

II. FREIGHT MOVED IN DOMESTIC 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, 2012, and 2040¹
(millions of tons)

	2007				2012				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	19,662	17,523	901	1,238	28,520	23,095	2,632	2,794
Truck	12,778	12,587	95	97	13,182	12,973	118	92	18,786	18,083	368	335
Rail	1,900	1,745	61	93	2,018	1,855	82	82	2,770	2,182	388	201
Water	950	504	65	381	975	542	95	338	1,070	559	164	347
Air, air & truck	13	3	4	6	15	3	5	7	53	6	20	27
Multiple modes & mail ¹	1,429	433	389	606	1,588	453	540	595	3,575	645	1,546	1,383
Pipeline ¹	1,493	1,314	4	175	1,546	1,421	13	112	1,740	1,257	17	467
Other & unknown	316	266	36	14	338	277	47	14	526	362	130	34

¹ 2007 total and domestic numbers for the multiple modes & mail and the pipeline categories were revised as a result of Freight Analysis Framework database improvements.

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 2012 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.

In 2012 the U.S. transportation system moved a daily average of about 54 million tons of freight valued at nearly \$48 billion. After back-to-back declines in 2008 and 2009, the tonnage and value of freight moved in 2012 surpassed the previous highs reached in 2007, by just over 4 percent each.

Table 2-1. Weight of Shipments by Transportation Mode: 2007, 2012, and 2040

Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework, version 3.4, 2014.

Table 2-2. Value of Shipments by Transportation Mode: 2007, 2012, and 2040¹
(billions of 2007 dollars)

	2007				2012				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	17,352	13,927	1,392	2,033	39,265	27,131	5,303	6,831
Truck	10,780	10,225	267	287	11,130	10,531	309	289	21,465	19,315	985	1,166
Rail	512	374	45	93	551	400	55	96	898	555	148	195
Water	340	158	15	167	339	170	21	148	337	138	46	153
Air, air & truck	1,077	151	422	505	1,182	163	470	549	5,043	834	1,997	2,212
Multiple modes & mail ¹	2,884	1,646	394	844	3,023	1,697	478	848	9,925	5,203	1,911	2,811
Pipeline ¹	716	651	4	61	768	699	9	61	776	605	17	154
Other & unknown	341	252	48	41	359	267	51	41	821	482	199	139

¹ 2007 total and domestic numbers for the multiple modes & mail and the pipeline categories were revised as a result of Freight Analysis Framework database improvements.

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 2012 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 \$1,377 per ton in 2040 when controlling for inflation. Exports at \$1,826 per ton and imports at \$1,456 per ton are 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

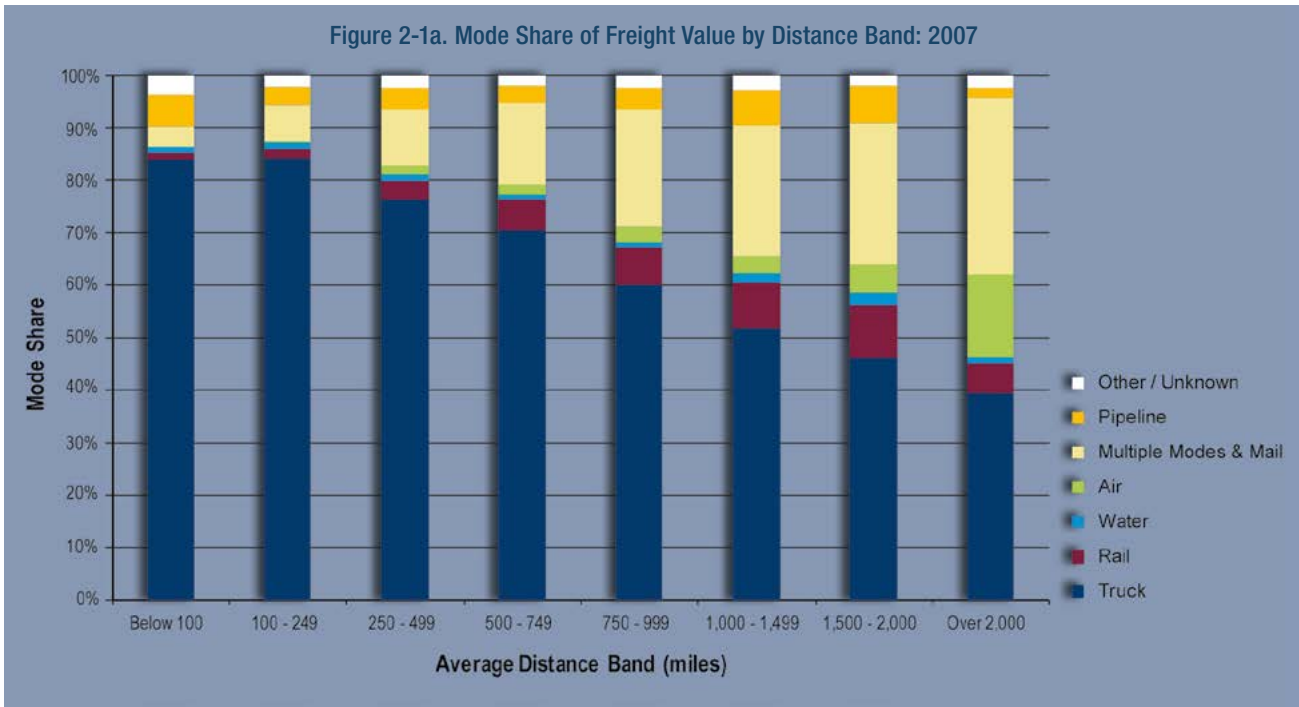
The largest percentage of goods movement occurs close to home. Approximately 50 percent of the weight and 40 percent of the value of goods were moved less than 100 miles between origin and destination in 2007. Less than 10 percent of the weight and 18 percent of the value of goods were moved more than 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, 2012, and 2040

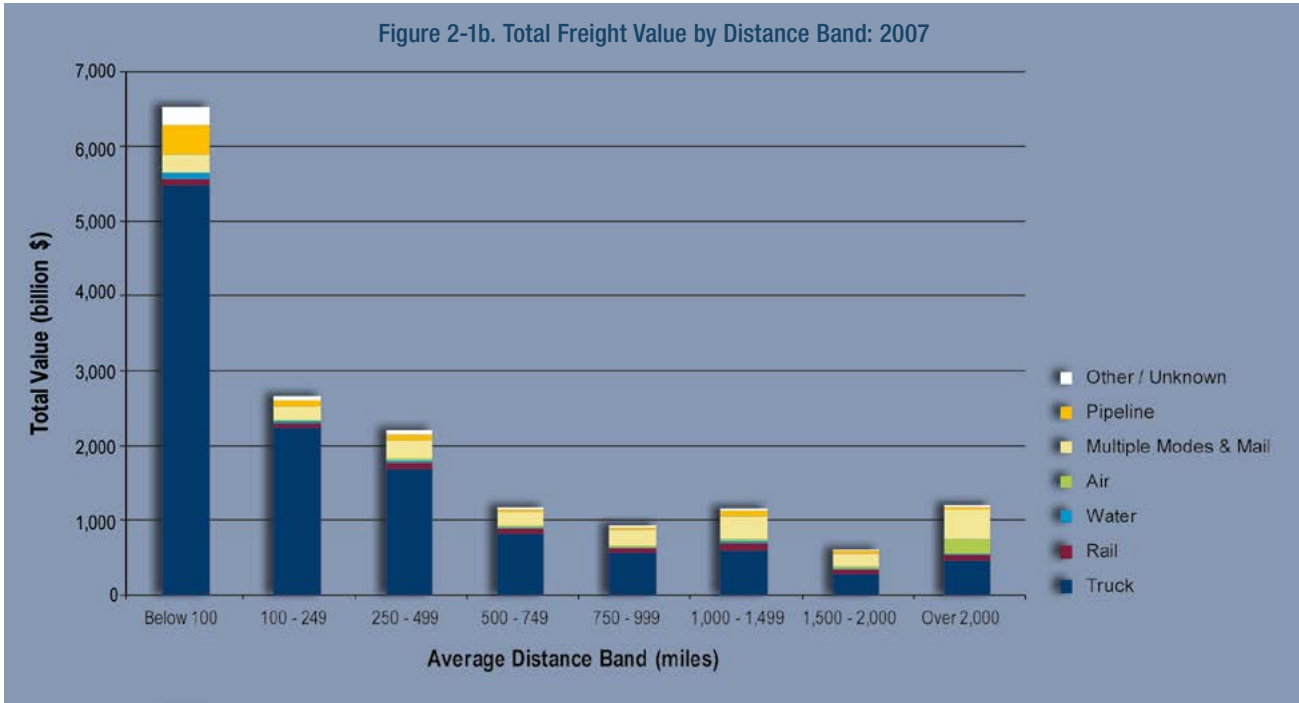
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework, version 3.4, 2014.

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

Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework, version 3.4, 2012.



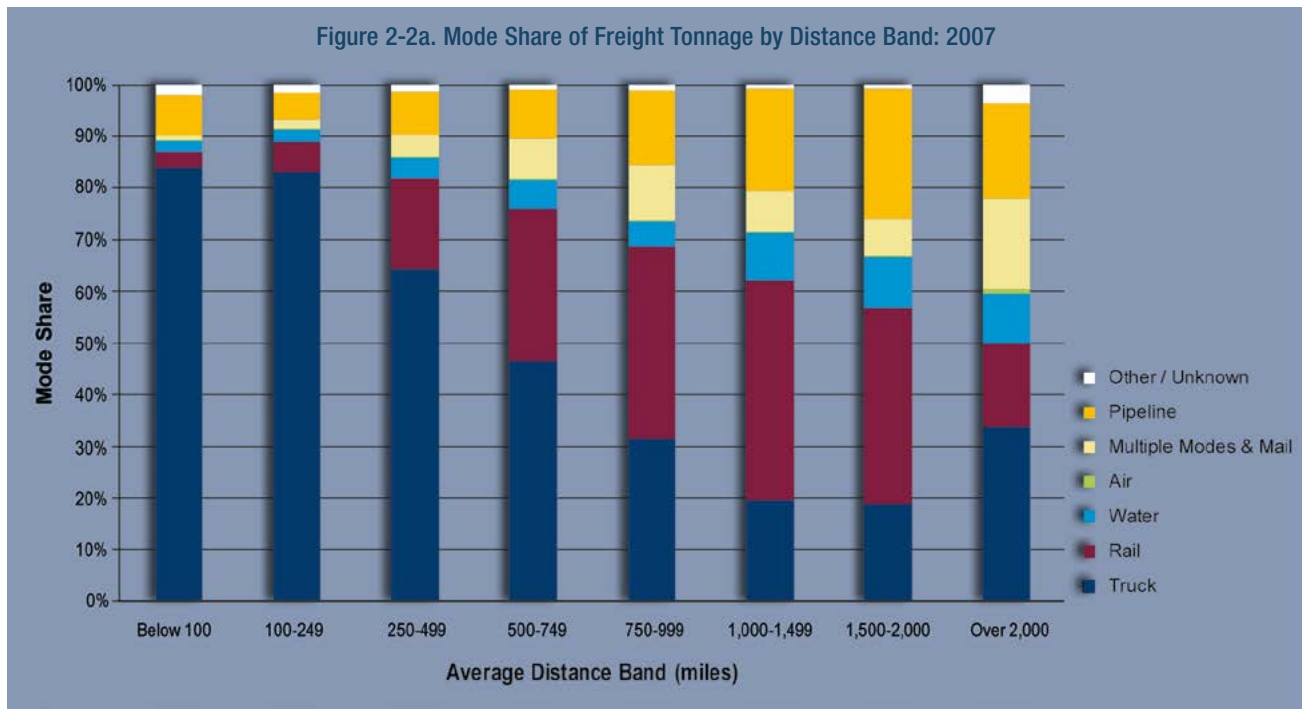
By value, trucks move the largest percentage of goods across all distance bands, with the largest share, 84 percent, occurring at the shortest distances (less than 750 miles). With increasing distance, the multiple modes and mail category's share increases from 4 percent for local travel to a high of 34 percent for the longest distance band. Air transportation moved 16 percent of the value of freight over distances more than 2,000 miles.



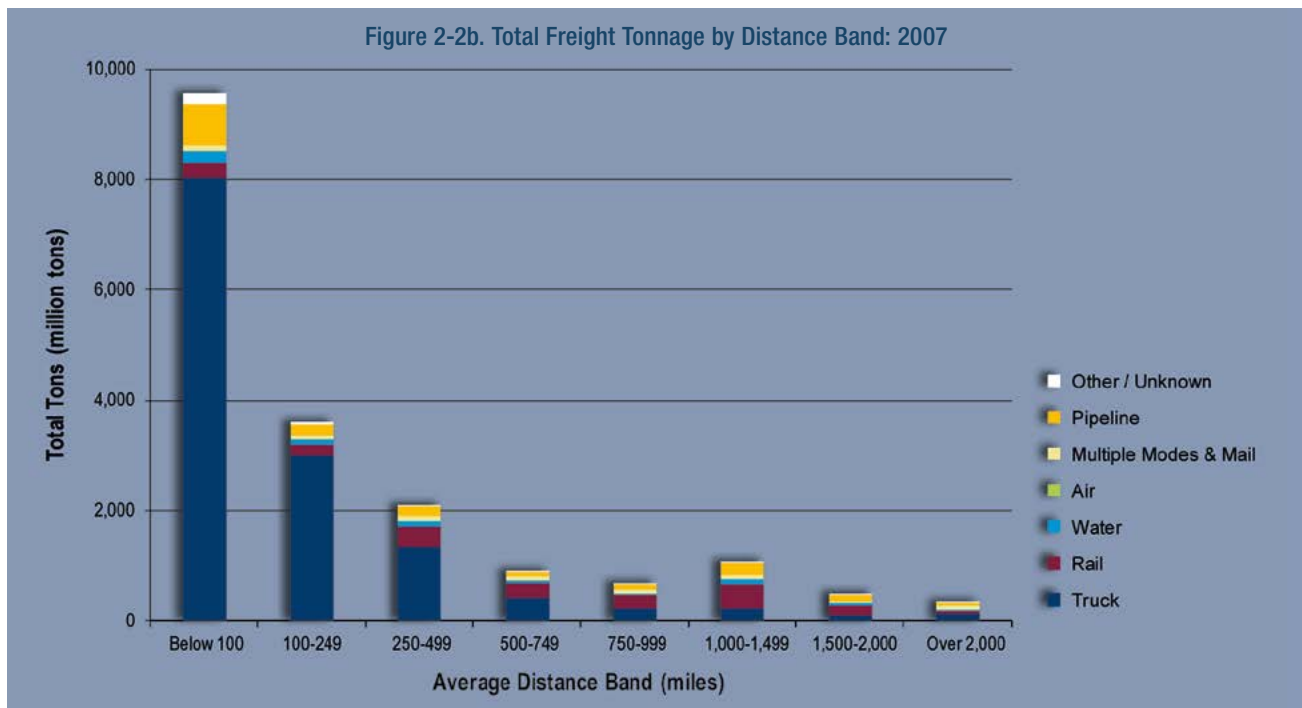
Nearly 40 percent of the total value of goods are moved less than 100 miles while long-distance moves (2,000 or more miles) accounted for 7 percent of the total value of shipments.

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

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



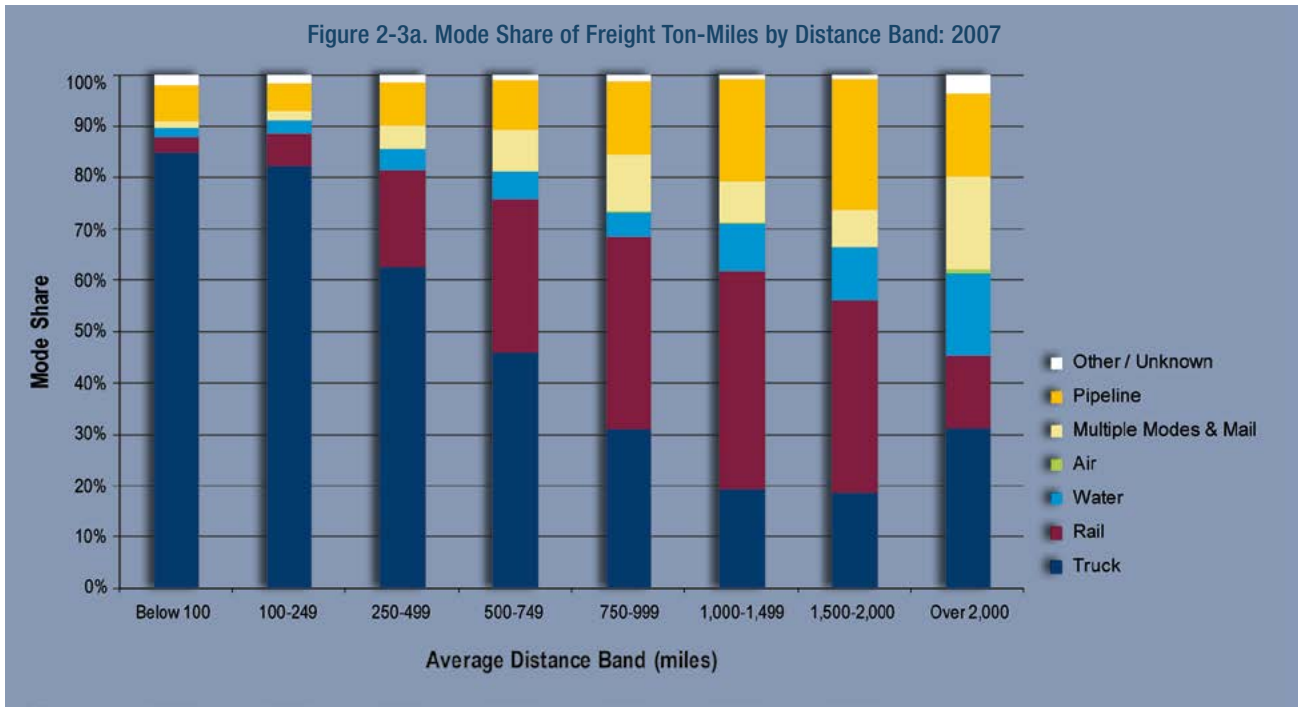
Trucks carry the largest share of goods by weight for distances less than 750 miles and more than 2,000 miles. Rail is the dominant mode for goods moved over distances greater than 750 miles and less than 2,000 miles, accounting for 37 percent of total tons moved.



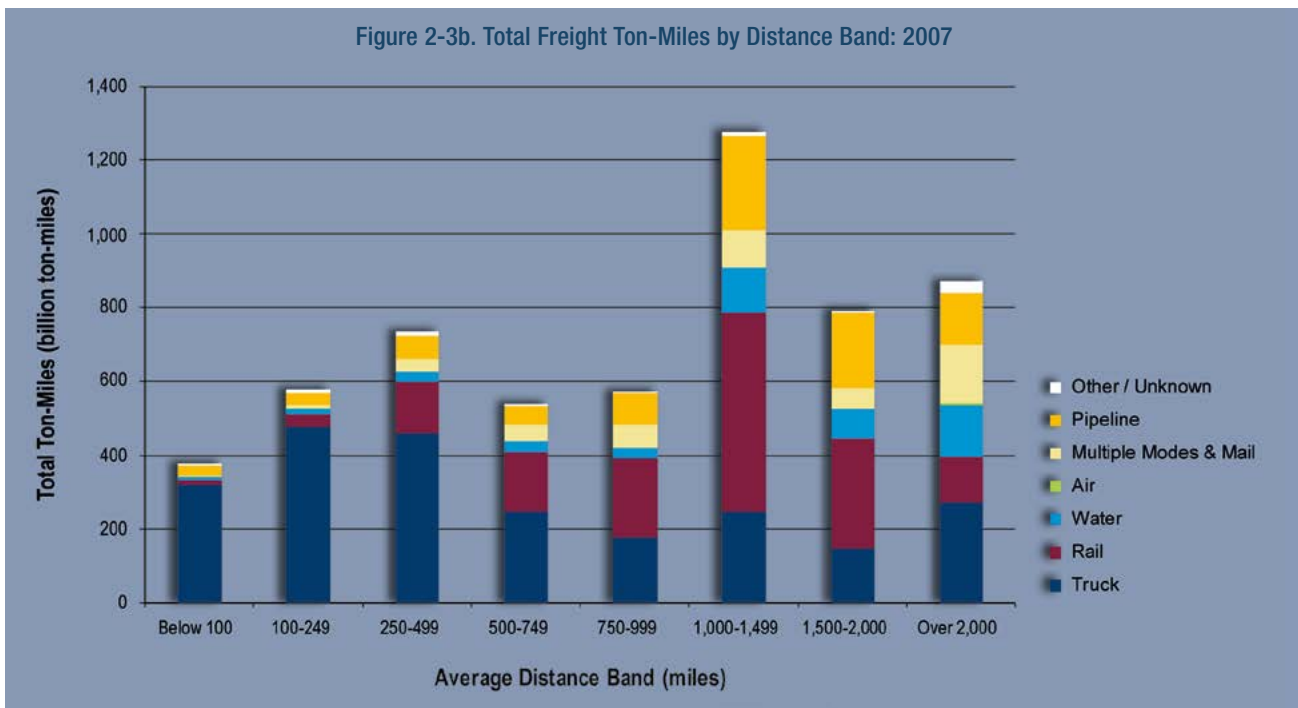
The vast majority of freight tonnage (87 percent) is moved over distances less than 750 miles. Freight transported more than 2,000 miles accounted for less than two percent of total tonnage.

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

Figure 2-2b. Total Freight Tonnage by Distance Band: 2007
 Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management 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. Rail moved nearly two-thirds of total ton-miles while pipelines accounted for 70 percent of ton-miles for distances more than 1,000 miles.



Nearly one-fourth of all ton-miles occur at distances between 1,000-1,499 miles. FAF estimated the freight industry moved goods over 5.7 trillion ton-miles in 2007.

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

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

Table 2-4. Top Commodities: 2012

Millions of Tons		Billions of 2007 Dollars	
Total, all commodities	19,662	Total, all commodities	17,352
Gravel	2,319	Machinery	1,836
Cereal grains	1,595	Electronics	1,492
Coal	1,527	Motorized vehicles	1,348
Natural gas, coke, asphalt ¹	1,442	Mixed freight	1,090
Non-metallic mineral products	1,442	Pharmaceuticals	909
Waste/scrap	1,368	Miscellaneous manufactured products	717
Gasoline	1,030	Textiles/leather	710
Crude petroleum	783	Gasoline	705
Fuel oils	765	Plastics/rubber	601
Natural Sands	585	Articles of base metal	588

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.

The top 10 commodities by weight are comprised entirely of bulk products and accounted for 65 percent of total tonnage but only 16 percent of the value of goods moved in 2012. The top 10 commodities by value accounted for 58 percent of total value and 13 percent of all tons. The leading commodities by weight are bulk goods including gravel, cereal grains, and coal. The leading commodities by value are high value-per-ton goods requiring more rapid delivery, including machinery, electronics, and motorized vehicles.

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

Transportation mode	Value		Tons		Ton-miles ¹		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 ²	837	57.8	1,203	53.9	104	32.2	59
For-hire	359	24.8	495	22.2	63	19.6	214
Private	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
Truck and rail	7	0.5	12	0.5	10	3.1	779
Truck and water	23	1.6	37	1.6	12	3.8	1,010
Rail and water	5	0.4	6	0.3	3	0.9	1,506
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 Ton-miles estimates are based on estimated distances traveled along a modeled transportation network.

² Truck as a single mode includes shipments that went by private truck only, for-hire truck only, or a combination of both.

³ Excludes crude oil shipments.

Note: Value-of-shipment estimates are reported in \$ 2007 dollars. Numbers and percents may not add to totals due to rounding.

As measured by the Bureau of Transportation Statistics (BTS), the Commodity Flow Survey indicates that 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 distances. By contrast, rail accounted for only six percent of hazardous materials shipments by weight but nearly 29 percent of ton-miles.

Table 2-4. Top Commodities: 2012

Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework, version 3.4, 2014.

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

Source: U.S. Department of Transportation, 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 September 20, 2013.

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

Hazard class	Description	Value		Tons		Ton-miles ¹		Miles
		\$ Billions	Percent	Millions	Percent	Billions	Percent	Average distance per shipment
Class 1	Explosives	12	0.8	3	0.1	<1	<0.1	738
Class 2	Gases	132	9.1	251	11.2	55	17.1	51
Class 3	Flammable liquids	1,170	80.8	1,753	78.6	182	56.1	91
Class 4	Flammable solids	4	0.3	20	0.9	6	1.7	309
Class 5	Oxidizers and organic peroxides	7	0.5	15	0.7	7	2.2	361
Class 6	Toxic (poison)	21	1.5	11	0.5	6	1.8	467
Class 7	Radioactive materials	21	1.4	<1	<0.1	<1	<0.1	S
Class 8	Corrosive materials	51	3.6	114	5.1	44	13.7	208
Class 9	Miscellaneous dangerous goods	30	2.1	63	2.8	23	7.1	484
Total		1,448	100.0	2,231	100.0	323	100.0	96

Key: S = data are not published because of high sampling variability or other reasons.

¹ Ton-miles estimates are based on estimated distances traveled along a modeled transportation network.

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

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

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 ¹	749	2,365	1,968	7,852
Rail	279	957	200	573
Water	151	268	54	94
Air, air & truck ²	2	10	206	892
Multiple modes & mail ³	149	509	278	1,250
Pipeline	346	899	137	350
Other & unknown	51	168	220	1,016
No domestic mode ⁴	300	250	130	108

¹ Excludes truck moves to and from airports.

² Includes truck moves to and from airports.

³ 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 by multiple modes & mail.

⁴ 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.

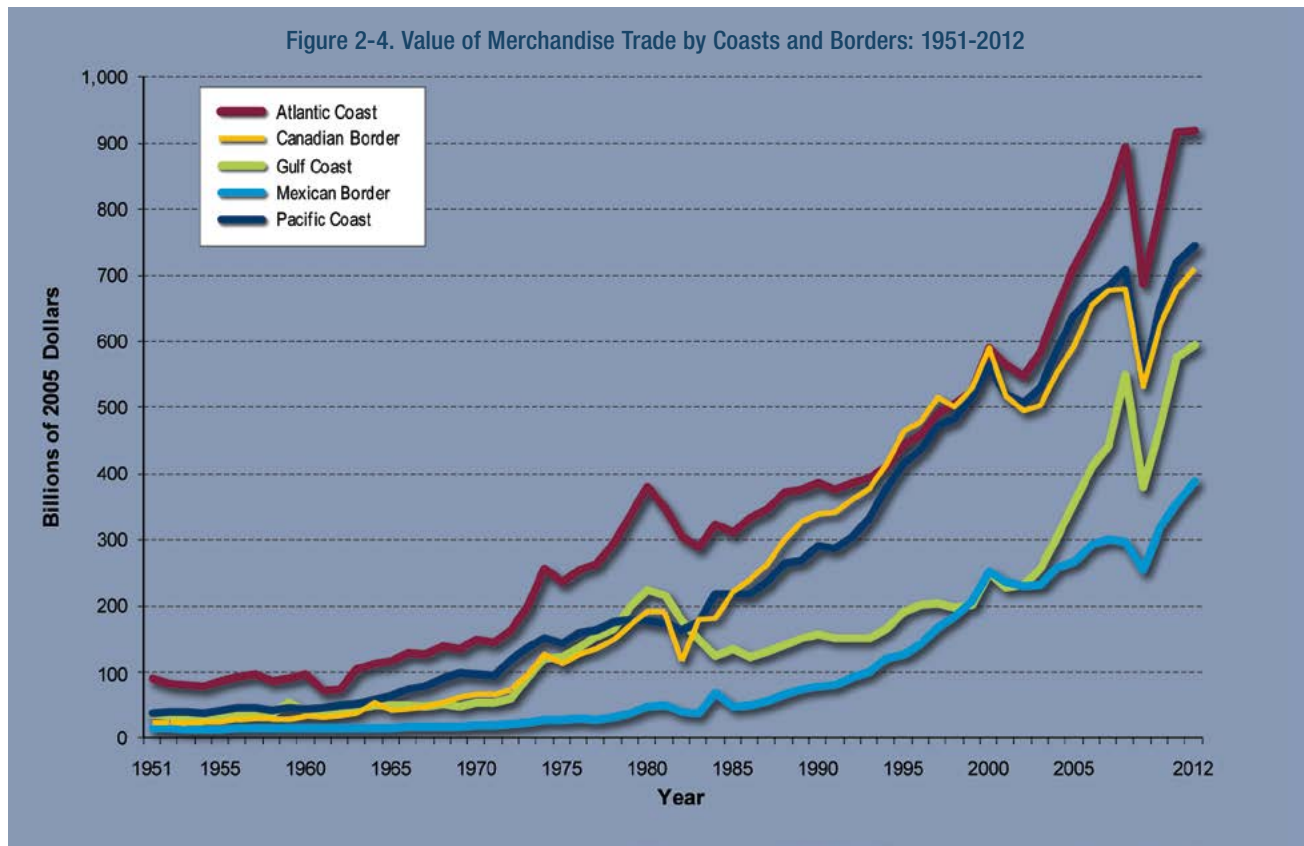
Table 2-6. Hazardous Materials Shipments by Hazard Class: 2007

Source: U.S. Department of Transportation, Bureau of Transportation Statistics and U.S. Department of Commerce, Census Bureau, 2007 Commodity Flow Survey, Hazardous Materials (Washington, DC: July 2010), table 2a, available at www.bts.gov/publications/commodity_flow_survey/ as of September 30, 2013.

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.





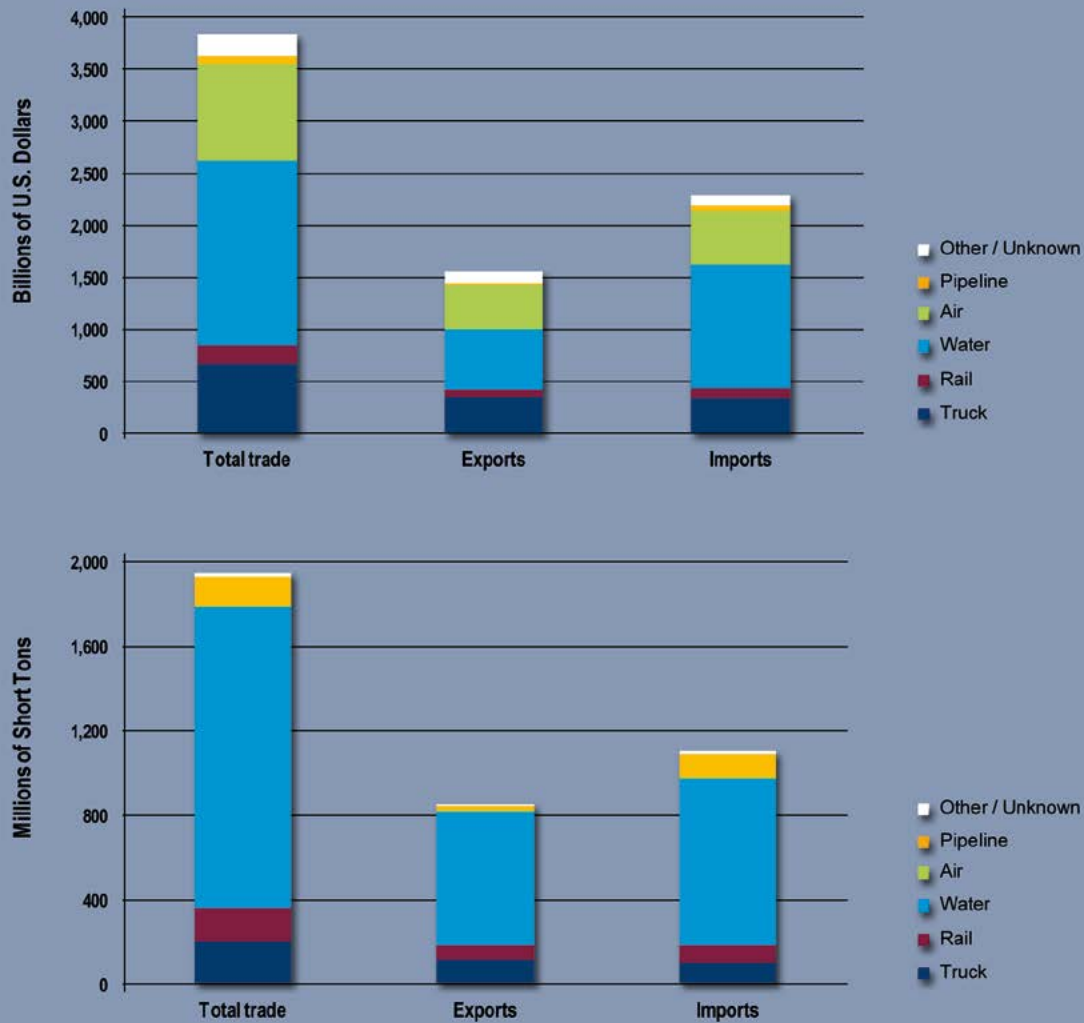
Foreign trade has had a major impact on all U.S. borders and coasts. Since 1951, the value of merchandise trade has grown by twenty-fold in inflation-adjusted terms. In 2012, ports and airports on the Atlantic Coast account for the largest share (27 percent) in terms of the value of trade.



Figure 2-4. Value of Merchandise Trade by Coasts and Borders: 1951-2012
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); 1971-1999: U.S. Department of Commerce, Census Bureau, Statistical Abstract of the United States (Washington, DC: annual issues); 2000-2012: 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 September 18, 2013.



Figure 2-5. U.S. International Merchandise Trade by Transportation Mode: 2012



Notes: 1 short ton = 2,000 pounds. The U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics estimated 2012 weight data for truck, rail, pipeline, and other and unknown 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.

Approximately 75 percent of freight tons in U.S. foreign trade moved by water in 2012, but air and truck transportation are also important when the value of goods traded is considered. By value, the water share dropped to about 49 percent, with air and truck accounting for nearly 26 percent and 18 percent, respectively. Together, rail and pipeline accounted for about 7 percent of the total.

Figure 2-5. U.S. International Merchandise Trade by Transportation Mode: 2012
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 2013). Truck, rail, pipeline, and other and unknown data: U.S. Department of Transportation, Bureau of Transportation Statistics, North American Transborder Freight Data, available at <http://transborder.bts.gov/programs/international/transborder/> as of October 17, 2013.

**Table 2-8. Top 25 Trading Partners of the United States in Merchandise Trade:
2000, 2005, 2011, and 2012
(billions of current U.S. dollars)**

Partner	2012 Rank	2000	2005	2011	2012
Canada	1	406	499	596	616
China	2	116	285	503	536
Mexico	3	248	290	461	494
Japan	4	212	194	195	216
Germany	5	88	119	148	158
United Kingdom	6	85	90	107	110
South Korea	7	68	71	100	101
Brazil	8	29	40	75	76
Saudi Arabia	9	20	34	61	74
France	10	50	56	68	73
Taiwan	11	65	57	67	63
Netherlands	12	32	41	66	63
India	13	14	27	58	63
Venezuela	14	24	40	56	56
Italy	15	36	43	50	53
Switzerland	16	20	24	49	52
Singapore	17	37	36	50	51
Belgium	18	24	32	47	47
Hong Kong	19	26	25	41	43
Colombia	20	11	14	37	41
Ireland	21	24	38	47	41
Australia	22	19	23	38	41
Russian Federation	23	10	19	43	40
Malaysia	24	37	44	40	39
Thailand	25	23	27	36	37
Top 25 total¹		1,747	2,188	3,042	3,182
U.S. total trade		1,997	2,575	3,688	3,821
Top 25 as % of total		87.5	84.9	82.5	83.3

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 2012.

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

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 2012, from about 6 percent in 2000 to 14 percent in 2012.



**Table 2-9. Value and Tonnage of U.S. Merchandise Trade with Canada and Mexico:
2000, 2005, 2011, and 2012**
(billions of current U.S. dollars and millions of short tons)

Mode	2000		2005		2011		2012	
	Value	Weight	Value	Weight	Value	Weight	Value	Weight
Total¹	653	NA	790	679	1,058	675	1,110	703
Truck ¹	429	NA	491	191	626	208	665	196
Rail ¹	94	NA	116	141	152	142	168	154
Air	45	<1	33	<1	46	<1	44	<1
Water	33	194	58	256	108	208	106	196
Pipeline ¹	24	NA	52	86	81	123	77	136
Other ¹	29	NA	39	5	46	13	50	21

Key: NA = not available.

¹The U.S. Department of Transportation, 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.

Trade with both Canada and Mexico has grown rapidly since 2000. Trucks carried 60 percent of the value of goods traded with these countries in 2012.



Table 2-9. Value and Tonnage of U.S. Merchandise Trade with Canada and Mexico: 2000, 2005, 2011, and 2012

Source: Truck, Rail, Pipeline, and Other: U.S. Department of Transportation Bureau of Transportation Statistics, North American Transborder Freight Data, available at www.bts.gov/transborder as of October 15, 2013; **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, 2011, and 2012
(millions of current U.S. dollars)

	2000	2005	2011	2012
Exports to Canada, total	154,847	192,907	254,450	266,120
Truck	129,825	151,222	195,126	202,542
Rail	12,947	19,322	29,569	33,068
Pipeline	162	2,394	6,211	6,071
Other ¹	11,913	19,933	23,488	24,382
Mail	<1	37	55	57
Exports to Mexico, total	97,159	104,277	163,021	180,320
Truck	82,389	83,341	127,720	140,846
Rail	10,496	15,748	24,862	27,611
Pipeline	302	543	3,492	3,241
Other ¹	3,972	4,623	6,946	8,442
Mail	<1	22	2	<1
Imports from Canada, total	210,270	265,402	282,582	290,096
Truck	127,816	143,696	135,528	138,948
Rail	49,699	60,606	65,118	69,914
Pipeline	23,117	48,766	70,743	67,733
Other ¹	9,571	12,184	7,039	6,636
Mail	4	<1	<1	<1
FTZ ²	63	149	4,153	6,865
Imports from Mexico, total	113,437	135,400	204,080	223,599
Truck	88,669	112,268	167,483	182,403
Rail	21,056	20,782	32,303	36,912
Pipeline	12	<1	281	214
Other ¹	1,574	1,990	1,892	1,783
Mail	<1	<1	<1	<1
FTZ ²	2,126	360	2,120	2,287

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.

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 also carry a large volume of imports from Canada.