822	–11,516	1,274	3,015	499
7	Mexico	20,148	14,272	5,877	–8,395	165	148	234
8	Venezuela	19,413	15,102	4,310	–10,792	164	133	865
9	Brazil	17,157	9,652	7,505	–2,147	462	355	755
10	Saudi Arabia	16,865	13,215	3,650	–9,565	178	144	1,252
11	Italy	15,940	12,392	3,548	–8,844	759	1,437	287
12	France	12,974	8,855	4,119	–4,735	1,105	1,394	765
13	Thailand	12,631	10,425	2,206	–8,219	1,045	1,219	623
14	Netherlands	12,507	5,000	7,507	2,507	618	765	547
15	Belgium	11,593	4,604	6,989	2,385	814	775	842
16	Hong Kong	11,153	6,116	5,037	–1,079	2,594	6,917	1,475
17	Indonesia	10,658	8,693	1,966	–6,727	759	1,044	344
18	Australia	10,466	4,793	5,673	880	839	512	1,824
19	Malaysia	10,361	8,642	1,720	–6,922	1,448	1,673	863
20	Canada	9,180	6,279	2,900	–3,379	100	104	90
21	Nigeria	9,036	8,295	741	–7,554	182	174	357
22	Dominican Republic	7,268	3,523	3,745	222	1,395	2,382	1,004
23	Singapore	7,043	2,977	4,066	1,089	1,032	2,394	729
24	India	7,007	5,441	1,566	–3,875	1,119	1,452	622
25	Spain	6,890	3,718	3,173	–545	421	568	323
	Total, all countries	**718,448**	**519,607**	**198,841**	**–320,766**	**563**	**568**	**551**

(Table C-7 continued on next page)

(Table C-7 continued)

RANKED BY TOTAL WEIGHT

Rank	Country	Value of maritime trade (millions of $)				Value per short ton ($)		
		Total	Imports	Exports	Balance	Total	Imports	Exports
1	Mexico	121,786	96,689	25,097	–71,592	165	148	234
2	Venezuela	118,204	113,224	4,980	–108,243	164	133	865
3	Saudi Arabia	94,906	91,992	2,914	–89,078	178	144	1,252
4	Canada	92,151	60,091	32,059	–28,032	100	104	90
5	Japan	68,778	13,104	55,674	42,570	1,675	6,794	470
6	China	52,767	34,207	18,560	–15,646	1,825	2,535	515
7	Nigeria	49,750	47,673	2,077	–45,595	182	174	357
8	Iraq	42,621	42,531	91	–42,440	136	136	441
9	Brazil	37,163	27,216	9,947	–17,269	462	355	755
10	Colombia	36,533	32,021	4,512	–27,510	178	139	453
11	United Kingdom	30,994	22,725	8,269	–14,456	846	701	1,244
12	South Korea	28,966	11,340	17,626	6,286	1,064	1,863	550
13	Norway	21,864	21,418	446	–20,972	226	206	1,172
14	Italy	21,004	8,624	12,381	3,757	759	1,437	287
15	Netherlands	20,251	6,535	13,716	7,181	618	765	547
16	Taiwan	19,754	6,081	13,672	7,591	1,274	3,015	499
17	Angola	18,634	18,507	126	–18,381	173	164	1,563
18	Algeria	18,289	16,090	2,199	–13,892	184	166	313
19	Trinidad and Tobago	17,582	16,719	863	–15,856	181	139	983
20	Spain	16,378	6,541	9,837	3,296	421	568	323
21	Kuwait	15,109	14,889	220	–14,669	174	128	3,272
22	Germany	14,846	10,061	4,785	–5,276	2,834	3,342	1,764
23	Belgium	14,239	5,939	8,300	2,360	814	775	842
24	Indonesia	14,041	8,327	5,715	–2,612	759	1,044	344
25	Russia	12,832	10,868	1,964	–8,903	497	397	1,048
	Total, all countries	**1,275,909**	**915,079**	**360,830**	**–554,249**	**563**	**568**	**551**

SOURCES: U.S. Department of Transporation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *U.S. Exports of Merchandise CD* and *U.S. Imports of Merchandise CD*, December 2001.

Table C-8
Total Monthly Maritime Container Entries into the United States: 1998–2001

	1998	1999	2000	2001	Monthly % change, 2000–2001
January	408	276	463	515	11.2
February	393	303	456	528	16.0
March	474	303	492	484	–1.7
April	489	325	466	462	–0.8
May	447	426	461	481	4.3
June	450	426	470	416	–11.6
July	463	544	514	486	–5.6
August	492	496	517	471	–8.9
September	289	630	531	432	–18.6
October	312	500	552	462	–16.2
November	293	499	526	401	–23.7
December	308	466	526	444	–15.7
Total	**4,817**	**5,195**	**5,974**	**5,582**	**–6.6**

NOTE: Includes full and empty vessel containers.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, April 2002; based on U.S. Department of Treasury, U.S. Customs Service, Mission Support Services, Office of Field Operations, *Operations Management Database CD*.

Table C-9
Top 20 Fastest Growing U.S. Gateways for International Air Freight by Weight: 1990–2000
(Short tons)

Rank in 1990[1]	Rank in 2000[1]	Airport	1990	2000	Annual growth rate, 1990–2000 (%)
48	9	Memphis, TN	14	198,630	160.1
49	38	Laredo, TX	9	9,809	101.3
45	25	Indianapolis, IN	65	27,922	83.4
47	40	Phoenix, AZ	23	8,713	81.1
46	41	Toledo, OH	26	8,614	78.7
40	29	Oakland, CA	209	19,956	57.8
44	46	Austin, TX	68	5,732	55.8
41	39	San Jose, CA	149	9,625	51.7
42	44	El Paso, TX	139	6,402	46.7
39	36	Detroit Willow Run Airport, MI	254	11,176	46.0
43	49	Las Vegas, NV	113	4,934	45.9
37	26	Louisville, KY	842	26,442	41.2
36	35	Houston Ellington Field, TX	1,073	13,178	28.5
27	20	Huntsville/Decatur, AL	6,167	64,253	26.4
38	47	Pago Pago, Samoa	559	5,428	25.5
26	21	Cincinnati, OH	7,517	57,914	22.7
19	14	Philadelphia, PA	18,041	124,317	21.3
17	10	Fairbanks, AK	27,351	175,186	20.4
35	33	Pittsburgh, PA	2,235	13,602	19.8
11	7	Newark, NJ	74,627	353,066	16.8
		Total U.S. international freight	**4,357,583**	**8,428,478**	**6.8**

[1] Airports are ranked by annual growth rate.

NOTE: These data are based on nonstop bidirectional air trade by U.S. and foreign carriers by weight between the United States and other countries and as such, will differ from U.S. Census Bureau international air freight weight data.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information data, May 2002.

Table C-10
U.S. Air Transportation Freight Operating Revenues: 1980–2001

	Current $ in millions			Real 1996 $ in millions		
	Domestic	International	Total	Domestic	International	Total
1980	1,614	1,036	2,650	2,829	1,816	4,645
1981	1,695	1,009	2,704	2,718	1,618	4,335
1982	1,547	1,015	2,562	2,335	1,532	3,867
1983	1,654	1,022	2,676	2,402	1,484	3,886
1984	1,786	1,196	2,982	2,500	1,674	4,174
1985	1,659	1,159	2,818	2,251	1,573	3,824
1986	4,363	1,479	5,842	5,793	1,964	7,756
1987	5,019	1,816	6,835	6,469	2,341	8,810
1988	5,879	2,190	8,069	7,329	2,730	10,059
1989	5,478	2,464	7,942	6,579	2,959	9,538
1990	4,352	2,645	6,997	5,029	3,057	8,086
1991	4,564	3,184	7,748	5,090	3,551	8,642
1992	4,743	3,027	7,770	5,164	3,296	8,459
1993	5,357	3,269	8,626	5,696	3,476	9,172
1994	5,943	3,651	9,594	6,190	3,803	9,993
1995	6,638	4,042	10,680	6,767	4,120	10,887
1996	7,123	4,711	11,834	7,123	4,711	11,834
1997	7,596	5,212	12,808	7,451	5,112	12,563
1998	7,816	5,327	13,143	7,574	5,162	12,735
1999	8,171	5,968	14,139	7,807	5,702	13,509
2000	8,776	6,324	15,100	8,199	5,908	14,107
2001	8,087	6,366	14,453	7,395	5,821	13,216

NOTE: Data reflect only U.S. air carriers.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information data, May 2002.

Table C-11
U.S. Total Merchandise Trade with Canada and Mexico by Mode: 2001

TOTAL NAFTA TRADE

Mode	Value (U.S. million $)	Weight (short tons)	Value to weight ratio
Truck	395,425	180,443,036	2,191
Rail	92,617	97,304,192	952
Pipeline	26,428	79,303,348	333
Air	36,996	465,362	79,499
Water	29,328	213,932,666	137
Other and unknown	32,843	1,019,752	32,207
Total	**613,635**	**572,468,357**	**1,072**

TRADE WITH CANADA

Mode	Value (U.S. million $)	Weight (short tons)	Value to weight ratio
Truck	234,824	138,572,490	1,695
Rail	60,171	84,945,768	708
Pipeline	26,130	76,025,236	344
Air	24,999	327,016	76,445
Water	9,180	92,148,977	100
Other and unknown	25,390	628,518	40,397
Total	**380,693**	**392,648,004**	**970**

TRADE WITH MEXICO

Mode	Value (U.S. million $)	Weight (short tons)	Value to weight ratio
Truck	160,600	41,870,546	3,836
Rail	32,446	12,358,424	2,625
Pipeline	298	3,278,112	91
Air	11,997	138,347	86,717
Water	20,148	121,783,690	165
Other and unknown	7,452	391,234	19,049
Total	**232,942**	**179,820,352**	**1,295**

NOTES: Other includes "flyaway aircraft" (i.e., aircraft moving from the manufacturer to a customer and not carrying any freight), vessels moving under their own power, pedestrians carrying freight, and miscellaneous.
Shipments that neither originate nor terminate in the United States (i.e., in-transit shipments) are not included here, although they use the U.S. transportation system. These shipments are usually part of Mexico-Canada trade and simply pass through the United States. Merchandise trade data exclude export shipments valued at less than $2,500 and import shipments valued at less than $1,250. Individual modal totals may not sum to exact export or import totals due to rounding.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, May 2002; based on: **total trade, air, and water**—U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *FT920 U.S. Merchandise Trade* (Washington, DC: 2001); **all land modes**—U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, January 2002.

Table C-12
U.S. Merchandise Imports from Canada and Mexico by Mode: 2001

TOTAL NAFTA IMPORTS

Mode	Value (U.S. million $)	Weight (short tons)	Value to weight ratio
Truck	203,507	91,639,312	2,221
Rail	69,255	75,032,793	923
Pipeline	25,910	75,399,107	344
Air	15,127	138,614	109,131
Water	20,551	156,777,660	131
Other and unknown	14,052	443,131	31,710
Total	**348,402**	**399,430,616**	**872**

IMPORTS FROM CANADA

Mode	Value (U.S. million $)	Weight (short tons)	Value to weight ratio
Truck	117,130	69,119,663	1,695
Rail	47,198	66,631,589	708
Pipeline	25,908	75,381,271	344
Air	9,836	76,617	128,379
Water	6,279	60,090,216	104
Other and unknown	10,617	262,819	40,397
Total	**216,969**	**271,562,176**	**799**

IMPORTS FROM MEXICO

Mode	Value (U.S. million $)	Weight (short tons)	Value to weight ratio
Truck	86,377	22,519,649	3,836
Rail	22,057	8,401,204	2,625
Pipeline	2	17,836	91
Air	5,291	61,996	85,345
Water	14,272	96,687,444	148
Other and unknown	3,435	180,311	19,049
Total	**131,433**	**127,868,440**	**1,028**

NOTES: Other includes "flyaway aircraft" (i.e., aircraft moving from the manufacturer to a customer and not carrying any freight), vessels moving under their own power, pedestrians carrying freight, and miscellaneous.
Shipments that neither originate nor terminate in the United States (i.e., in-transit shipments) are not included here, although they use the U.S. transportation system. These shipments are usually part of Mexico-Canada trade and simply pass through the United States. Merchandise trade data exclude import shipments valued at less than $1,250. Individual modal totals may not sum to exact import totals due to rounding.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, May 2002; based on: **total trade, air, and water**—U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *FT920 U.S. Merchandise Trade* (Washington, DC: 2001); **all land modes**—U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, January 2002.

Table C-13
U.S. Merchandise Exports to Canada and Mexico by Mode: 2001

TOTAL NAFTA EXPORTS

Mode	Value (U.S. million $)	Weight (short tons)	Value to weight ratio
Truck	191,918	88,803,724	2,161
Rail	23,362	22,271,399	1,049
Pipeline	517	3,904,240	133
Air	21,869	326,749	66,928
Water	8,777	57,155,006	154
Other and unknown	18,791	576,622	32,588
Total	**265,234**	**173,037,741**	**1,533**

EXPORTS TO CANADA

Mode	Value (U.S. million $)	Weight (short tons)	Value to weight ratio
Truck	117,694	69,452,828	1,695
Rail	12,973	18,314,179	708
Pipeline	221	643,965	344
Air	15,163	250,398	60,554
Water	2,900	32,058,760	90
Other and unknown	14,773	365,699	40,397
Total	**163,724**	**121,085,828**	**1,352**

EXPORTS TO MEXICO

Mode	Value (U.S. million $)	Weight (short tons)	Value to weight ratio
Truck	74,223	19,350,897	3,836
Rail	10,389	3,957,221	2,625
Pipeline	296	3,260,275	91
Air	6,706	76,350	87,832
Water	5,877	25,096,246	234
Other and unknown	4,018	210,923	19,049
Total	**101,509**	**51,951,912**	**1,954**

NOTES: Other includes "flyaway aircraft" (i.e., aircraft moving from the manufacturer to a customer and not carrying any freight), vessels moving under their own power, pedestrians carrying freight, and miscellaneous.
Shipments that neither originate nor terminate in the United States (i.e., in-transit shipments) are not included here, although they use the U.S. transportation system. These shipments are usually part of Mexico-Canada trade and simply pass through the United States. Merchandise trade data exclude export shipments valued at less than $2,500. Individual modal totals may not sum to exact export totals due to rounding.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, May 2002; based on: **total trade, air, and water**—U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *FT920 U.S. Merchandise Trade* (Washington, DC: 2001); **all land modes**—U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, January 2002.

Table C-14
U.S.-NAFTA Trade by State for All Surface Modes: 2001
(Millions of current dollars)

U.S. state[1]	Total U.S.-NAFTA surface trade	U.S.-Canada	U.S. -Mexico
Michigan	89,327	61,787	27,540
Texas	77,324	14,972	62,352
California	53,845	21,623	32,222
New York	31,748	27,133	4,616
Ohio	28,335	22,919	5,417
Illinois	28,023	22,750	5,273
Pennsylvania	15,697	11,947	3,751
Indiana	15,270	9,745	5,525
Washington	14,585	13,382	1,203
Tennessee	11,891	8,097	3,794
North Carolina	11,047	6,289	4,758
Arizona	10,287	2,150	8,137
Georgia	9,903	6,541	3,362
New Jersey	9,569	7,736	1,833
Wisconsin	9,131	7,595	1,537
Minnesota	8,332	7,354	978
Massachusetts	7,975	6,958	1,017
Kentucky	7,319	5,431	1,888
Florida	7,067	4,471	2,596
Missouri	6,344	4,694	1,650
South Carolina	5,815	4,067	1,747
Virginia	5,426	3,717	1,709
Vermont	4,453	4,427	26
Connecticut	4,326	3,356	970
Oregon	3,879	3,398	481
Iowa	3,872	3,311	562

(Table C-14 continued on next page)

(Table C-14 continued)

U.S. state[1]	Total U.S.-NAFTA surface trade	U.S.-Canada	U.S.-Mexico
Alabama	3,845	2,591	1,253
Kansas	3,571	2,924	647
Maryland	2,862	2,085	778
Colorado	2,722	2,192	529
Maine	2,695	2,657	37
Oklahoma	2,121	1,629	492
Arkansas	2,022	1,630	391
Montana	1,909	1,863	46
Utah	1,902	1,659	242
Louisiana	1,882	1,509	374
New Hampshire	1,725	1,402	323
North Dakota	1,716	1,616	100
Mississippi	1,647	864	783
Nebraska	1,593	1,097	497
Delaware	1,517	1,099	418
Wyoming	1,310	1,254	56
West Virginia	1,174	1,095	79
Nevada	992	888	105
Idaho	893	813	80
Rhode Island	869	725	144
South Dakota	611	531	80
New Mexico	473	252	221
Alaska	303	275	28
District of Columbia	122	109	13
Hawaii	60	57	3
Total, all U.S. states	**547,312**	**346,515**	**200,797**

[1] States are ranked by total U.S.-NAFTA surface trade.

NOTE: U.S. state surface trade value equals imports to the U.S. state of destination plus exports from the U.S. state of origin. The U.S. state of destination reflects the state of the importer of record. This state may not always represent the ultimate physical destination of shipments. The U.S. state of origin typically reflects the state of origin where the goods were grown, manufactured or otherwise produced. In some instances, however, it may not always reflect the actual state of physical origin. Shipments for Hawaii are intermodal and are included in this dataset, because a portion of the shipment moves by a land mode from either its origin or final destination. Total for all U.S. states includes data where the state of origin or destination was unknown.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, as of January 2002.

Table C-15
Incoming Truck Crossings on the U.S.-Canadian and U.S.-Mexican Borders: 1994, 2000, and 2001
(Thousands of crossings)

INCOMING TRUCK CROSSINGS ON THE U.S.-CANADIAN BORDER

Rank in 2001	Port	1994	2000	2001	1994 (percent)	2001 (percent)	Percentage change, 1994–2001	Annual growth rate (%)
1	Detroit, MI	1,155	1,769	1,642	23.3	24.2	42.2	5.2
2	Buffalo-Niagara Falls, NY	887	1,198	1,124	17.9	16.6	26.7	3.4
3	Port Huron, MI	609	839	829	12.3	12.2	36.1	4.5
4	Blaine, WA	324	517	472	6.5	7.0	45.6	5.5
5	Champlain-Rouses Pt., NY	273	391	382	5.5	5.6	40.0	4.9
6	Alexandria Bay, NY	190	278	277	3.8	4.1	45.9	5.5
7	Pembina, ND	127	214	220	2.6	3.2	73.0	8.1
8	Calais, ME	112	154	144	2.3	2.1	28.3	3.6
9	Derby Line, VT	81	139	141	1.6	2.1	74.6	8.3
10	Sweetgrass, MT	90	146	140	1.8	2.1	55.8	6.5
	Total, U.S.-Canadian border	**4,956**	**7,048**	**6,777**	**100.0**	**100.0**	**36.7**	**4.6**

INCOMING TRUCK CROSSINGS ON THE U.S.-MEXICAN BORDER

Rank in 2001	Port	1994	2000	2001	1994 (percent)	2001 (percent)	Percentage change, 1994–2001	Annual growth rate (%)
1	Laredo, TX	668	1,493	1,404	24.2	32.6	110.2	11.2
2	Otay Mesa/ San Ysidro, CA	440	688	708	15.9	16.5	61.0	7.0
3	El Paso, TX	574	720	661	20.8	15.3	15.1	2.0
5	Calexico East/ Calexico, CA	178	279	257	6.4	6.0	44.2	5.4
4	Hidalgo, TX	165	374	368	6.0	8.6	123.3	12.2
6	Brownsville, TX	267	299	252	9.7	5.8	–5.8	-0.8
7	Nogales, AZ	192	255	249	6.9	5.8	29.8	3.8
8	Eagle Pass, TX	57	107	98	2.1	2.3	71.3	8.0
9	Tecate, CA	36	63	61	1.3	1.4	69.1	7.8
10	Del Rio, TX	33	61	60	1.2	1.4	81.6	8.9
	Total, U.S.-Mexican border	**2,763**	**4,526**	**4,305**	**100.0**	**100.0**	**55.8**	**6.5**

NOTES: Data represent the number of truck crossings, not the number of unique vehicles, and include both loaded and unloaded trucks. Data for the port of Calexico are typically reported as a combined total with Calexico East.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, March 2002; based on data from U.S. Department of the Treasury, U.S. Customs Service, Mission Support Services, Office of Field Operations, *Operations Management CD,* 2002.

Table C-16
Monthly Incoming Truck Crossings at the Top 10 U.S. Land Ports: 2001

THOUSANDS OF CROSSINGS

Rank in 2001	Port	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	Detroit, MI	144	133	153	142	156	146	113	143	123	143	138	107
2	Laredo, TX	115	106	121	108	125	117	117	128	114	132	114	106
3	Buffalo-Niagara Falls, NY	97	89	100	96	106	99	89	101	81	99	93	75
4	Port Huron, MI	70	64	71	69	77	72	63	73	66	76	70	59
5	Otay Mesa, CA	55	53	61	58	64	62	63	63	56	66	59	50
6	El Paso, TX	53	55	59	53	60	57	46	56	53	60	58	50
7	Blaine, WA	40	38	42	40	42	41	44	46	35	40	33	29
8	Champlain-Rouses Pt., NY	32	29	32	31	36	33	32	33	32	35	31	26
9	Hidalgo, TX	30	28	35	34	32	29	30	32	28	32	30	27
10	Alexandria Bay, NY	24	21	24	24	25	23	24	25	22	25	22	19
	Total, top 10 ports	**660**	**618**	**698**	**656**	**723**	**679**	**619**	**700**	**609**	**709**	**650**	**547**
	Total, from Canada	579	532	596	569	626	585	529	601	542	607	555	455
	Total, from Mexico	359	342	388	352	388	361	343	374	333	385	356	322
	Total, all land ports	**939**	**875**	**985**	**921**	**1,013**	**946**	**872**	**975**	**875**	**993**	**912**	**777**

PERCENTAGE CHANGE: 2000–2001

Rank in 2001	Port	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	Detroit, MI	–3.9	–13.5	–9.3	–2.4	–3.3	–6.4	–1.6	–8.3	–16.7	–9.1	–4.3	–5.5
2	Laredo, TX	0.5	–13.0	–9.4	–3.8	–4.8	–10.9	–1.7	–5.1	–9.8	–0.2	–9.0	–3.4
3	Buffalo-Niagara Falls, NY	5.4	–8.0	–11.2	–4.9	–4.8	–8.1	–0.3	–4.8	–16.4	–7.1	–4.6	–8.1
4	Port Huron, MI	5.2	–4.4	–6.0	1.8	1.1	–7.2	4.7	–3.7	–6.3	–1.1	–2.6	8.1
5	Otay Mesa, CA	10.4	–1.4	4.1	7.3	6.6	–2.8	3.4	0.1	–5.2	9.4	5.0	–0.9
6	El Paso, TX	–6.2	–6.9	–8.9	–5.0	–7.5	–10.0	–16.0	–27.4	–11.5	–5.4	14.0	1.3
7	Blaine, WA	1.6	–2.9	–4.6	–3.3	–10.7	–9.7	–1.9	–5.7	–17.1	–3.7	–27.9	–18.2
8	Champlain-Rouses Pt., NY	9.3	0.5	0.0	–3.8	2.4	1.0	0.2	–9.6	–14.1	1.6	–6.5	–3.5
9	Hidalgo, TX	5.9	–8.3	–3.0	10.9	–3.0	–6.9	–1.5	–5.3	–7.1	0.4	–2.5	4.0
10	Alexandria Bay, NY	5.2	–2.7	–5.1	0.9	–1.0	–4.1	8.5	3.8	–0.2	–0.2	–6.4	–3.1
	Total, North America	**2.0**	**–8.0**	**–6.3**	**–1.4**	**–2.3**	**–6.6**	**–1.6**	**–6.5**	**–8.4**	**–2.2**	**–5.5**	**–3.3**
	From Mexico	0.6	–9.2	–6.3	–2.0	–3.5	–9.7	–4.1	–8.9	–9.1	–0.7	–2.1	–2.0
	From Canada	2.9	–7.2	–6.3	–1.1	–1.5	–4.6	0.0	–5.0	–7.9	–3.1	–7.5	–4.2

NOTE: Rank is based on the total number of truck crossings in 2001. Data represent the number of truck crossings, not the number of unique vehicles, and include both loaded and unloaded trucks.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, April 2002; based on U.S. Department of the Treasury, U.S. Customs Service, Mission Support Services, Office of Field Operations, *Operations Management Database CD*, 2002.

Table C-17
Top 50 U.S. International Freight Gateways by Shipment Value: 2001
(Millions of current dollars)

Rank in 2001	Port	Mode	Total	Exports	Imports
	Total, airports		**518,602**	**251,494**	**267,107**
	Total, maritime ports		**718,448**	**198,841**	**519,607**
	Total, surface ports		**547,312**	**234,588**	**312,724**
1	JFK Internatl. Airport, NY	Air	116,581	50,079	66,502
2	Los Angeles, CA	Waterborne	104,193	17,436	86,757
3	Long Beach, CA	Waterborne	94,699	16,716	77,984
4	Detroit, MI	Surface	91,982	49,205	42,776
5	NY/NJ	Waterborne	85,918	22,673	63,245
6	Laredo, TX	Surface	79,607	34,706	44,901
7	Los Angeles Internatl. Airport, CA	Air	63,882	34,030	29,853
8	San Francisco Internatl. Airport, CA	Air	61,953	32,320	29,633
9	Buffalo-Niagara Falls, NY	Surface	60,478	29,375	31,103
10	Port Huron, MI	Surface	55,648	17,276	38,372
11	Chicago, IL	Air	44,916	19,918	24,998
12	Houston, TX	Waterborne	44,489	19,522	24,967
13	El Paso, TX	Surface	37,931	15,918	22,013
14	Charleston, SC	Waterborne	33,411	12,483	20,928
15	Seattle, WA	Waterborne	28,595	5,298	23,298
16	New Orleans, LA	Air	27,353	13,810	13,544
17	Oakland, CA	Waterborne	24,985	7,739	17,245
18	Norfolk, VA	Waterborne	24,864	11,260	13,604
19	Miami Internatl. Airport, FL	Air	22,565	15,403	7,162
20	Anchorage, AK	Air	21,874	5,109	16,765
21	Baltimore, MD	Waterborne	20,820	5,131	15,689
22	Cleveland, OH	Airport	19,679	9,213	10,467
23	Otay Mesa, CA	Surface	19,401	8,232	11,169
24	Dallas/Fort Worth, TX	Air	18,797	8,836	9,961
25	Tacoma, WA	Waterborne	18,650	4,256	14,394

(Table C-17 continued on next page)

(Table C-17continued)

Rank in 2001	Port	Mode	Total	Exports	Imports
26	Savannah, GA	Waterborne	17,158	6,421	10,737
27	New Orleans, LA	Waterborne	16,976	8,134	8,842
28	Miami, FL	Waterborne	16,600	8,487	8,113
29	Champlain-Rouses Pt., NY	Surface	16,163	5,929	10,234
30	Atlanta, GA	Air	15,848	7,562	8,286
31	Nogales, AZ	Surface	12,509	4,619	7,890
32	Hidalgo, TX	Surface	12,423	5,715	6,708
33	Blaine, WA	Surface	11,687	5,079	6,608
34	Brownsville-Cameron, TX	Surface	10,911	5,813	5,098
35	Jacksonville, FL	Waterborne	10,807	1,991	8,817
36	Portland, OR	Waterborne	10,713	2,690	8,023
37	Alexandria Bay, NY	Surface	10,621	4,051	6,570
38	Port Everglades, FL	Waterborne	10,283	4,433	5,851
39	Philadelphia, PA	Waterborne	9,971	556	9,414
40	Newark, NJ	Air	9,414	3,245	6,170
41	Boston, MA	Air	9,216	5,664	3,552
42	Pembina, ND	Surface	8,886	4,428	4,458
43	Seattle-Tacoma Internatl., WA	Air	8,849	3,546	5,303
44	Philadelphia Internatl. Airport, PA	Air	8,799	4,945	3,854
45	Sweetgrass, MT	Surface	8,269	3,834	4,435
46	Morgan City, LA	Waterborne	7,830	144	7,687
47	San Juan Internatl. Airport, PR	Air	7,779	3,686	4,093
48	Houston Internatl. Airport, TX	Air	7,690	4,824	2,866
49	Corpus Christie, TX	Waterborne	7,679	1,227	6,452
50	Beaumont, TX	Waterborne	7,669	824	6,845

NOTES: **All data**—Trade levels reflect the mode of transportation as a shipment enters or exits a border port. Flows through individual ports are based on reported data collected from U.S. trade documents. Trade does not include low-value shipments. (In general, these are imports valued at less than $1,250 and exports valued at less than $2,500.) **Air**—Data for all air gateways include a low level (generally less than 2%–3% of the total value) of small user-fee airports located in the same region. Air gateways not identified by airport name (e.g., Chicago, IL) include major airport(s) in that geographic area in addition to small regional airports. In addition, due to Census Bureau confidentiality regulations, data for courier operations are included in the airport totals for JFK International Airport, New Orleans, Los Angeles, Cleveland, Chicago, Miami, and Anchorage. **Water**—Data are preliminary.

SOURCES: **Air**—U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, special tabulation, May 2002. **Water**—U.S. Department of Transportation, Maritime Administration, Office of Statistical and Economic Analysis, personal communication, May 2002. **Land**—U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, 2002.

Table C-18
U.S. International Trade Balance in Transportation-Related Goods Among the Top 5 Trading Partners for Each Commodity Group: 1990, 2000, and 2001
(Millions of current dollars)

Commodity and country	1990	Country	2000	Country	2001
87: Vehicles other than railway					
Canada	–8,345	Canada	–22,325	Canada	–20,508
Japan	–26,734	Japan	–40,267	Japan	–39,107
Germany	–5,904	Mexico	–14,586	Mexico	–15,229
Mexico	–264	Germany	–14,604	Germany	–14,336
United Kingdom	–1,249	Korea	–4,856	Korea	–6,375
Total	**–42,431**	**Total**	**–101,927**	**Total**	**–100,592**
88: Aircraft, spacecraft, and parts					
United Kingdom	2,799	France	–3,418	Canada	–3,469
Japan	3,058	Canada	–2,479	France	–3,563
Canada	–249	United Kingdom	3,259	United Kingdom	3,673
France	340	Germany	804	Germany	173
Germany	1,908	Japan	2,207	Japan	1,292
Total	**24,182**	**Total**	**22,809**	**Total**	**23,607**
89: Ships, boats, and floating structures					
Canada	37	France	–134	Canada	147
Japan	139	Canada	–96	France	349
Singapore	94	United Kingdom	–126	United Kingdom	–89
United Kingdom	62	Germany	89	Germany	–142
France	43	Japan	–105	Japan	–80
Total	**969**	**Total**	**–65**	**Total**	**693**
86: Railway locomotives and parts					
Canada	–283	Canada	–85	Canada	257
Mexico	115	Mexico	–267	Mexico	–31
Japan	–61	Japan	–50	Japan	–83
Sweden	–29	Italy	–64	Italy	–91
Germany	–20	Brazil	42	China	–20
Total	**–179**	**Total**	**–416**	**Total**	**149**

NOTE: Totals are for all countries worldwide.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, U.S. International Trade Commission, available at http://dataweb.usitc.gov/, as of August 2002.

Table C-19
U.S. Transportation-Related Commodity Trade by Mode: 2001
(Millions of current dollars)

HS code	Commodity description	Total, all modes	Maritime	Air	Truck	Rail	Other and unknown [1]
Total trade							
86	Railway locomotives and parts	2,863	928	160	854	857	63
87	Vehicles other than railway	218,091	96,506	3,004	59,858	54,696	4,027
88	Aircraft, spacecraft, and parts	65,804	5,449	18,303	2,017	35	39,999
89	Ships, boats, and floating structures	3,105	2,024	53	607	2	419
Share (%)							
86	Railway locomotives and parts	100.0	32.4	5.6	29.8	29.9	2.2
87	Vehicles other than railway	100.0	44.3	1.4	27.4	25.1	1.8
88	Aircraft, spacecraft, and parts	100.0	8.3	27.8	3.1	0.1	60.8
89	Ships, boats, and floating structures	100.0	65.2	1.7	19.5	0.1	13.5
Exports							
86	Railway locomotives and parts	1,506	434	94	468	490	21
87	Vehicles other than railway, and parts	58,750	14,740	1,712	29,308	10,503	2,486
88	Aircraft, spacecraft, and parts	44,705	2,786	14,855	1,375	0	25,689
89	Ships, boats, and floating structures	1,899	1,266	39	208	1	386
Imports							
86	Railway locomotives and parts	1,357	494	66	387	367	42
87	Vehicles, other than railway	159,341	81,767	1,292	30,549	44,193	1,540
88	Aircraft, spacecraft, and parts	21,098	2,664	3,448	642	35	14,310
89	Ships, boats, and floating structures	1,206	758	14	399	2	34
Balance (exports minus imports)							
86	Railway locomotives and parts	149	–61	28	81	122	–22
87	Vehicles other than railway	–100,592	–67,027	419	–1,241	–33,690	946
88	Aircraft, spacecraft, and parts	23,607	122	11,407	733	–34	11,380
89	Ships, boats, and floating structures	693	507	25	–191	–1	352

[1] Other includes "flyaway aircraft" (i.e., aircraft moving from the manufacturer to a customer and not carrying freight) and vessels moving under their own power.

NOTES: Truck and rail land modes cover trade with Canada and Mexico. Maritime and Air modes includes trade with all countries. Commodity come, based on the 2-digit harmonized schedule for internationally traded goods.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, May 2002; based on: **total trade, air, and water**—U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *FT920 U.S. Merchandise Trade* (Washington, DC: 2001); **all land modes**—U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data.

Table C-20
U.S. International Private Services Trade by Type: 2000–2001
(Millions of dollars)

	Exports (receipts)		Imports (payments)		Total (exports plus imports)		Percentage change,
	2000	2001	2000	2001	2000	2001	2000–2001
Total private services	**277,478**	**266,209**	**202,060**	**192,305**	**479,538**	**458,514**	**–4.4**
Travel	82,267	73,119	64,788	60,117	147,055	133,236	–9.4
Passenger fares	20,760	18,007	24,306	22,418	45,066	40,425	–10.3
Freight transportation and port services	30,137	28,306	41,598	38,823	71,735	67,129	–6.4
Freight	12,994	11,930	27,388	25,667	40,382	37,597	–6.9
Port services	17,143	16,376	14,210	13,156	31,353	29,532	–5.8
Royalties and license fees	39,607	38,668	16,115	16,359	55,722	55,027	–1.2
Other private services	104,707	108,109	55,253	54,588	159,960	162,697	1.7

NOTES: Receipts consist of money received by the domestic carriers or service providers from foreign sources. Payments consist of money paid by domestic consumers to foreign carriers or service providers.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from the U.S. Department of Commerce, Bureau of Economic Analysis, U.S. International Accounts Data, available at http://www.bea.gov/bea/di/1001serv/intlserv.htm, as of January 2003.

Table C-21
U.S. International Trade in Transportation-Related Services with G-7 and Selected Countries: 2001
(Millions of dollars)

Country	Total freight and port services	Freight services				Port services			
		Total	Ocean	Air	Other and unknown[1]	Total	Ocean	Air	Other and unknown[1]
Total (exports plus imports)									
All countries	**67,129**	**37,597**	**23,538**	**9,322**	**4,737**	**29,532**	**10,476**	**18,746**	**310**
Japan	8,553	4,387	3,072	1,231	NA	4,166	1,428	2,738	NA
Canada	5,510	4,298	292	125	3,881	1,212	264	638	310
United Kingdom	4,320	1,628	573	1,047	NA	2,692	204	2,488	NA
Germany	4,023	1,793	1,197	584	NA	2,230	719	1,511	NA
South Korea	3,311	1,786	1,396	390	NA	1,525	827	698	NA
Mexico	2,228	535	238	228	69	1,693	138	1,555	NA
China	2,109	1,201	596	605	NA	908	333	575	NA
France	1,587	616	160	444	NA	971	41	930	NA
Italy	1,091	688	519	165	NA	403	136	267	NA
Exports (receipts)									
All countries	**28,306**	**11,930**	**4,143**	**5,364**	**2,423**	**16,376**	**8,474**	**7,699**	**203**
Japan	3,298	1,229	384	761	84	2,069	1,279	790	NA
Canada	2,212	1,837	146	80	1,611	375	45	127	203
United Kingdom	1,904	847	178	661	8	1,057	146	911	NA
Germany	1,887	462	147	303	12	1,425	615	810	NA
South Korea	1,751	335	132	203	NA	1,416	780	636	NA
China	894	378	202	176	NA	516	159	357	NA
Mexico	680	345	61	221	63	335	109	226	NA
France	631	343	52	279	12	288	28	260	NA
Italy	383	163	75	84	4	220	69	151	NA
Imports (payments)									
All countries	**38,823**	**25,667**	**19,395**	**3,958**	**2,314**	**13,156**	**2,002**	**11,047**	**107**
Japan	5,255	3,158	2,688	470	NA	2,097	149	1,948	NA
Canada	3,298	2,461	146	45	2,270	837	219	511	107
United Kingdom	2,416	781	395	386	NA	1,635	58	1,577	NA
Germany	2,136	1,331	1,050	281	NA	805	104	701	NA
South Korea	1,560	1,451	1,264	187	NA	109	47	62	NA
Mexico	1,548	190	177	7	6	1,358	29	1,329	NA
China	1,215	823	394	429	NA	392	174	218	NA
France	956	273	108	165	NA	683	13	670	NA
Italy	708	525	444	81	NA	183	67	116	NA

[1] For Canada and Mexico, "Other" includes freight services by surface modes.

Key: NA = not applicable.

NOTES: Payments consist of money paid by domestic consumers to foreign carriers or service providers. Receipts consist of money received by domestic carriers or service providers from foreign sources. G-7 (Group of Seven) countries are the United States, Canada, France, Germany, Italy, the United Kingdom, and Japan.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, Bureau of Economic Analysis, U.S. International Accounts Data, available at http://www.bea.gov/bea/di/1001serv/intlserv.html, as of January 2003.

Table C-22
U.S. Exports and Imports of Computer and Related Information Technology (IT) Goods

	Total trade in merchandise goods (exports plus imports)[1]	Computer-related IT goods			IT as % of total goods
		Total	Exports	Imports	
	Billions of current $				
1990	907	49	26	23	5.4
1991	927	53	27	26	5.7
1992	994	61	29	32	6.1
1993	1,053	67	29	38	6.4
1994	1,186	80	33	46	6.7
1995	1,341	96	40	56	7.2
1996	1,427	105	44	62	7.4
1997	1,574	120	49	70	7.6
1998	1,611	118	45	73	7.3
1999	1,745	128	47	82	7.3
2000	2,031	145	56	90	7.2
2001	1,910	122	48	74	6.4
	Billions of chained 1996 $				
1990	891	24	12	12	2.7
1991	919	29	14	15	3.2
1992	994	38	17	21	3.8
1993	1,062	47	20	27	4.5
1994	1,186	61	25	36	5.2
1995	1,308	82	33	48	6.2
1996	1,427	105	44	62	7.4
1997	1,631	139	57	81	8.5
1998	1,754	161	60	101	9.2
1999	1,911	199	68	130	10.4
2000	2,152	238	86	153	11.1
2001	2,068	215	76	139	10.4

[1] Bureau of Economic Analysis (BEA) data for overall U.S. trade in current dollars will differ from figures reported by the U.S. Census Bureau, due to BEA adjustments in the data.

NOTE: Exports and imports of certain goods, primarily military equipment purchased and sold by the federal government, are included in services.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics; based on data from U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Account basis, available at http://www.bea.doc.gov/bea/dn/nipaweb/SelectTable.asp?Selected=N#S4, as of Apr. 24, 2002.

APPENDIX D

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