II. FREIGHT MOVED AND INTERNATIONAL TRADE

The American economy stretches across a continent with links to the world, drawing on natural resources and manufactured products from many locations to serve markets at home and abroad. More freight is moving greater distances as part of far-flung supply chains among distant trading partners.

Table 2-1. Weight of Shipments by Transportation Mode: 2007, 2011, and 2040 (millions of tons)[1]

	2007				2011				2040			
	Total	Domestic	Exports[2]	Imports[2]	Total	Domestic	Exports[2]	Imports[2]	Total	Domestic	Exports[2]	Imports[2]
Total	**18,879**	**16,851**	**655**	**1,372**	**17,622**	**15,336**	**895**	**1,390**	**28,520**	**23,095**	**2,632**	**2,794**
Truck	12,778	12,587	95	97	11,301	11,065	107	130	18,786	18,083	368	335
Rail	1,900	1,745	61	93	1,895	1,695	108	92	2,770	2,182	388	201
Water	950	504	65	381	825	501	75	248	1,070	559	164	347
Air, air & truck	13	3	4	6	17	3	5	10	53	6	20	27
Multiple modes & mail	1,415	419	389	606	1,618	409	547	662	3,575	645	1,546	1,383
Pipeline	1,507	1,328	4	175	1,652	1,412	6	235	1,740	1,257	17	467
Other & unknown	316	266	36	14	313	251	48	14	526	362	130	34

[1]Many 2007 and 2040 numbers in this table were revised as a result of Freight Analysis Framework (FAF) database improvements in FAF version 3.4.
[2]Data do not include imports and exports that pass through the United States from a foreign origin to a foreign destination by any mode.
Notes: Numbers may not add to totals due to rounding. The 2011 data are provisional estimates that are based on selected modal and economic trend data. All truck, rail, water, and pipeline movements that involve more than one mode, including exports and imports that change mode at international gateways, are included in multiple modes & mail to avoid double counting. As a consequence, rail and water totals in this table are less than other published sources.

The U.S. transportation system moved, on average, 52 million dollars worth nearly $46 billion each day in 2007. Preliminary Freight Analysis Framework (FAF) estimates show that the tonnage of goods moved in 2011 has not yet surpassed the tonnage moved in 2007. The value of freight transported in 2011, however, does show a slight increase over the 2007 value.

FAF tables and figures in this edition are based on version 3.4 and include minor corrections to last year's report, which is based on version 3.2.

Table 2-1. Weight of Shipments by Transportation Mode: 2007, 2011, and 2040
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework, version 3.4, 2012.

Table 2-2. Value of Shipments by Transportation Mode: 2007, 2011, and 2040[1] (billions of 2007 dollars)

	2007				2011				2040			
	Total	Domestic	Exports[2]	Imports[2]	Total	Domestic	Exports[2]	Imports[2]	Total	Domestic	Exports[2]	Imports[2]
Total	**16,651**	**13,457**	**1,196**	**1,997**	**16,804**	**13,200**	**1,285**	**2,319**	**39,265**	**27,131**	**5,303**	**6,831**
Truck	10,780	10,225	267	287	10,573	9,921	266	386	21,465	19,315	985	1,166
Rail	512	374	45	93	515	380	47	88	898	555	148	195
Water	340	158	15	167	279	151	19	108	337	138	46	153
Air, air & truck	1,077	151	422	505	1,219	158	420	641	5,043	834	1,997	2,212
Multiple modes & mail	2,877	1,639	394	844	3,099	1,658	473	968	9,925	5,203	1,911	2,811
Pipeline	723	658	4	61	779	693	5	81	776	605	17	154
Other & unknown	341	252	48	41	341	239	55	47	821	482	199	139

[1]Many 2007 and 2040 numbers in this table were revised as a result of Freight Analysis Framework (FAF) database improvements in FAF version 3.4.
[2]Data do not include imports and exports that pass through the United States from a foreign origin to a foreign destination by any mode.
Notes: Numbers may not add to totals due to rounding. The 2011 data are provisional estimates that are based on selected modal and economic trend data. All truck, rail, water, and pipeline movements that involve more than one mode, including exports and imports that change mode at international gateways, are included in multiple modes & mail to avoid double counting. As a consequence, rail and water totals in this table are less than other published sources.

The value of freight moved is expected to increase faster than the weight, rising from $882 per ton in 2007 to $1,376 per ton in 2040 when controlling for inflation. Exports at $2,015 per ton and imports at $2,445 per ton are significantly higher than domestic shipments at $799 per ton in 2007. Exports and imports accounted for 11 percent of the tons and 19 percent of the value in 2007 and are forecast to make up an even greater share of freight moving throughout the United States in the future, reaching 19 percent of the tons and 31 percent of the value by 2040.

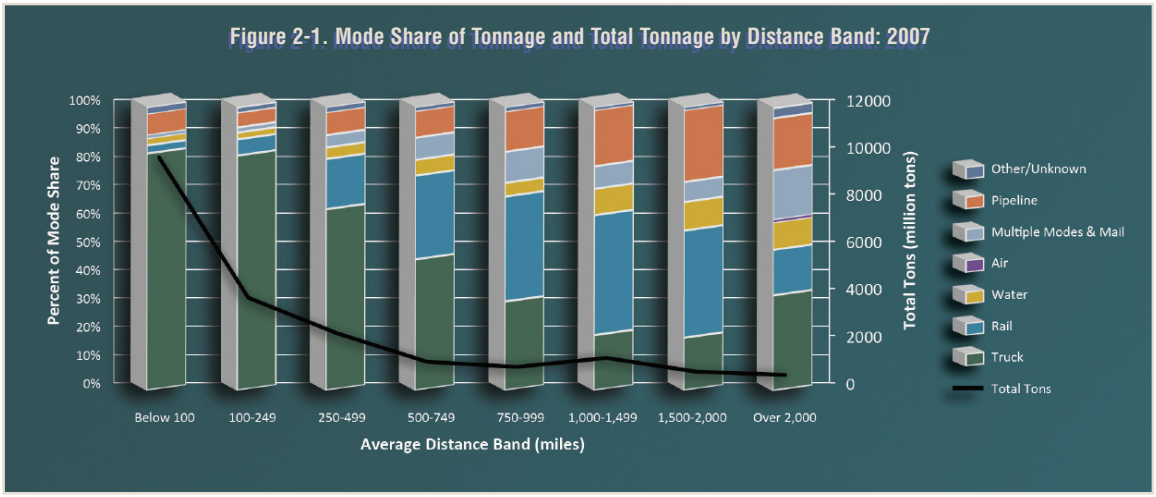
Table 2-3. Total Freight moved by Distance Band: 2007

Distance Band (miles)	Value		Weight		Ton-Miles	
	Percent	Cumulative Percent	Percent	Cumulative Percent	Percent	Cumulative Percent
Below 100	40	40	51	51	7	7
100 - 249	16	56	19	71	10	17
250 - 499	13	69	11	82	13	29
500 - 749	7	76	5	87	9	39
750 - 999	6	82	4	90	10	49
1,000 - 1,499	7	89	6	96	22	71
1,500 - 2,000	4	93	2	98	14	85
Over 2,000	7	100	2	100	15	100

The largest percentage of goods movement occurs close to home. Approximately 50 percent of the weight and 40 percent of the value of goods were moved less than 100 miles between origin and destination in 2007. Less than 10 percent of the weight and 18 percent of the value of goods were moved more than 1,000 miles. Distance, as used in this publication, refers to the Great Circle Distance, which is commonly called "as-the-crow-flies."

TABLE 2-2. VALUE OF SHIPMENTS BY TRANSPORTATION MODE: 2007, 2011, AND 2040
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework, version 3.4, 2012.

TABLE 2-3. TOTAL FREIGHT MOVED BY DISTANCE BAND: 2007
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Managements and Operations, Freight Analysis Framework, version 3.4, 2012.



Trucks carry the largest share of goods by weight for distances less than 750 miles and more than 2,000 miles. Rail is the dominant mode for goods moved over distances greater than 750 miles and less than 2,000 miles, accounting for 37 percent of total freight moved.

By value, trucks moved the largest percentage of goods across all distance bands, with the largest share, 84 percent, occurring for the shortest distances. With increasing distance, the multiple modes and mail category's share increases from 4 percent for local travel to a high of 34 percent for the longest distance band.

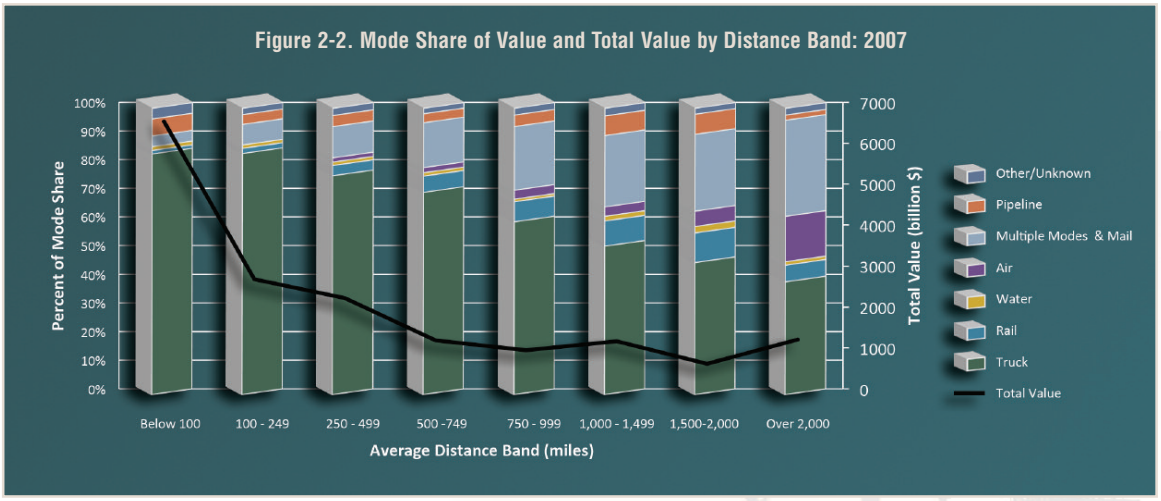
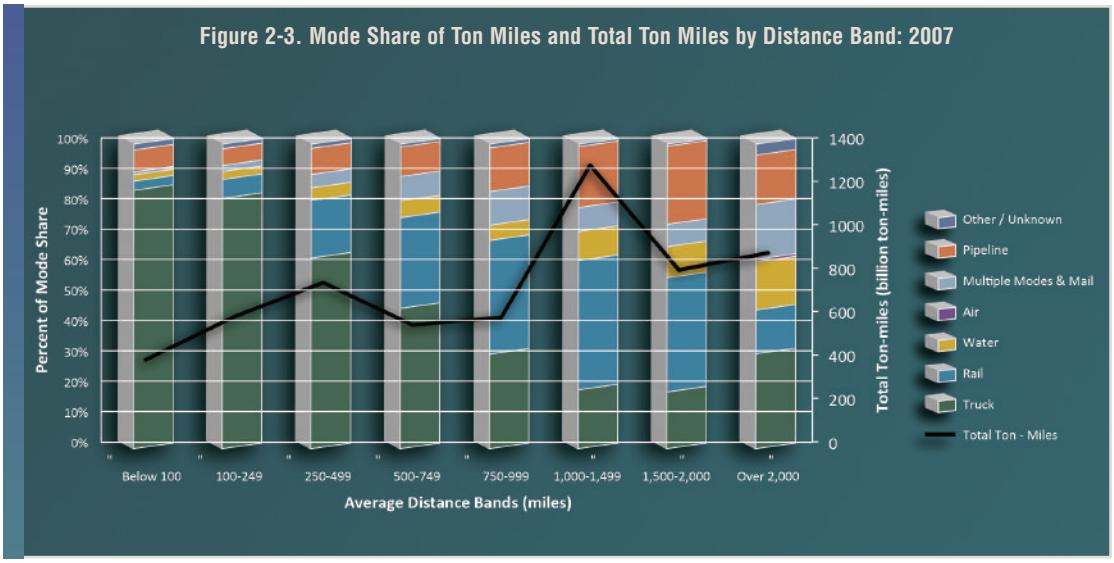


Figure 2-1. Mode Share of Tonnage and Total Tonnage by Distance Band: 2007
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Managements and Operations, Freight Analysis Framework, version 3.4, 2012.

Figure 2-2. Mode Share of Value and Total Value by Distance Band: 2007
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Managements and Operations, Freight Analysis Framework, version 3.4, 2012.

The modal distribution for ton miles is similar to that for tons, with the exception of long-distance water moves.



The top 10 commodities by weight are comprised entirely of bulk products and accounted for 65 percent of total tonnage but only 19 percent of the value of goods moved in 2011. The top 10 commodities by value accounted for 57 percent of total value and 16 percent of all tons. The leading commodities by weight include gravel, cereal grains, natural gas, coke, and asphalt. The leading commodities by value are time-sensitive goods, including machinery, electronics, and motorized vehicles.

Table 2-4. Top Commodities: 2011

Millions of Tons		Billions of Dollars	
Total, all commodities	**17,622**	**Total, all commodities**	**16,804**
Gravel	1,612	Machinery	2,078
Cereal grains	1,574	Electronics	1,289
Natural gas, coke, asphalt[1]	1,507	Motorized vehicles	1,237
Coal	1,413	Mixed freight	980
Waste/scrap	1,187	Pharmaceuticals	815
Non-metallic mineral products	1,011	Textiles/leather	710
Gasoline	989	Gasoline	677
Fuel oils	799	Miseellaneous manufactured products	663
Crude petroleum	781	Plastics/rubber	611
Other foodstuffs	571	Other foodstuffs	589

[1]This group includes coal and petroleum products not elsewhere classified such as liquefied natural gas, coke, asphalt, and other products of coal and petroleum refining, excluding gasoline, aviation fuel, and fuel oil.

As measured by the Commodity Flow Survey, trucks moved more than one-half of all hazardous materials shipped from within the United States. However, truck ton miles of hazardous materials shipments accounted for a much smaller share, about one-third of all ton miles, because such shipments travel relatively short

Figure 2-3. Mode Share of Ton Miles and Total Ton Miles by Distance Band: 2007
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Managements and Operations, Freight Analysis Framework, version 3.4, 2012.

Table 2-4. Top Commodities: 2011
Sources: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Managements and Operations, Freight Analysis Framework, version 3.4, 2012.

Table 2-5. Hazardous Materials Shipments by Transportation Mode: 2007

Transportation mode	Value		Tons		Ton-miles		Miles
	$ Billions	Percent	Millions	Percent	Billions	Percent	Average distance per shipment
All modes, total	**1,448**	100.0	**2,231**	100.0	**323**	100.0	**96**
Single modes, total	**1,371**	94.6	**2,112**	94.6	**279**	86.3	**65**
Truck[1]	837	57.8	1,203	53.9	104	32.2	59
For-hire	359	24.8	495	22.2	63	19.6	214
Private[2]	478	33.0	708	31.7	41	12.6	32
Rail	69	4.8	130	5.8	92	28.5	578
Water	69	4.8	150	6.7	37	11.5	383
Air	2	0.1	S	S	S	S	1,095
Pipeline[3]	393	27.2	629	28.2	S	S	S
Multiple modes, total	**71**	4.9	**111**	5.0	**43**	13.3	**834**
Parcel, U.S. Postal Service, or Courier	8	0.5	<1	<0.1	<1	<0.1	836
Other multiple modes	28	1.9	57	2.5	17	5.3	233
Unknown and other modes, total	**7**	0.5	**8**	0.4	**1**	0.5	**58**

Key: S = data are not published because of high sampling variability or other reasons.
[1]Truck as a single mode includes shipments that went by private truck only, for-hire truck only, or a combination of both.
[2]Private truck refers to a truck operated by a temporary or permanent employee of an establishment or the buyer/receiver of the shipment.
[3]Excludes crude oil shipments.
Note: Numbers and percents may not add to totals due to rounding.

distances. By contrast, rail accounted for only six percent of hazardous materials shipments by weight but nearly 29 percent of ton miles.

Flammable liquids, especially gasoline, are the predominant hazardous materials transported in the United States. In terms of ton miles, flammable liquids accounted for about 56 percent of hazardous materials shipments. The next largest class of hazardous materials shipments, in terms of ton miles, is gases at about 17 percent.

Table 2-6. Hazardous Materials Shipments by Hazard Class: 2007

Hazard class	Description	Value		Tons		Ton-miles	
		$ Billions	Percent	Millions	Percent	Billions	Percent
Class 1	Explosives	12	0.8	3	0.1	<1	<0.1
Class 2	Gases	132	9.1	251	11.2	55	17.1
Class 3	Flammable liquids	1,170	80.8	1,753	78.6	182	56.1
Class 4	Flammable solids	4	0.3	20	0.9	6	1.7
Class 5	Oxidizers and organic peroxides	7	0.5	15	0.7	7	2.2
Class 6	Toxic (poison)	21	1.5	11	0.5	6	1.8
Class 7	Radioactive materials	21	1.4	<1	<0.1	<1	<0.1
Class 8	Corrosive materials	51	3.6	114	5.1	44	13.7
Class 9	Miscellaneous dangerous goods	30	2.1	63	2.8	23	7.1
Total		**1,448**	**100.0**	**2,231**	**100.0**	**323**	**100.0**

Note: Numbers and percents may not add to totals due to rounding.

Table 2-5. Hazardous Materials Shipments by Transportation Mode: 2007
Source: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics and U.S. Department of Commerce, Census Bureau, *2007 Commodity Flow Survey*, Hazardous Materials (Washington, DC: July 2010), table 1a, available at www.bts.gov/publications/commodity_flow_survey/ as of August 5, 2012.

Table 2-6. Hazardous Materials Shipments by Hazard Class: 2007
Source: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics and U.S. Department of Commerce, Census Bureau, *2007 Commodity Flow Survey*, Hazardous Materials (Washington, DC: July 2010), table 1a, available at www.bts.gov/publications/commodity_flow_survey/ as of August 5, 2012.

Table 2-7. Domestic Mode of Exports and Imports by Tonnage and Value: 2007 and 2040

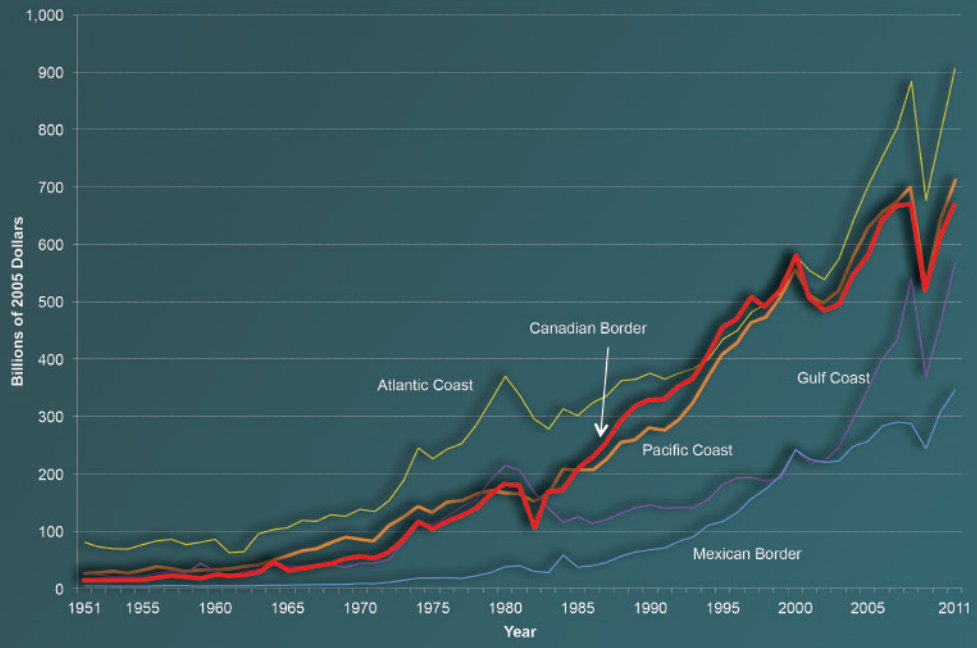
	Millions of Tons		Billions of 2007 Dollars	
	2007	2040	2007	2040
Total	**2,027**	**5,426**	**3,193**	**12,134**
Truck[2]	749	2,365	1,968	7,852
Rail	279	957	200	573
Water	151	268	54	94
Air, air & truck[3]	2	10	206	892
Multiple modes & mail[4]	149	509	278	1,250
Pipeline	346	899	137	350
Other & unknown	51	168	220	1,016
No domestic mode[5]	300	250	130	108

[1]Many 2007 and 2040 numbers in this table were revised as a result of Freight Analysis Framework (FAF) database improvements in FAF version 3.4.
[2]Excludes truck moves to and from airports.
[3]Includes truck moves to and from airports.
[4]Multiple modes & mail includes U.S. Postal Service, courier shipments, and all intermodal combinations, except air and truck. In this table, oceangoing export and import shipments that move between ports and domestic locations by single modes are classified by the domestic mode rather than multiple modes & mail.
[5]No domestic mode includes waterborne import shipments of crude petroleum off-loaded directly at the domestic destination (refineries) with no domestic mode of transportation.
Note: Numbers may not add to totals due to rounding.

International trade has grown considerably and the movement of these goods within the United States is placing pressure on the domestic transportation network and on all modes. Trucks are the most common mode used to move imports and exports between international gateways and inland locations. This trend is expected to continue with tonnage of international trade forecast to grow at a rate of 3.4 percent per year between 2007 and 2040.

Foreign trade has had a major impact on all U.S. borders and coasts. Since 1951, the

Figure 2-4. Value of Merchandise Trade by Coasts and Borders: 1951-2011



Notes: The value of 2011 coal exports ($9.42 bilion) from Mobile, AL, Charleston, SC, and Norfolk, VA are considered proprietary information and are consolidated. In this figure, the total value of coal exports for the above three cities are included under the Atlantic Coast Customs District.

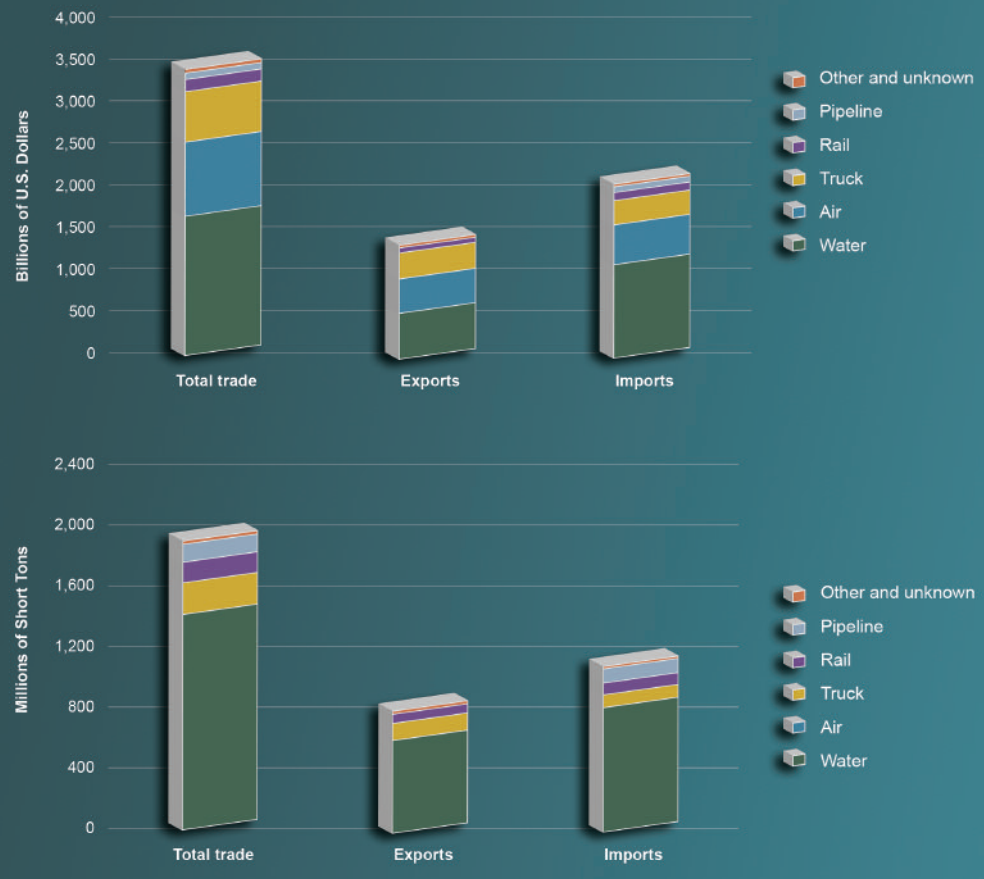
Table 2-7. Domestic Mode of Exports and Imports by Tonnage and Value: 2007 and 2040
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework, version 3.4, 2012.

Figure 2-4. Value of Merchandise Trade by Coasts and Borders: 1951-2011
Sources: 1951-1970: U.S. Department of Commerce, Census Bureau, *Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition* (Washington, DC: 1975); **1970-2000:** U.S. Department of Commerce, Census Bureau, *Statistical Abstract of the United States* (Washington, DC: annual issues); **2000-2011:** U.S. Department of Commerce, Census Bureau, Foreign Trade Division, FT920 - *U.S. Merchandise Trade: Selected Highlights* (Washington, DC: annual issues). **Implicit GDP Deflator:** U.S. Department of Commerce, Bureau of Economic Analysis, Current-Dollar and "Real" Gross Domestic Product, available at www.bea.gov as of August 30, 2012.

value of merchandise trade has grown by twenty-fold in inflation-adjusted terms. However, overall growth has been affected by short-term downturns, such as between 1981 and 1986 and in 2009. In 2011, ports and airports on the Atlantic Coast remain the most significant in terms of value.

Approximately 75 percent of freight tons in U.S. foreign trade move by water, but air and truck transportation are also important when freight value is considered. By value, the water share drops to about 48 percent, with air and truck accounting for nearly 26

Figure 2-5. U.S. International Merchandise Trade by Transportation Mode: 2011



Notes: 1 short ton = 2,000 pounds. The U.S. Department of Transportation (USDOT), Research and Innovative Technology Administration, Bureau of Transportation Statistics estimated 2011 weight data for truck, rail, pipeline, and other modes using value-to-weight ratios derived from imported commodities. Totals for the most recent year differ slightly from the USDOT, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework (FAF) due to variations in coverage and FAF conversion of values to constant dollars.

Figure 2-5. U.S. International Merchandise Trade by Transportation Mode: 2011
Source: Total, water and air data: U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, *FT920 - U.S. Merchandise Trade: Selected Highlights* (Washington, DC: February 2012). **Truck, rail, and pipeline data:** U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transporation Statistics, North American Transborder Freight Data, available at www.bts.gov/transborder as of August 10, 2012. **Other and unknown:** U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transporation Statistics, special tabulation, July 2012.

percent and 18 percent respectively. Rail and pipeline together accounted for about 7 percent of the total.

Canada is this country's top trading partner followed by China and Mexico. China's share of trade with the United States more than doubled between 2000 and 2011, from about 6 percent of total merchandise trade to 14 percent. More recently, between 2010 and 2011, the value of U.S. trade with Mexico grew by 17 percent.

Table 2-8. Top 25 Trading Partners of the United States in Merchandise Trade: 2000, 2005, 2010, and 2011 (billions of current U.S. dollars)

Partner	2011 Rank	2000	2005	2010	2011
Canada	1	406	499	527	596
China	2	116	285	457	503
Mexico	3	248	290	393	461
Japan	4	212	194	181	195
Germany	5	88	119	131	148
United Kingdom	6	85	90	98	107
South Korea	7	68	71	88	100
Brazil	8	29	40	59	75
France	9	50	56	65	68
Taiwan	10	65	57	62	67
Netherlands	11	32	41	54	66
Saudi Arabia	12	20	34	43	61
India	13	14	27	49	58
Venezuela	14	24	40	43	56
Singapore	15	37	36	46	50
Italy	16	36	43	43	50
Switzerland	17	20	24	40	49
Belgium	18	24	32	41	47
Ireland	19	24	38	41	47
Russian Federation	20	10	19	32	43
Hong Kong	21	26	25	31	41
Malaysia	22	37	44	40	40
Nigeria	23	11	26	35	39
Australia	24	19	23	30	38
Colombia	25	11	14	28	37
Top 25 total[1]		**1,746.7**	**2,187.5**	**2,662.4**	**3,041.8**
U.S. total trade		**1,997.3**	**2,575.3**	**3,191.4**	**3,688.3**
Top 25 as % of total		**87.5**	**84.9**	**83.4**	**82.5**

[1]Top 25 trading partners change each year. Totals represent the top 25 trading partners for each year, not necessarily the top 25 trading partners listed here for 2011.
Note: Numbers may not add to totals due to rounding.

Trade with both Canada and Mexico has grown rapidly over the past decade. Trucks carried about 59 percent of the value of goods traded with these two countries.

In addition to trucks transporting the largest share of total trade value with Canada and Mexico, rail is the second largest mover of bidirectional freight moving across both U.S. land borders. Pipelines carry a significant volume of imports from Canada.

TABLE 2-8. TOP 25 TRADING PARTNERS OF THE UNITED STATES IN MERCHANDISE TRADE: 2000, 2005, 2010, AND 2011
Source: U.S. Department of Commerce, International Trade Administration, TradeStats Express, available at www.ita.doc.gov/ as of June 16, 2012.

Table 2-9. Value and Tonnage of U.S. Merchandise Trade with Canada and Mexico by Transportation Mode: 2000, 2005, 2010, and 2011 (billions of current U.S. dollars and millions of short tons)

	2000		2005		2010		2011	
Mode	**Value**	**Weight**	**Value**	**Weight**	**Value**	**Weight**	**Value**	**Weight**
Truck[1]	429	NA	491	191	557	187	626	208
Rail[1]	94	NA	116	141	131	134	152	142
Air	45	<1	33	<1	45	<1	46	<1
Water	33	194	58	256	81	210	108	188
Pipeline[1]	24	NA	52	86	63	106	81	123
Other[1]	29	NA	39	5	40	9	46	13
Total[1]	**653**	**NA**	**790**	**679**	**918**	**646**	**1,058**	**675**

Key: NA = not available.
[1]The U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics estimated the weight of exports for truck, rail, pipeline, and other modes using weight-to-value ratios derived from imported commodities.
Notes: 1 short ton = 2,000 pounds. "Other" includes shipments transported by mail, other and unknown modes, and shipments through Foreign Trade Zones. Totals for the most recent year differ slightly from the Freight Analysis Framework (FAF) due to variations in coverage and FAF conversion of values to constant dollars. Numbers may not add to totals due to rounding.

Table 2-10. Value of U.S. Exports to and Imports from Canada and Mexico by Land Transportation Mode: 2000, 2005, 2010, and 2011 (millions of current U.S. dollars)

	2000	2005	2010	2011
Exports to Canada, total	**154,847**	**192,907**	**224,809**	**254,450**
Truck	129,825	151,222	173,588	195,126
Rail	12,947	19,322	26,116	29,569
Pipeline	162	2,394	3,151	6,211
Other[1]	11,913	19,933	21,901	23,488
Mail	<1	37	53	55
Exports to Mexico, total	**97,159**	**104,277**	**138,929**	**163,021**
Truck	82,389	83,341	111,110	127,720
Rail	10,496	15,748	19,632	24,862
Pipeline	302	543	2,038	3,492
Other[1]	3,972	4,623	6,148	6,946
Mail	<1	2	1	2
Imports from Canada, total	**210,270**	**265,402**	**246,252**	**282,582**
Truck	127,816	143,696	123,238	135,528
Rail	49,699	60,606	56,996	65,118
Pipeline	23,117	48,766	57,562	70,743
Other[1]	9,571	12,184	7,288	7,039
Mail	4	<1	0	1
FTZ[2]	63	149	1,167	4,153
Imports from Mexico, total	**113,437**	**135,400**	**181,339**	**204,080**
Truck	88,669	112,268	148,948	167,483
Rail	21,056	20,782	28,484	32,303
Pipeline	12	<1	182	281
Other[1]	1,574	1,990	1,864	1,892
Mail	1	<1	<1	<1
FTZ[2]	2,126	360	1,862	2,120

[1]"Other" includes "flyaway aircraft" or aircraft moving under their own power (i.e., aircraft moving from the manufacturer to a customer and not carrying any freight), powerhouse (electricity), vessels moving under their own power, pedestrians carrying freight, and unknown.
[2]Foreign Trade Zones (FTZs) were added as a mode of transport for land import shipments beginning in April 1995. Although FTZs are treated as a mode of transportation in the North American Transborder Freight Data, the actual mode for a specific shipment into or out of an FTZ is unknown because U.S. Customs does not collect this information.
Note: Numbers may not add to totals due to rounding.

Table 2-9. Value and Tonnage of U.S. Merchandise Trade with Canada and Mexico by Transportation Mode: 2000, 2005, 2010, and 2011
Source: Sources: Truck, Rail, Pipeline, and Other: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, North American Transborder Freight Data, available at www.bts.gov/transborder as of June 14, 2012; **Air and Water:** U.S. Department of Commerce, Census Bureau, Foreign Trade Division, *FT920 - U.S. Merchandise Trade: Selected Highlights* (Washington, DC: annual issues).

Table 2-10. Value of U.S. Exports to and Imports from Canada and Mexico by Land Transportation Mode: 2000, 2005, 2010, and 2011
Sources: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, North American Transborder Freight Data, available at www.bts.gov/transborder as of June 14, 2012.