Chapter 7
Light Vehicles and Characteristics

Summary Statistics from Tables in this Chapter

Source		
Table 7.1	Passenger cars, 2000	
	Registrations (thousands)	*133,621*
	Vehicle miles (million miles)	*1,601,914*
	Fuel economy (miles per gallon)	*22.0*
Table 7.2	Two-axle, four-tire trucks, 2000	
	Registrations (thousands)	*79,085*
	Vehicle miles (million miles)	*924,018*
	Fuel economy (miles per gallon)	*17.5*
Table 7.5	Light truck share of total light vehicle sales	
	1970 calendar year	*14.8%*
	2001 calendar year	*50.5%*
Table 7.7	Automobile sales, 2001 sales period	8, 307,985
	Minicompact	*33,206*
	Subcompact	*922,287*
	Compact	*3,058,389*
	Midsize	*2,669,116*
	Large	*1,506,890*
	Two-seater	*118,097*
Table 7.8	Light truck sales, 2001 sales period	*8,019,518*
	Small pickup	*819,033*
	Large pickup	*1,987,833*
	Small van	*1,050,952*
	Large van	*323,806*
	Small SUV	*894,788*
	Medium SUV	*2,158,012*
	Large SUV	*785,094*
Tables 7.18	Corporate average fuel economy	(mpg)
and 7.19	*Automobile standard, MY 2002*	*27.5*
	Automobile fuel economy, MY 2002	*28.8*
	Light truck standard, MY 2002	*20.7*
	Light truck fuel economy, MY 2002	*21.2*
Table 7.24	Average fuel economy loss from 55 to 70 mph	17.1%

The Federal Highway Administration released revised historical data back to 1985 in their "Highway Statistics Summary to 1995" report. As a result, the data in this table have been revised. The data in this table from 1985–on ***DO NOT*** *include minivans, pickups, or sport utility vehicles.*

Table 7.1
Summary Statistics for Passenger Cars, 1970–2000

Year	Registrations[a] (thousands)	Vehicle travel (million miles)	Fuel use (million gallons)	Fuel economy[b] (miles per gallon)
1970	89,244	916,700	67,820	13.5
1971	92,718	966,330	71,346	13.5
1972	97,082	1,021,365	75,937	13.5
1973	101,985	1,045,981	78,233	13.4
1974	104,856	1,007,251	74,229	13.6
1975	106,706	1,033,950	74,140	13.9
1976	110,189	1,078,215	78,297	13.8
1977	112,288	1,109,243	79,060	14.0
1978	116,573	1,146,508	80,652	14.2
1979	118,429	1,113,640	76,588	14.5
1980	121,601	1,111,596	69,981	15.9
1981	123,098	1,133,332	69,112	16.4
1982	123,702	1,161,713	69,116	16.8
1983	126,444	1,195,054	70,322	17.0
1984	128,158	1,227,043	70,663	17.4
1985[c]	127,885	1,246,798	71,518	17.4
1986	130,004	1,270,167	73,174	17.4
1987	131,482	1,315,982	73,308	18.0
1988	133,836	1,370,271	73,345	18.7
1989	134,559	1,401,221	73,913	19.0
1990	133,700	1,408,266	69,568	20.2
1991	128,300	1,358,185	64,318	21.1
1992	126,581	1,371,569	65,436	21.0
1993	127,327	1,374,709	67,047	20.5
1994	127,883	1,406,089	67,874	20.7
1995	128,387	1,438,294	68,072	21.1
1996	129,728	1,469,854	69,221	21.2
1997	129,749	1,502,556	69,892	21.5
1998	131,839	1,549,577	71,695	21.4
1999	132,432	1,569,100	73,283	21.4
2000	133,621	1,601,914	72,916	22.0
		Average annual percentage change		
1970–2000	1.4%	1.9%	0.2%	1.6%
1990–2000	0.0%	1.3%	0.5%	0.9%

Source:
U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2000*, Washington, DC, 2001, Table VM-1, p. V-50, and annual.
(Additional resources: www.fhwa.dot.gov)

[a] This number differs from R.L. Polk's estimates of "number of automobiles in use." See Table 6.3.
[b] Fuel economy for automobile population.
[c] Beginning in this year the data were revised to exclude minivans, pickups and sport utility vehicles which may have been previously included.

The Federal Highway Administration released revised historical data back to 1985 which better reflected two-axle, four-tire trucks. The definition of this category includes vans, pickup trucks, and sport utility vehicles.

Table 7.2
Summary Statistics for Two-Axle, Four-Tire Trucks, 1970–2000

Year	Registrations (thousands)	Vehicle travel (million miles)	Fuel use (million gallons)	Fuel economy (miles per gallon)
1970	14,211	123,286	12,313	10.0
1971	15,181	137,870	13,484	10.2
1972	16,428	156,622	15,150	10.3
1973	18,083	176,833	16,828	10.5
1974	19,335	182,757	16,657	11.0
1975	20,418	200,700	19,081	10.5
1976	22,301	225,834	20,828	10.8
1977	23,624	250,591	22,383	11.2
1978	25,476	279,414	24,162	11.6
1979	27,022	291,905	24,445	11.9
1980	27,876	290,935	23,796	12.2
1981	28,928	296,343	23,697	12.5
1982	29,792	306,141	22,702	13.5
1983	31,214	327,643	23,945	13.7
1984	32,106	358,006	25,604	14.0
1985[a]	37,214	390,961	27,363	14.3
1986	39,382	423,915	29,074	14.6
1987	41,107	456,870	30,598	14.9
1988	43,805	502,207	32,653	15.4
1989	45,945	536,475	33,271	16.1
1990	48,275	574,571	35,611	16.1
1991	53,033	649,394	38,217	17.0
1992	57,091	706,863	40,929	17.3
1993	59,994	745,750	42,851	17.4
1994	62,904	764,634	44,112	17.3
1995	65,738	790,029	45,605	17.3
1996	69,134	816,540	47,354	17.2
1997	70,224	850,739	49,389	17.2
1998	71,330	868,275	50,462	17.2
1999	75,356	901,022	52,859	17.0
2000	79,085	924,018	52,832	17.5
		Average annual percentage change		
1970–2000	5.9%	6.9%	5.0%	1.9%
1990–2000	5.1%	4.9%	4.0%	0.8%

Source:
U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 2000*, Washington, DC, 2001, Table VM-1, p. V-50, and annual.
(Additional resources: www.fhwa.dot.gov)

[a] Beginning in this year the data were revised to include all vans (including mini-vans), pickups and sport utility vehicles.

Because data on Class 2b trucks are scarce, the U.S. DOE funded a study to investigate available sources of data. In the final report, four methodologies are described to estimate the sales of Class 2b trucks.

Table 7.3
Summary Statistics on Class 1, Class 2a, and Class 2b Light Trucks

	CY 1999 truck sales (millions)	MY 2000 truck population (millions)	Percent diesel trucks in population	Average age (years)	Estimated annual miles[a] (billions)	Estimated fuel use (billion[a] gallons)
Class 1	5.7	49.7	0.3%	7.3	672.7	37.4
Class 2a	1.8	19.2	2.5%	7.4	251.9	18.0
Class 2b	0.5	5.8	24.0%	8.6	76.7	5.5

Source: Davis, S.C. and L.F. Truett, *Investigation of Class 2b Trucks (Vehicles of 8,500 to 10,000 lbs GVWR)*, ORNL/TM-2002/49, March 2002, Table 16.
Note: CY - calendar year. MY - model year.

Table 7.4
Sales Estimates of Class 1, Class 2a, and Class 2b Light Trucks, 1989–1999

	Sales estimates (thousands)			
Calendar Year	Class 1 (6,000 lbs and under)	Class 2a (6,001-8,500 lbs)	Class 2b (8,5001-10,000 lbs)	Total
1989	3,313	918	379	4,610
1990	3,451	829	268	4,548
1991	3,246	670	206	4,122
1992	3,608	827	194	4,629
1993	4,119	975	257	5,351
1994	4,527	1,241	265	6,033
1995	4,422	1,304	327	6,053
1996	4,829	1,356	334	6,519
1997	5,085	1,315	397	6,797
1998	5,263	1,694	342	7,299
1999	5,707	1,845	521	8,073
		Percent change		
1989–1999	72.3%	101.0%	37.5%	75.1%

Source: Davis, S.C. and L.F. Truett, *Investigation of Class 2b Trucks (Vehicles of 8,500 to 10,000 lbs GVWR)*, ORNL/TM-2002/49, March 2002, Table 1.
Note: These data were calculated using Methodology 4 from the report.

[a]Estimates derived using 2000 population data and 1997 usage data. See source for details.

Nearly one-quarter of autos sold in 2000 were transplants–autos built in the U.S. by a foreign firm.

Table 7.5
New Retail Automobile Sales in the United States, 1970–2001

Calendar year	Domestic[a]	Import[b]	Total	Percentage imports	Percentage transplants[c] on model year basis	Percentage imports and transplants	Percentage diesel
	(thousands)						
1970	7,119	1,285	8,404	15.3%	[d]	[d]	[d]
1975	7,053	1,571	8,624	18.2%	[d]	[d]	0.31%
1980	6,581	2,398	8,979	26.7%	2.1%	28.8%	4.31%
1981	6,209	2,327	8,536	27.3%	1.8%	29.1%	6.10%
1982	5,759	2,223	7,982	27.9%	1.4%	29.3%	4.44%
1983	6,795	2,387	9,182	26.0%	1.3%	27.3%	2.09%
1984	7,952	2,439	10,391	23.5%	2.0%	25.5%	1.45%
1985	8,205	2,838	11,043	25.7%	2.2%	27.9%	0.82%
1986	8,215	3,238	11,453	28.3%	2.8%	31.1%	0.37%
1987	7,081	3,197	10,278	31.1%	5.2%	36.3%	0.16%
1988	7,526	3,099	10,626	29.2%	5.8%	35.0%	0.02%
1989	7,073	2,825	9,898	28.5%	7.3%	35.8%	0.13%
1990	6,897	2,404	9,301	25.8%	11.2%	37.0%	0.08%
1991	6,137	2,038	8,175	24.9%	13.7%	38.6%	0.10%
1992	6,277	1,937	8,213	23.6%	14.1%	37.7%	0.06%
1993	6,742	1,776	8,518	20.9%	14.9%	35.8%	0.03%
1994	7,255	1,735	8,990	19.3%	16.5%	35.8%	0.04%
1995	7,129	1,506	8,635	17.4%	18.9%	36.3%	0.04%
1996	7,255	1,271	8,526	14.9%	22.3%	37.2%	0.10%
1997	6,917	1,355	8,272	16.4%	23.7%	40.1%	0.09%
1998	6,762	1,380	8,142	16.9%	25.1%	42.0%	0.13%
1999	6,979	1,719	8,698	19.8%	24.6%	44.4%	0.16%
2000	6,831	2,016	8,847	22.8%	24.4%	47.2%	0.26%
2001	6,325	2,098	8,423	24.9%	26.0%	50.9%	0.18%
			Average annual percentage change				
1970–2001	-0.4%	1.6%	0.0%				
1991–2001	0.3%	0.3%	0.3%				

Source:
Domestic and import data - 1970–97: American Automobile Manufacturers Association, *Motor Vehicle Facts and Figures 1998*, Detroit, MI, 1998, p. 15, and annual. 1997 data from *Economic Indicators, 4th Quarter 1997*. 1998–2001: Ward's Communication, *Ward's 2000 Motor Vehicle Facts and Figures*, Detroit, MI, 2000, p. 15.
Diesel data - Ward's Communications, *Ward's Automotive Yearbook*, Detroit, MI, 2002, p. 52, and annual.
Transplant data - Oak Ridge National Laboratory, Light Vehicle MPG and Market Shares Data System, Oak Ridge, TN, 2002. (Additional resources: www.aama.com, www.wardsauto.com)

[a] North American built.
[b] Does not include import tourist deliveries.
[c] A transplant is an automobile which was built in the U.S. by a foreign firm. Also included are joint ventures which are built in the U.S.
[d] Data are not available.

In 2000, light trucks, which include pick-ups, minivans, sport-utility vehicles, and other trucks less than 10,000 pounds gross vehicle weight (GVW), accounted for 48.7% of light vehicle sales.

Table 7.6
New Retail Sales of Trucks 10,000 Pounds GVW and Less in the United States, 1970–2001

Calendar year	Light truck sales[a] (thousands)	Percentages					
		Import[b]	Transplants[c]	Diesel[d]	Four-wheel drive of domestic light trucks[d]	Light trucks of light-duty vehicle sales[e]	Light trucks of total truck sales
1970	1,463	4.5%	[f]	[g]	[f]	14.8%	80.4%
1975	2,281	10.0%	[f]	[g]	23.4%	20.9%	87.9%
1980	2,440	19.7%	0.9%	3.6%	20.7%	21.4%	88.9%
1981	2,189	20.3%	0.0%	3.1%	18.6%	20.4%	89.8%
1982	2,470	16.5%	0.0%	8.5%	16.8%	23.6%	92.8%
1983	2,984	15.6%	0.0%	6.7%	28.5%	24.5%	93.6%
1984	3,863	15.7%	2.0%	4.8%	27.0%	27.1%	93.0%
1985	4,458	17.2%	2.6%	3.8%	29.1%	28.8%	93.6%
1986	4,594	20.1%	2.3%	3.7%	27.0%	28.6%	94.3%
1987	4,610	17.9%	1.7%	2.3%	32.0%	31.0%	93.9%
1988	4,800	12.6%	2.4%	2.3%	32.1%	31.1%	93.2%
1989	4,610	10.9%	2.6%	2.9%	31.4%	31.8%	93.3%
1990	4,548	13.2%	3.4%	3.1%	31.6%	32.8%	93.9%
1991	4,123	12.8%	4.5%	3.2%	34.4%	33.5%	94.5%
1992	4,629	8.6%	5.5%	3.3%	31.6%	36.0%	94.4%
1993	5,351	6.8%	7.1%	3.7%	32.6%	38.6%	94.2%
1994	6,033	6.5%	8.1%	3.9%	34.4%	40.2%	94.0%
1995	6,053	6.5%	7.5%	4.1%	39.1%	41.2%	93.4%
1996	6,519	6.6%	8.4%	3.7%	35.7%	43.3%	94.1%
1997	6,797	8.4%	7.0%	4.8%	39.6%	46.6%	94.1%
1998	7,299	8.9%	7.6%	1.7%	43.8%	47.3%	93.3%
1999	8,073	9.5%	8.7%	5.9%	43.3%	48.1%	92.6%
2000	8,387	9.9%	11.3%	4.8%	41.7%	48.7%	93.9%
2001	8,598	10.0%	12.8%	5.3%	42.2%	50.5%	95.0%
		Average annual percentage change					
1970–2001	5.9%						
1991–2001	7.6%						

Source:
Four-wheel drive - 1970–88: Ward's Communications, *Ward's Automotive Yearbook*, Detroit, MI, 1989, p. 168, and annual. 1989–on: Ward's Communications, *Ward's Automotive Yearbook*, Factory Installation Reports, Detroit, MI, 2001, and annual.
Transplants - Oak Ridge National Laboratory, Light-Duty Vehicle MPG and Market Shares System, Oak Ridge, TN, 1996.
All other - 1970–97: American Automobile Manufacturers Association, *Motor Vehicle Facts and Figures 1998*, Detroit, MI, 1998, pp. 8, 15, 24, and annual. 1998–on: Ward's Communications, *Ward's 2000 Motor Vehicle Facts and Figures*, Detroit, MI, p. 24, and annual.
(Additional resources: www.aama.com, www.wardsauto.com)

[a] Includes all trucks of 10,000 pounds gross vehicle weight and less sold in the U.S.
[b] Excluding transplants.
[c] Based on model year data. A transplant is a light truck which was built in the U.S. by a foreign firm. Also included are joint ventures built in the U.S.
[d] Based on model year factory installations. Column was revised.
[e] Light-duty vehicles include automobiles and light trucks.
[f] Data are not available.
[g] Indicates less than 1 percent.

The sales-weighted fuel economy of automobiles increased dramatically from 1976 (17.2 mpg) to 1990 (27.6 mpg), but has remained fairly constant since then.

Table 7.7
Period Sales, Market Shares, and Sales-Weighted Fuel Economies of New Domestic and Import Automobiles, Selected Sales Periods[a] 1976–2001

Sales Period[a]	1976	1980	1985	1990	1995	2000	2001
MINICOMPACT							
Total sales, units	–	428,346	52,295	76,698	44,752	19,245	33,206
Market share, %	–	4.7	0.5	0.8	0.5	0.2	0.4
Fuel economy, mpg	–	29.4	32.7	26.4	27.0	25.6	24.6
SUBCOMPACT							
Total sales, units	2,625,929	3,441,480	2,382,339	2,030,226	1,518,209	1,789,350	922,287
Market share, %	27.1	37.8	21.7	22.0	17.4	19.9	11.1
Fuel economy, mpg	23.5	27.3	30.1	31.3	31.7	31.1	29.6
COMPACT							
Total sales, units	2,839,603	599,423	3,526,118	3,156,481	3,289,735	2,397,813	3,058,389
Market share, %	29.3	6.6	32.1	34.2	37.7	26.7	36.8
Fuel economy, mpg	17.1	22.3	29.6	28.9	30.2	30.4	31.3
MIDSIZE							
Total sales, units	1,815,505	3,073,103	3,117,817	2,511,503	2,498,521	3,352,198	2,669,116
Market share, %	18.7	33.8	28.4	27.2	28.6	37.3	32.1
Fuel economy, mpg	15.3	21.3	24.9	25.9	25.9	26.8	27.2
LARGE							
Total sales, units	2,206,102	1,336,190	1,516,249	1,279,092	1,320,608	1,297,237	1,506,890
Market share, %	22.8	14.7	13.8	13.9	15.1	14.4	18.1
Fuel economy, mpg	13.9	19.3	22.3	23.5	24.1	25.3	25.4
TWO SEATER							
Total sales, units	199,716	215,964	373,697	170,465	53,045	122,259	118,097
Market share, %	2.1	2.4	3.4	1.8	0.6	1.4	1.4
Fuel economy, mpg	20.1	21.0	27.6	28.0	24.7	25.8	26.5
TOTAL							
Total sales, units	9,686,855	9,094,506	10,968,515	9,224,465	8,724,870	8,978,102	8,307,985
Market share, %	100	100	100	100	100	100	100
Fuel economy, mpg	17.2	23.2	27.0	27.6	28.0	28.2	28.5

Source:
Oak Ridge National Laboratory, Light Vehicle MPG and Market Shares System, Oak Ridge, TN, 2002.
(Additional resources: www-cta.ornl.gov)

[a] Sales period is October 1 of the previous year through September 30 of the current year. These figures represent only those sales that could be matched to corresponding EPA fuel economy values.

Light truck sales have more than tripled from 1976 to 2001. Similar to the automobile trend, the sales-weighted fuel economy of light trucks increased during the late '70's and '80's, but has remained fairly constant in the '90's.

Table 7.8
Period Sales, Market Shares, and Sales-Weighted Fuel Economies of New Domestic and Import Light Trucks, Selected Sales Periods[a] 1976–2001

Sales Period[a]	1976	1980	1985	1990	1995	2000	2001
SMALL PICKUP							
Total sales, units	170,351	516,412	863,584	1,135,727	1,067,764	1,071,730	819,033
Market share, %	7.1	23.3	20.4	25.2	18.0	12.9	10.2
Fuel economy, mpg	23.9	25.5	26.8	24.5	24.4	22.0	21.3
LARGE PICKUP							
Total sales, units	1,586,020	1,115,248	1,690,931	1,116,490	1,472,885	1,968,710	1,987,833
Market share, %	65.8	50.3	39.9	24.7	24.8	23.7	24.8
Fuel economy, mpg	15.1	17.0	19.0	17.5	17.8	18.7	19.0
SMALL VAN							
Total sales, units	18,651	13,649	437,660	1,012,141	1,330,586	1,272,070	1,050,952
Market share, %	0.8	0.6	10.3	22.4	22.4	15.3	13.1
Fuel economy, mpg	19.5	19.6	23.9	22.3	22.4	23.0	23.1
LARGE VAN							
Total sales, units	574,745	328,065	536,242	319,429	327,586	368,820	323,806
Market share, %	23.9	14.8	12.7	7.1	5.5	4.4	4.0
Fuel economy, mpg	15.4	16.3	16.4	17.1	17.2	18.2	18.3
SMALL SUV							
Total sales, units	0	51,684	441,966	402,354	509,737	756,142	894,788
Market share, %	0.0	2.3	10.4	8.9	8.6	9.1	11.2
Fuel economy, mpg		17.7	22.1	22.5	22.0	23.8	24.3
MEDIUM SUV							
Total sales, units	50,763	151,929	187,447	434,491	1,076,686	2,167,329	2,158,012
Market share, %	2.1	6.9	4.4	9.6	18.1	26.1	26.9
Fuel economy, mpg	15.1	14.9	17.2	19.7	19.2	20.4	20.7
LARGE SUV							
Total sales, units	9,228	39,550	77,535	93,993	148,622	702,152	785,094
Market share, %	0.4	1.8	1.8	2.1	2.5	8.5	9.8
Fuel economy, mpg	14.2	13.7	17.1	16.5	16.1	17.5	17.6
TOTAL							
Total sales, units	2,409,758	2,216,537	4,235,365	4,514,625	5,933,866	8,306,953	8,019,518
Market share, %	100	100	100	100	100	100	100
Fuel economy, mpg	15.6	18.1	20.4	20.5	20.2	20.4	20.5

Source:
Oak Ridge National Laboratory, Light Vehicle MPG and Market Shares System, Oak Ridge, TN, 2002.
(Additional resources: www-cta.ornl.gov)

Note:
Revised definitions of light trucks are based on vehicle **curb weight** as follows:
Small pickup= <3,500 lbs. Large pickup=3,500-8,500 lbs.
Small van = <4,500 lbs. Large van=4,500-8,500 lbs.
Small utility= <3,500 lbs. Medium utility=3,500-4,799 lbs. Large utility=4,800-8,500 lbs.

[a] Sales period is October 1 of the previous year through September 30 of the current year. These figures represent only those sales that could be matched to corresponding EPA fuel economy values.

Back in 1976 only 20% of new light vehicle sales were light trucks. Because of the boom in sales of minivans, sport utility vehicles, and pick-up trucks, today almost half of light vehicle sales are light trucks.

Table 7.9
Light Vehicle Market Shares by Size Class, Sales Periods[a] 1976–2001

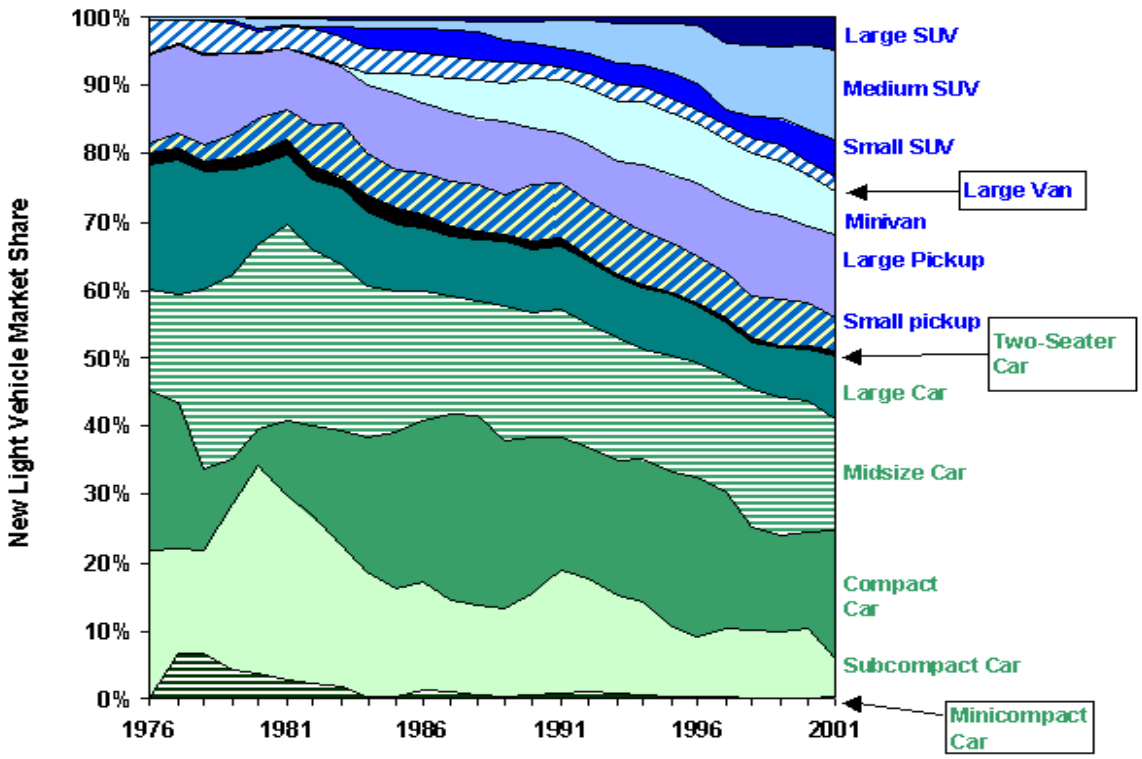
Sales period[a]	1976	1980	1985	1990	1995	2000	2001
Minicompact	0.0%	3.8%	0.3%	0.6%	0.3%	0.1%	0.2%
Subcompact	21.7%	30.4%	15.7%	14.8%	10.4%	10.4%	5.6%
Compact	23.5%	5.3%	23.2%	23.0%	22.4%	13.9%	18.7%
Midsize	15.0%	27.2%	20.5%	18.3%	17.0%	19.4%	16.3%
Large	18.2%	11.8%	10.0%	9.3%	9.0%	7.5%	9.2%
Two seater	1.7%	1.9%	2.5%	1.2%	0.4%	0.7%	0.7%
Small pickup	1.4%	4.6%	5.7%	8.3%	7.3%	6.2%	5.0%
Large pickup	13.1%	9.9%	11.1%	8.1%	10.0%	11.4%	12.2%
Small van	0.2%	0.1%	2.9%	7.4%	8.6%	7.4%	6.4%
Large van	4.8%	2.9%	3.5%	2.3%	9.1%	2.1%	2.0%
Small utility	0.0%	0.5%	2.9%	2.9%	3.5%	4.4%	5.5%
Medium utility	0.4%	1.3%	1.2%	3.2%	7.3%	12.5%	13.2%
Large utility	0.1%	0.3%	0.5%	0.7%	1.0%	4.1%	4.8%
Total light vehicles sold	12,096,613	11,311,043	15,203,880	13,739,090	14,658,736	17,285,055	16,327,503
Cars	80.1%	80.4%	72.1%	67.1%	59.5%	51.9%	50.9%
Light trucks	19.9%	19.6%	27.9%	32.9%	40.5%	48.1%	49.1%

Source:
Oak Ridge National Laboratory, Light Vehicle MPG and Market Shares System, Oak Ridge, TN, 2002.
(Additional resources: www-cta.ornl.gov)

[a] Sales period is October 1 of the current year through September 30 of the next year.

This graph shows the emergence of the mini-van in the early 1980's and the rising popularity of sport utility vehicles in the 1990's.

Figure 7.1. Light Vehicle Market Shares, Sales Periods 1976–2001



Source:
See Table 7.9

The compact, midsize, and large automobile sales-weighted engine sizes declined dramatically in the late '70's and early '80's.

Table 7.10
Sales-Weighted Engine Size of New Domestic and Import Automobiles by Size Class, Sales Periods[a] 1976–2001
(liters[b])

Sales period[a]	Minicompact	Subcompact	Compact	Midsize	Large	Two seater	Fleet
1976	[c]	2.67	5.00	5.85	6.79	2.89	4.89
1977	1.98	2.73	4.79	5.47	6.02	2.81	4.56
1978	2.06	2.67	3.95	4.89	6.17	3.01	4.33
1979	1.86	2.39	3.74	4.41	5.56	2.77	3.78
1980	1.90	2.10	3.03	3.90	5.12	2.79	3.22
1981	1.57	2.04	2.20	3.63	5.00	2.49	2.98
1982	1.53	2.08	2.12	3.47	4.73	2.41	2.89
1983	1.60	2.19	2.20	3.45	4.95	2.52	2.98
1984	2.17	2.22	2.21	3.40	4.87	2.50	2.97
1985	1.95	2.29	2.27	3.37	4.65	2.47	2.92
1986	1.45	2.19	2.21	3.19	4.38	2.83	2.76
1987	1.48	2.19	2.20	2.99	4.36	2.57	2.68
1988	1.52	2.05	2.21	3.00	4.32	2.75	2.66
1989	2.54	2.08	2.11	3.01	4.31	2.81	2.68
1990	2.42	1.96	2.25	3.13	4.33	2.57	2.72
1991	2.17	1.97	2.23	3.16	4.40	2.67	2.72
1992	1.89	2.01	2.33	3.16	4.34	3.01	2.76
1993	1.96	2.07	2.28	3.16	4.27	3.47	2.78
1994	2.21	2.27	2.23	3.15	4.17	3.82	2.79
1995	2.42	2.26	2.23	3.12	4.12	3.76	2.79
1996	2.49	2.23	2.19	2.98	4.09	3.67	2.71
1997	2.62	2.13	2.28	3.02	4.03	3.08	2.74
1998	3.15	2.29	2.17	2.94	3.98	3.51	2.75
1999	2.86	2.31	2.25	2.91	3.91	3.62	2.76
2000	2.55	2.30	2.23	2.85	3.88	3.45	2.73
2001	3.01	2.66	2.16	2.85	3.69	3.48	2.74
			Average annual percentage change				
1976–2001	1.1%[d]	0.0%	-3.3%	-2.8%	-2.4%	0.7%	-2.3%
1991–2001	3.3%	3.0%	-0.3%	-1.0%	-1.7%	2.7%	0.1%

Source:
Oak Ridge National Laboratory, Light Vehicle MPG and Market Shares System, Oak Ridge, TN, 2002.
(Additional resources: www-cta.ornl.gov)

[a] Sales period is October 1 of the previous year through September 30 of the current year.
[b] 1 liter = 61.02. cubic inches.
[c] There were no minicompact automobiles sold in 1976.
[d] Average annual percentage change begins with 1977.

Table 7.11
Sales-Weighted Engine Size of New Domestic and Import Light Trucks by Size Class
Sales Periods[a] 1976–2001
(liters[b])

Sales period[a]	Small pickup	Large pickup	Small van	Large van	Small utility	Medium utility	Large utility	Fleet
1976	1.92	4.41	1.97	4.27	[c]	4.21	5.74	4.18
1977	1.95	4.41	1.97	4.37	[c]	4.21	5.74	4.11
1978	1.96	4.39	1.97	4.25	3.80	4.48	5.74	4.09
1979	2.00	5.15	1.97	4.24	4.23	4.67	5.74	4.41
1980	1.99	4.41	1.97	4.85	2.47	4.51	5.74	3.88
1981	2.08	4.16	1.97	4.34	2.47	4.55	5.00	3.67
1982	2.06	4.02	1.59	4.33	2.47	4.54	5.00	3.55
1983	2.04	4.05	1.59	4.32	2.28	4.84	5.59	3.37
1984	2.05	4.17	2.13	4.33	2.33	4.14	5.65	3.40
1985	2.09	4.02	2.22	4.43	2.60	4.44	4.96	3.38
1986	2.13	3.79	2.29	4.41	2.28	4.33	4.95	3.12
1987	2.17	3.71	2.29	4.46	2.39	3.83	4.95	3.07
1988	2.56	4.68	3.15	5.21	3.23	4.19	5.55	3.82
1989	2.64	4.70	3.11	5.22	3.77	3.77	5.58	3.93
1990	2.90	5.14	3.43	5.24	3.68	3.55	5.56	3.93
1991	2.93	5.22	3.36	5.26	3.60	3.85	5.46	3.92
1992	3.09	5.15	3.43	5.31	3.62	3.94	5.45	4.00
1993	3.15	5.15	3.41	5.24	3.60	4.06	5.58	4.02
1994	3.05	5.26	3.58	5.37	3.53	4.01	5.54	4.10
1995	2.99	5.13	3.50	5.16	3.56	4.04	5.41	4.06
1996	2.93	5.17	3.51	5.25	3.43	4.29	5.35	4.12
1997	3.00	5.05	3.47	5.04	2.75	3.96	5.33	4.09
1998	2.89	5.01	3.45	4.99	2.84	4.15	5.39	4.16
1999	3.36	5.02	3.48	5.05	2.87	4.12	5.46	4.19
2000	3.42	4.94	3.43	5.00	2.78	4.03	5.21	4.11
2001	3.50	4.79	3.59	4.96	2.70	3.84	5.13	4.05
			Average annual percentage change					
1976–2001	2.4%	0.3%	2.4%	0.6%	[c]	-0.4%	-0.4%	-0.1%
1991–2001	1.8%	-0.9%	0.7%	-0.6%	-2.8%	0.0%	-0.6%	0.3%

Source:
Oak Ridge National Laboratory, Light Vehicle MPG and Market Shares System, Oak Ridge, TN, 2002. (Additional resources: www-cta.ornl.gov)
Note:
Revised definitions of light trucks are based on vehicle **curb weight** as follows:
Small pickup= <3,500 lbs. Large pickup=3,500-8,500 lbs.
Small van = <4,500 lbs. Large van=4,500-8,500 lbs.
Small utility= <3,500 lbs. Medium utility=3,500-4,799 lbs. Large utility=4,800-8,500 lbs.

[a] Sales period is October 1 of the previous year through September 30 of the current year.
[b] 1 liter = 61.02 cubic inches.
[c] Data are not available.

The sales-weighted curb weight of new automobiles has gone up for each size class from 1989 to 2000.

Table 7.12
Sales-Weighted Curb Weight of New Domestic and Import Automobiles by Size Class, Sales Periods[a] 1976–2001
(pounds)

Sales period[a]	Minicompact	Subcompact	Compact	Midsize	Large	Two seater	Fleet
1976	[b]	2,577	3,609	4,046	4,562	2,624	3,608
1977	2,228	2,586	3,550	3,900	4,026	2,608	3,424
1978	2,200	2,444	3,138	3,427	3,956	2,763	3,197
1979	2,120	2,367	3,048	3,287	3,763	2,699	3,000
1980	2,154	2,270	2,813	3,081	3,667	2,790	2,790
1981	1,920	2,370	2,382	2,996	3,672	2,744	2,744
1982	2,002	2,302	2,422	2,992	3,703	2,525	2,730
1983	2,072	2,334	2,441	3,027	3,779	2,663	2,788
1984	2,376	2,380	2,454	2,990	3,734	2,559	2,788
1985	2,211	2,392	2,464	2,954	3,575	2,539	2,743
1986	2,120	2,415	2,432	2,857	3,451	2,575	2,675
1987	1,960	2,423	2,474	2,857	3,483	2,602	2,689
1988	1,933	2,346	2,558	2,880	3,487	2,693	2,717
1989	2,576	2,357	2,517	2,985	3,496	2,735	2,760
1990	2,651	2,368	2,637	3,065	3,594	2,656	2,828
1991	2,584	2,406	2,652	3,085	3,650	2,707	2,848
1992	2,395	2,444	2,674	3,131	3,670	2,770	2,879
1993	2,449	2,478	2,659	3,142	3,615	2,967	2,894
1994	2,719	2,571	2,639	3,171	3,657	3,035	2,921
1995	2,831	2,552	2,647	3,179	3,648	2,947	2,937
1996	2,847	2,533	2,667	3,203	3,671	2,985	2,950
1997	2,997	2,489	2,737	3,241	3,653	2,863	2,977
1998	3,004	2,584	2,703	3,198	3,675	2,956	3,002
1999	2,835	2,626	2,755	3,198	3,689	3,007	3,034
2000	2,906	2,635	2,800	3,215	3,680	2,943	3,052
2001	3,332	2,803	2,720	3,197	3,606	2,849	3,047
			Average annual percentage change				
1976–2001	1.7%[c]	0.3%	-1.1%	-0.9%	-0.9%	0.3%	-0.7%
1991–2001	2.6%	1.5%	0.3%	0.4%	0.1%	0.5%	0.7%

Source:
Oak Ridge National Laboratory, Light Vehicle MPG and Market Shares System, Oak Ridge, TN, 2002.
(Additional resources: www-cta.ornl.gov)

[a] Sales period is October 1 of the previous year through September 30 of the current year.
[b] There were no minicompact automobiles sold in 1976.
[c] Average annual percentage change begins with 1977.

The sales-weighted interior space has not changed much for midsize automobiles over the last two decades, but has increased for subcompact autos and decreased for compact and large autos.

Table 7.13
Sales-Weighted Interior Space of New Domestic and Import Automobiles by Size Class, Sales Periods[a] 1976–2001
(cubic feet)

Sales period[a]	Minicompact (< 85)	Subcompact (85–99)	Compact (100–109)	Midsize (110–119)	Large (> 120)	Fleet[b]
1977	78.8	89.8	107.1	113.0	128.0	107.9
1978	79.4	89.8	105.3	112.9	128.5	107.9
1979	80.0	90.2	105.8	113.4	130.1	106.9
1980	82.4	89.9	105.4	113.5	130.8	104.9
1981	83.3	90.2	103.6	113.7	130.6	105.5
1982	83.1	91.3	102.9	113.9	130.4	106.0
1983	82.7	93.3	103.0	113.1	131.3	107.3
1984	77.0	93.8	103.0	113.3	130.4	108.0
1985	77.8	94.1	103.1	113.5	129.7	107.9
1986	80.1	94.5	102.8	113.8	127.6	107.0
1987	81.6	93.1	103.0	113.9	127.5	106.9
1988	81.0	93.5	103.3	113.6	127.2	107.0
1989	75.0	93.3	102.7	113.8	127.4	107.5
1990	79.9	93.9	103.2	113.8	127.8	107.3
1991	79.6	94.4	103.2	113.8	128.3	107.1
1992	79.1	94.0	104.2	114.0	129.2	107.5
1993	79.2	94.5	104.0	114.0	128.9	108.0
1994	79.4	94.4	103.8	113.8	128.8	108.0
1995	78.5	93.8	103.9	114.3	128.1	108.7
1996	76.7	94.9	103.4	114.2	128.0	108.8
1997	77.2	95.6	103.2	114.6	128.0	108.7
1998	66.9	97.0	102.2	114.4	127.7	109.2
1999	76.3	96.7	103.3	114.1	127.1	109.5
2000	76.3	96.6	103.1	114.2	126.4	109.3
2001	78.2	94.6	103.2	113.5	125.2	109.4
			Average annual percentage change			
1977–2001	0.0%	0.2%	-0.2%	0.0%	-0.1%	0.1%
1991–2001	-0.2%	0.0%	0.0%	0.0%	-0.2%	0.0%

Source:
Oak Ridge National Laboratory, Light Vehicle MPG and Market Shares System, Oak Ridge, TN, 2002.
(Additional resources: www-cta.ornl.gov)

[a] Sales period is October 1 of the previous year through September 30 of the current year.
[b] Interior volumes of two-seaters are not reported to EPA.

The sales-weighted wheelbase of new automobiles and light trucks (combined) has been rising in the 1990's, but has been declining in this decade.

Table 7.14
Sales-Weighted Wheelbase of New Automobiles and Light Trucks, Sales Periods[a] 1976–2001
(inches)

Sales period[a]	Automobiles	Light trucks	Automobiles and light trucks combined
1976	110.78	118.87	112.03
1977	109.75	117.79	111.05
1978	107.67	116.23	108.65
1979	105.77	116.27	107.93
1980	103.61	114.54	105.76
1981	102.97	114.86	105.10
1982	103.01	114.87	105.60
1983	103.76	113.73	106.10
1984	103.50	113.87	106.21
1985	102.96	113.98	106.02
1986	102.27	113.40	105.48
1987	102.11	113.27	105.52
1988	102.21	111.79	105.21
1989	102.66	112.23	105.71
1990	103.13	111.41	105.85
1991	103.27	111.09	105.82
1992	103.60	112.68	106.78
1993	104.03	112.57	107.21
1994	104.31	113.23	107.75
1995	104.95	113.37	108.31
1996	105.04	113.36	108.53
1997	105.36	113.36	108.89
1998	105.55	114.53	109.76
1999	105.77	114.70	110.06
2000	105.89	114.05	109.81
2001	105.66	113.04	109.64
	Average annual percentage change		
1976–2001	-0.2%	-0.2%	-0.1%
1991–2001	0.2%	0.2%	0.4%

Source:
Oak Ridge National Laboratory, Light Vehicle MPG and Market Shares System, Oak Ridge, TN, 2002.
(Additional resources: www-cta.ornl.gov)

[a] Sales period is October 1 of the current year through September 30 of the next year.

The average auto lost over 300 pounds from 1978 to 1985, but gained a few pounds back since then. Much of the weight reduction was due to the declining use of conventional steel and iron and the increasing use of aluminum and plastics. Conventional steel, however, remained the predominant component of automobiles in 2001 with a 40.8% share of total materials. As conventional steel use has been decreasing, use of high-strength steel has increased.

Table 7.15
Average Material Consumption for a Domestic Automobile, 1978, 1985, and 2001

	1978		1985		2001	
Material	Pounds	Percentage	Pounds	Percentage	Pounds	Percentage
Conventional steel[a]	1,880.0	53.8%	1,481.5	46.5%	1,349.0	40.8%
High-strength steel	127.5	3.6%	217.5	6.8%	351.5	10.6%
Stainless steel	25.0	0.7%	29.0	0.9%	54.5	1.6%
Other steels	56.0	1.6%	54.5	1.7%	25.5	0.8%
Iron	503.0	14.4%	468.0	14.7%	345.0	10.4%
Aluminum	112.0	3.2%	138.0	4.3%	256.5	7.8%
Rubber	141.5	4.1%	136.0	4.3%	145.5	4.4%
Plastics/composites	176.0	5.0%	211.5	6.6%	253.0	7.6%
Glass	88.0	2.5%	85.0	2.7%	98.5	3.0%
Copper	39.5	1.1%	44.0	1.4%	46.0	1.4%
Zinc die castings	28.0	0.8%	18.0	0.5%	11.0	0.3%
Powder metal parts	16.0	0.5%	19.0	0.6%	37.5	1.1%
Fluids & lubricants	189.0	5.4%	184.0	5.8%	196.0	5.9%
Other materials	112.5	3.2%	101.5	3.2%	139.5	4.2%
Total	3,494.0	100.0%	3,187.5	100.0%	3,309.0	100.0%

Source:
American Metal Market, www.amm.com/ref/carmat98.htm, New York, NY, 2000.
(Additional resources: www.amm.com)

[a] Includes cold-rolled and pre-coated steel.

The number of franchised dealerships which sell new light-duty vehicles (cars and light trucks) has declined 27% since 1970, though new vehicle sales have increased. The average number of vehicles sold per dealer in 2000 was 774 vehicles per dealer – more than double the 1970 number.

Table 7.16
New Light Vehicle Dealerships and Sales, 1970–2000

Calendar year	Number of franchised new light vehicle dealerships[a]	New light vehicle sales (thousands)	Light vehicle sales per dealer
1970	30,800	9,867	320
1971	30,300	12,006	396
1972	30,100	13,189	438
1973	30,100	14,184	471
1974	30,000	11,191	373
1975	29,600	10,905	368
1976	29,300	13,066	446
1977	29,100	14,613	502
1978	29,000	15,122	521
1979	28,500	13,984	491
1980	27,900	11,419	409
1981	26,350	10,725	407
1982	25,700	10,452	407
1983	24,725	12,166	492
1984	24,725	14,254	577
1985	24,725	15,501	627
1986	24,825	16,047	646
1987	25,150	14,888	592
1988	25,025	15,426	616
1989	25,000	14,508	580
1990	24,825	13,849	558
1991	24,200	12,298	508
1992	23,500	12,842	546
1993	22,950	13,869	604
1994	22,850	15,023	657
1995	22,800	14,688	644
1996	22,750	15,046	661
1997	22,700	15,069	664
1998	22,600	15,441	683
1999	22,400	16,771	748
2000	22,250	17,234	774
	Average annual percentage change		
1970–2000	-1.1%	1.9%	3.0%
1990–2000	-1.1%	2.2%	3.3%

Source:
Number of dealers - National Automobile Dealers Association, *Automotive Executive Magazine*, 2001. (Additional resources: www.nada.org)
Light-duty vehicle sales - See tables 7.5 and 7.6.

[a]As of the beginning of the year.

The number of conventional refueling stations is declining while the number of vehicles fueling at those stations continues to rise. In 2000, there were 0.82 fueling stations per thousand vehicles. Data for alternative fuels in 2000 indicate that there was an average of 12 stations per thousand alternative fuel vehicles.

Table 7.17
Conventional and Alternative Fuel Refueling Stations

Year	Number of retail outlets	Vehicles in operation (thousands)	Stations per thousand vehicles
	Conventional fuels		
1993	207,416	186,315	1.11
1994	202,878	188,714	1.08
1995	195,455	193,441	1.01
1996	190,246	198,294	0.96
1997	187,892	201,071	0.93
1998	182,596	205,043	0.89
1999	180,567	209,509	0.86
2000	175,341	213,300	0.82
2001	175,132	216,683	0.81
	Alternative fuels, 2001		
LPG	3,403	269	12.65
CNG	1,232	110	11.20
Electricity	693	10	69.30
M85/M100	0	17	0.00
LNG	44	2	22.00
E85/E95	154	48	3.21
Total	5,526	456	12.12

Source:
Conventional refueling stations: National Petroleum News Survey, 2001.
Alternative fuel refueling stations: Alternative Fuels Data Center, www.afdc.doe.gov.
Conventional vehicles: The Polk Company, Detroit, MI, FURTHER REPRODUCTION PROHIBITED.
Alternative fuels vehicles: U.S. Department of Energy, Energy Information Administration, Alternatives to Traditional Transportation Fuels web site, www.eia.doe.gov/cneaf/alternate/page/datatables/atf01-13_00.html

Note:
The County Business Patterns (CBP) data published by the Bureau of the Census tells the number of establishments by North American Industry Classification System (NAICS). NAICS is an industry classification system that groups establishments into industries based on the activities in which they are primarily engaged. NAICS 447 represents gasoline stations. However, the CBP gasoline station data differ from the National Petroleum News Survey data; the CBP may not include every gasoline retail outlet due to the classification of the primary activity of the business.

The Corporate Average Fuel Economy standards were established by the U.S. Energy Policy and Conservation Act of 1975 (PL94-163). These standards must be met at the manufacturer level. Though the averages shown here indicate the standards were met in most years, some manufacturers fell short of meeting the standards while others exceeded them.

Table 7.18
Automobile Corporate Average Fuel Economy (CAFE)
Standards versus Sales-Weighted Fuel Economy Estimates, 1978–2002[a]
(miles per gallon)

Model year[b]	Automobiles				CAFE estimates
	CAFE standards	CAFE estimates[c]			Autos and light trucks combined
		Domestic	Import	Combined	
1978	18.0	18.7	27.3	19.9	19.9
1979	19.0	19.3	26.1	20.3	20.1
1980	20.0	22.6	29.6	24.3	23.1
1981	22.0	24.2	31.5	25.9	24.6
1982	24.0	25.0	31.1	26.6	25.1
1983	26.0	24.4	32.4	26.4	24.8
1984	27.0	25.5	32.0	26.9	25.0
1985	27.5	26.3	31.5	27.6	25.4
1986	26.0	26.9	31.6	28.2	25.9
1987	26.0	27.0	31.2	28.4	26.2
1988	26.0	27.4	31.5	28.0	26.0
1989	26.5	27.2	30.8	28.4	25.6
1990	27.5	26.9	29.9	27.9	25.4
1991	27.5	27.3	30.1	28.4	25.6
1992	27.5	27.0	29.2	27.9	25.1
1993	27.5	27.8	29.6	28.4	25.2
1994	27.5	27.5	29.7	28.3	24.7
1995	27.5	27.7	30.3	28.6	24.9
1996	27.5	28.1	29.6	28.5	24.9
1997	27.5	27.8	30.1	28.7	24.6
1998	27.5	28.6	29.2	28.8	24.7
1999	27.5	28.0	29.0	28.3	24.5
2000	27.5	28.7	28.3	28.5	24.8
2001	27.5	28.8	28.4	28.6	24.4
2002	27.5	29.1	28.5	28.8	24.5

Source:
U.S. Department of Transportation, NHTSA, "Summary of Fuel Economy Performance," Washington, DC, March 2002. (Additional resources: www.nhtsa.dot.gov)

[a]Only vehicles with at least 75 percent domestic content can be counted in the average domestic fuel economy for a manufacturer.
[b]Model year as determined by the manufacturer on a vehicle by vehicle basis.
[c]All CAFE calculations are sales-weighted.

The Corporate Average Fuel Economy standards for light trucks are lower than the automobile standards. Light trucks include pickups, minivans, sport utility vehicles and vans.

Table 7.19
Light Truck Corporate Average Fuel Economy (CAFE)
Standards versus Sales-Weighted Fuel Economy Estimates, 1978–2002[a]
(miles per gallon)

Model year[b]	Light trucks[c]				CAFE estimates
	CAFE standards	CAFE estimates[d]			Autos and light trucks combined
		Domestic	Import	Combined	
1978	[e]	[f]	[f]	[g]	19.9
1979	[e]	17.7	20.8	18.2	20.1
1980	[e]	16.8	24.3	18.5	23.1
1981	[e]	18.3	27.4	20.1	24.6
1982	17.5	19.2	27.0	20.5	25.1
1983	19.0	19.6	27.1	20.7	24.8
1984	20.0	19.3	26.7	20.6	25.0
1985	19.5	19.6	26.5	20.7	25.4
1986	20.0	20.0	25.9	21.5	25.9
1987	20.5	20.5	25.2	21.7	26.2
1988	20.5	20.6	24.6	21.3	26.0
1989	20.5	20.4	23.5	21.0	25.6
1990	20.0	20.3	23.0	20.8	25.4
1991	20.2	20.9	23.0	21.3	25.6
1992	20.2	20.5	22.7	20.8	25.1
1993	20.4	20.7	22.8	21.0	25.2
1994	20.5	20.5	22.0	20.8	24.7
1995	20.6	20.3	21.5	20.5	24.9
1996	20.7	20.5	22.1	20.8	24.9
1997	20.7	20.1	22.1	20.6	24.6
1998	20.7	20.4	23.0	21.1	24.7
1999	20.7	[f]	[f]	20.9	24.5
2000	20.7	[f]	[f]	21.3	24.8
2001	20.7	[f]	[f]	20.9	24.4
2002	20.7	[f]	[f]	21.2	24.5

Source:
U.S. Department of Transportation, NHTSA, "Summary of Fuel Economy Performance," Washington, DC, March 2002. (Additional resources: www.nhtsa.dot.gov)

[a]Only vehicles with at least 75 percent domestic content can be counted in the average domestic fuel economy for a manufacturer.
[b]Model year as determined by the manufacturer on a vehicle by vehicle basis.
[c]Represents two- and four-wheel drive trucks combined. Gross vehicle weight of 0–6,000 pounds for model year 1978–1979 and 0–8,500 pounds for subsequent years.
[d]All CAFE calculations are sales-weighted.
[e]Standards were set for two-wheel drive and four-wheel drive light trucks separately, but no combined standard was set in this year.
[f]Data are not available.

Manufacturers of autos and light trucks whose vehicles do not meet the CAFE standards are fined. Data from the National Highway Traffic Safety Administration show that $32 million was collected from the manufacturers in 2000.

Table 7.20
Corporate Average Fuel Economy (CAFE) Fines Collected, 1983-2000[a]
(thousands)

Model year	Current dollars	2000 constant dollars[b]
1983	58	100
1984	5,958	9,875
1985	15,565	24,910
1986	29,872	46,934
1987	31,261	47,387
1988	44,519	64,803
1989	47,381	65,798
1990	48,449	63,833
1991	42,243	53,409
1992	38,287	46,992
1993	28,688	34,187
1994	31,478	36,576
1995	40,788	46,087
1996	19,302	21,184
1997	36,211	38,851
1998	21,740	22,967
1999	27,516	28,441
2000	32,064	32,064

Source:
U.S. Department of Transportation, National Highway Traffic Safety Administration, Office of Vehicle Safety Compliance, Washington, DC, January 2002.
(Additional resources: www.nhtsa.dot.gov)

[a] These are fines which are actually collected. Fines which are assessed in certain year may not have been collected in that year.
[b] Adjusted using the Consumer Price Inflation Index.

Consumers must pay the Gas Guzzler Tax when purchasing an automobile that has an Environmental Protection Agency (EPA) fuel economy rating less than that stipulated in the table below. The Gas Guzzler Tax doubled in 1991 after remaining constant from 1986 to 1990. The tax has not changed since 1991. This tax does not apply to light trucks such as pickups, minivans, sport utility vehicles, and vans.

Table 7.21
The Gas Guzzler Tax on New Cars
(dollars per vehicle)

Vehicle fuel economy (mpg)	1980	1981	1982	1983	1984	1985	1986–90	1991+
Over 22.5	0	0	0	0	0	0	0	0
22.0–22.5	0	0	0	0	0	0	500	1,000
21.5–22.0	0	0	0	0	0	0	500	1,000
21.0–21.5	0	0	0	0	0	0	650	1,300
20.5–21.0	0	0	0	0	0	500	650	1,300
20.0–20.5	0	0	0	0	0	500	850	1,700
19.5–20.0	0	0	0	0	0	600	850	1,700
19.0–19.5	0	0	0	0	450	600	1,050	2,100
18.5–19.0	0	0	0	350	450	800	1,050	2,100
18.0–18.5	0	0	200	350	600	800	1,300	2,600
17.5–18.0	0	0	200	500	600	1,000	1,300	2,600
17.0–17.5	0	0	350	500	750	1,000	1,500	3,000
16.5–17.0	0	200	350	650	750	1,200	1,500	3,000
16.0–16.5	0	200	450	650	950	1,200	1,850	3,700
15.5–16.0	0	350	450	800	950	1,500	1,850	3,700
15.0–15.5	0	350	600	800	1,150	1,500	2,250	4,500
14.5–15.0	200	450	600	1,000	1,150	1,800	2,250	4,500
14.0–14.5	200	450	750	1,000	1,450	1,800	2,700	5,400
13.5–14.0	300	550	750	1,250	1,450	2,200	2,700	5,400
13.0–13.5	300	550	950	1,250	1,750	2,200	3,200	6,400
12.5–13.0	550	650	950	1,550	1,750	2,650	3,200	6,400
Under 12.5	550	650	1,200	1,550	2,150	2,650	3,850	7,700

Source:
Internal Revenue Service, Form 6197, (Rev. 1-91), "Gas Guzzler Tax."
(Additional resources: www.irs.ustreas.gov)

Consumers continue to demand gas guzzling automobiles. The IRS collected nearly $71 million in 2000 from those buying autos with fuel economy less than 22.5 miles per gallon. This tax does not apply to light trucks such as pickups, minivans, sport utility vehicles, and vans.

Table 7.22
Tax Receipts from the Sale of Gas Guzzlers, 1980–2000
(thousands)

Model year	Current dollars	2000 constant dollars[a]
1980	740	1,546
1981	780	1,478
1982	1,720	3,069
1983	4,020	6,950
1984	8,820	14,618
1985	39,790	63,679
1986	147,660	231,999
1987	145,900	221,162
1988	116,780	169,987
1989	109,640	152,258
1990	103,200	135,968
1991	118,400	149,695
1992	144,200	176,987
1993	111,600	132,993
1994	64,100	74,481
1995	73,500	83,049
1996	52,600	57,729
1997	48,200	51,714
1998	47,700	50,392
1999	68,300	70,596
2000	70,800	70,800

Source:
Internal Revenue Service, Statistics of Income Bulletin, Summer 2001, Washington, DC, 2001.
(Additional resources: www.irs.gov/tax_stats).

[a]Adjusted using the Consumer Price Inflation Index.

Fuel Economy by Vehicle Speed

ORNL has developed fuel consumption and emissions lookup tables for the Federal Highway Administration, for use in their TRAF series of traffic models (NETSIM, CORSIM, FRESIM), although more generic uses are also possible. To develop the data-based models, vehicles are tested both on-road and on a chassis dynamometer. Engine parameters are measured on-road under real-world driving conditions that cover the vehicle's entire operating envelope. Emissions and fuel consumption are then measured on the chassis dynamometer as functions of engine conditions. The two data sets are merged to produce the final three-dimensional maps as functions of vehicle speed and acceleration. Eight well-functioning, late-model vehicles, and one 1997 model vehicle, have been tested thus far in fully warmed-up conditions.

Similar continuing work is planned for the Department of Energy as well as FHWA, which will include more well-functioning, late-model vehicles, pre-control (1960's) vehicles, malfunctioning high-emitter vehicles, light-duty diesel vehicles (cars and pickup trucks), alternative fuel vehicles, and possibly heavy-duty diesel vehicles. ORNL will also be developing cold-start algorithms to enhance the existing models, since emissions and fuel economy generally improve as vehicles warm up to normal operating temperatures.

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Table 7.23
Vehicle Specifications for Vehicles Tested in the 1997 Study

Vehicle	Curb weight	Engine	Fuel delivery system[a]	Trans-mission	EPA fuel economy	
					City	Highway
1988 Chevrolet Corsica	2,665	2.8 liter V6	PFI	M5	19	29
1994 Olds Cutlass Supreme	3,290	3.4 liter V6	PFI	L4	17	26
1994 Oldsmobile 88	3,433	3.8 literV6	PFI	L4	19	29
1994 Mercury Villager	4,020	3.0 liter V6	PFI	L4	17	23
1995 Geo Prizm	2,359	1.6 liter I-4	PFI	L3	26	30
1994 Jeep Grand Cherokee	3,820	4.0 liter I-6	PFI	L4	15	20
1994 Chevrolet Pickup	4,020	5.7 liter V8	TBI	L4	14	18
1993 Subaru Legacy	2,800	2.2 liter H4	PFI	L4	22	29
1997 Toyota Celica	2,395	1.8 liter I4	PFI	L4	27	34

Source:
West, B.H., R.N. McGill, J.W. Hodgson, S.S. Sluder, and D.E. Smith, *Development and Verification of Light-Duty Modal Emissions and Fuel Consumption Values for Traffic Models*, Washington, DC, April 1997 and additional project data, April 1998.

[a] PFI = port fuel injection. TBI = throttle- body fuel injection.

The two earlier studies by the Federal Highway Administration (FHWA) indicate maximum fuel efficiency was achieved at speeds of 35 to 40 mph. The recent FHWA study indicates greater fuel efficiency at higher speeds. Note that the 1973 study did not include light trucks.

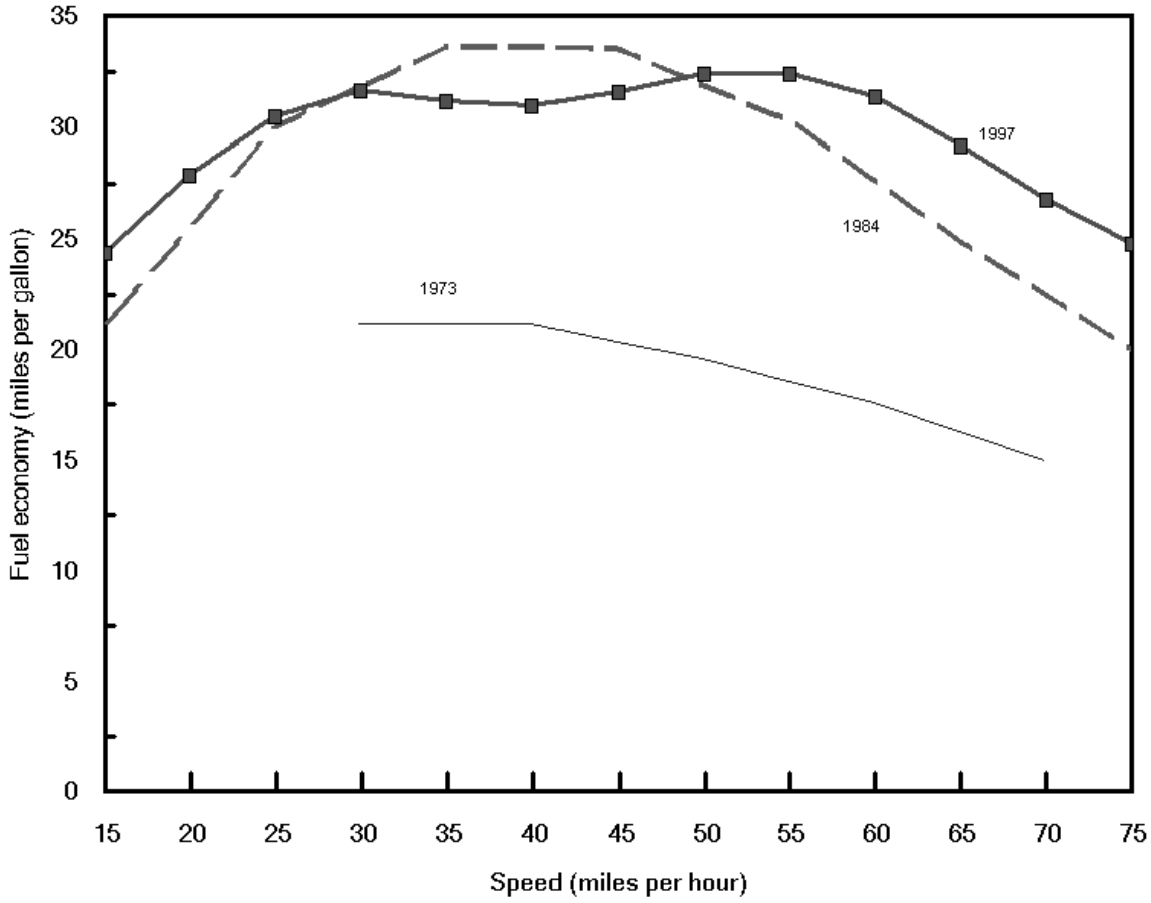
Table 7.24
Fuel Economy by Speed, 1973, 1984, and 1997 Studies
(miles per gallon)

Speed (miles per hour)	1973[a] (13 vehicles)	1984[b] (15 vehicles)	1997[c] (9 vehicles)
15	[d]	21.1	24.4
20	[d]	25.5	27.9
25	[d]	30.0	30.5
30	21.1	31.8	31.7
35	21.1	33.6	31.2
40	21.1	33.6	31.0
45	20.3	33.5	31.6
50	19.5	31.9	32.4
55	18.5	30.3	32.4
60	17.5	27.6	31.4
65	16.2	24.9	29.2
70	14.9	22.5	26.8
75	[d]	20.0	24.8
		Fuel economy loss	
55–65 mph	12.4%	17.8%	9.7%
65–70 mph	8.0%	9.6%	8.2%
55–70 mph	19.5%	25.7%	17.1%

Source:
1973- U.S. Department of Transportation, Federal Highway Administration, Office of Highway Planning, *The Effect of Speed on Automobile Gasoline Consumption Rates*, Washington, DC, October 1973.
1984 - U.S. Department of Transportation, Federal Highway Administration, *Fuel Consumption and Emission Values for Traffic Models*, Washington, DC, May 1985.
1997 - West, B.H., R.N. McGill, J.W. Hodgson, S.S. Sluder, and D.E. Smith, *Development and Verification of Light-Duty Modal Emissions and Fuel Consumption Values for Traffic Models*, FHWA Report (in press), Washington, DC, April 1997, and additional project data, April 1998. (Additional resources: www.fhwa-tsis.com)

[a]Model years 1970 and earlier automobiles.
[b]Model years 1981–84 automobiles and light trucks.
[c]Model years 1988–97 automobiles and light trucks.
[d]Data are not available.

Figure 7.2. Fuel Economy by Speed, 1973, 1984, and 1997 Studies



Source: See Table 7.23.

Of the tested vehicles, the 1994 Oldsmobile Olds 88 had the greatest fuel economy loss from 55 mph to 75 mpg. The 1997 Toyota Celica tested fuel economy was slightly better at 65 mph than at 55 mph.

Table 7.25
Steady Speed Fuel Economy for Vehicles Tested in the 1997 Study
(miles per gallon)

Speed (mph)	1988 Chevrolet Corsica	1993 Subaru Legacy	1994 Oldsmobile Olds 88	1994 Oldsmobile Cutlass	1994 Chevrolet Pickup	1994 Jeep Grand Cherokee	1994 Mercury Villager	1995 Geo Prizm	1997 Toyota Celica
5	10.0	14.5	10.5	5.1	7.9	8.2	12.3	18.1	19.1
10	16.8	24.7	14.9	7.9	16.0	11.2	19.0	23.1	34.1
15	17.7	31.9	22.2	11.4	16.3	17.5	22.4	38.9	41.7
20	21.7	34.4	26.3	12.5	19.9	24.7	25.8	39.4	46.0
25	23.9	37.4	28.3	15.6	22.7	21.8	30.8	41.7	52.6
30	28.7	39.7	29.0	19.0	26.3	21.6	30.3	40.0	50.8
35	28.6	38.0	30.9	21.2	24.3	25.0	26.1	39.1	47.6
40	29.2	37.0	33.2	23.0	26.7	25.5	29.0	38.9	36.2
45	28.8	33.7	32.4	23.0	27.3	25.4	27.8	42.3	44.1
50	31.2	33.7	34.2	27.3	26.3	24.8	30.1	39.1	44.8
55	29.1	37.7	34.6	29.1	25.1	24.0	31.7	37.7	42.5
60	28.2	35.9	32.5	28.2	22.6	23.2	27.3	36.7	48.4
65	28.7	33.4	30.0	25.0	21.8	21.3	25.3	34.1	43.5
70	26.1	31.0	26.7	22.9	20.1	20.0	23.9	31.7	39.2
75	23.7	28.8	24.0	21.6	18.1	19.1	22.4	28.3	36.8
				Fuel economy loss					
55–65 mph	1.4%	11.4%	13.3%	14.1%	13.1%	11.3%	20.2%	9.5%	-2.4%
65–75 mph	17.4%	13.8%	20.0%	13.6%	17.0%	10.3%	11.5%	17.0%	15.4%
55–75 mph	18.6%	23.6%	30.6%	25.8%	27.9%	20.4%	29.3%	24.9%	13.4%

Source:
B.H. West, R.N. McGill, J.W. Hodgson, S.S. Sluder, D.E. Smith, *Development and Verification of Light-Duty Modal Emissions and Fuel Consumption Values for Traffic Models*, Washington, DC, April 1997, and additional project data, April 1998. (Additional resources: www.fhwa-tsis.com)

Note:
For specifications of the tested vehicles, please see Table 7.21.

The Environmental Protection Agency (EPA) tests new vehicles to determine fuel economy ratings. The city and highway fuel economies that are posted on the windows of new vehicles are determined by testing the vehicle during these driving cycles. The driving cycles simulate the performance of an engine while driving in the city and on the highway. Once the urban cycle is completed, the engine is stopped, then started again for the 8.5 minute hot start cycle.

Figure 7.3. Urban Driving Cycle

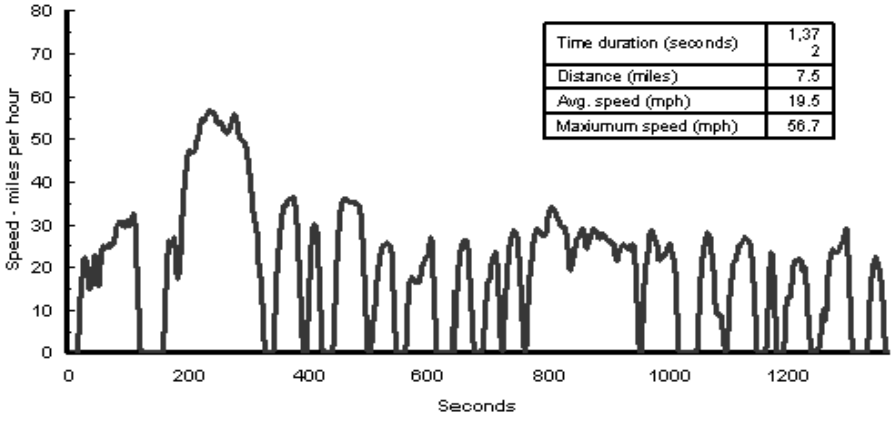
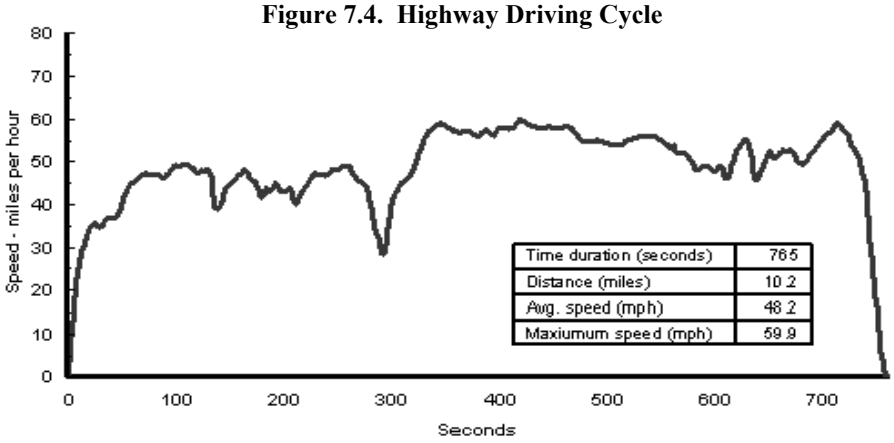


Figure 7.4. Highway Driving Cycle



Source:
Code of Federal Regulations, 40CFR, "Subpart B - Fuel Economy Regulations for 1978 and Later Model Year Automobiles - Test Procedures," July 1, 1988 edition, p. 676.

The New York Test Cycle was developed in the 1970's in order to simulate driving in downtown congested areas. The Representative Number Five Test Cycle was developed recently to better represent actual on-road driving by combining

Figure 7.5. New York City Driving Cycle

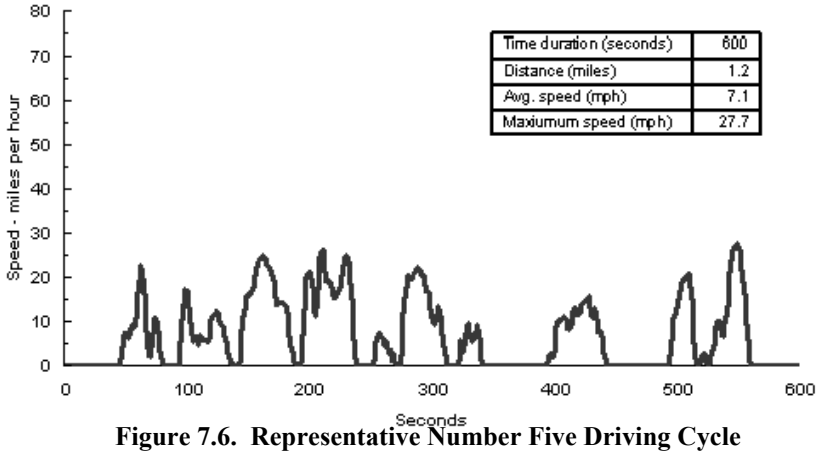
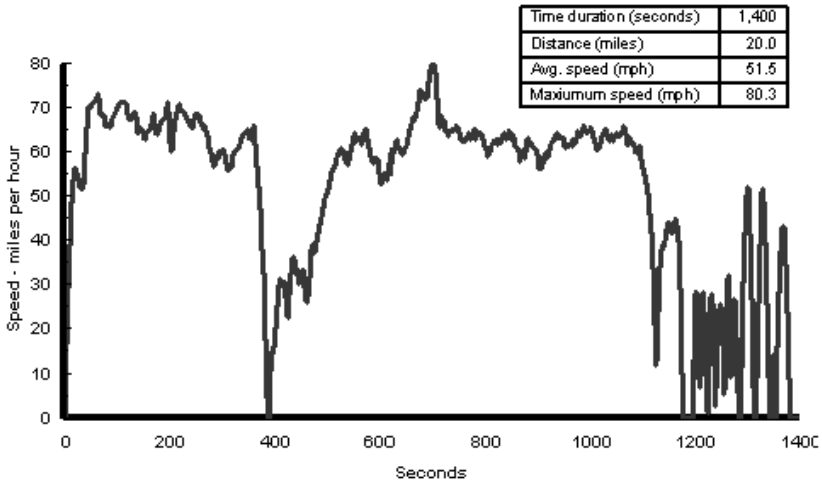


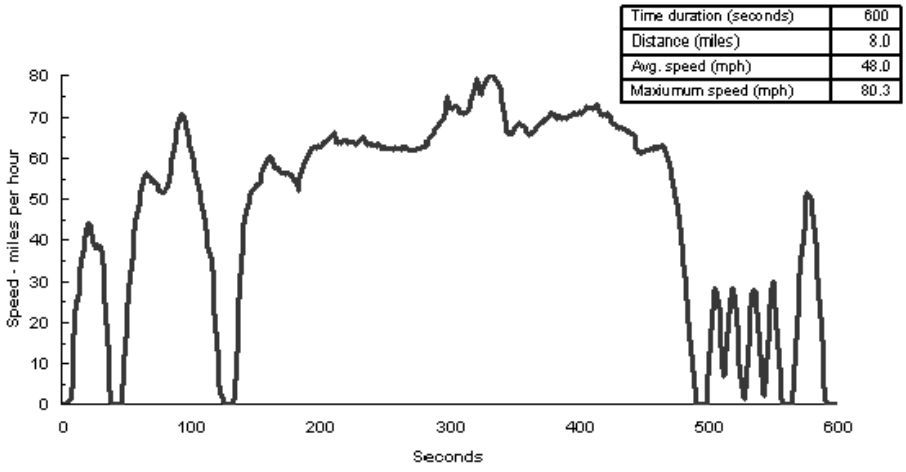
Figure 7.6. Representative Number Five Driving Cycle



Source:
Data obtained from Michael Wang, Argonne National Laboratory, Argonne, IL, 1997.

The US06 driving cycle was developed as a supplement to the Federal Test Procedure. It is a short-duration cycle (600 seconds) which represents hard-acceleration driving.

Figure 7.7. US06 Driving Cycle



Source:
Data obtained from Michael Wang, Argonne National Laboratory, Argonne, IL, 1997.

Researchers at Argonne National Laboratory have estimated the fuel economy of a midsize car using driving cycles from different countries. These results illustrate the difference in fuel economy which can be obtained from the same vehicle using different test cycles.

Table 7.26
Projected Fuel Economies from U.S., European, and Japanese Driving Cycles

Driving Cycle	Projected fuel economy for a 1995 composite midsize vehicle[a]
Japanese 10/15 mode test cycle	17.5 mpg
New European Driving Cycle (NEDC)	22.0 mpg
U.S. EPA city cycle (LA4)	19.8 mpg
U.S. EPA highway cycle	32.1 mpg
U.S. Corporate Average Fuel Economy cycle	23.9 mpg

Source:
Santini, D., A. Vyas, J. Anderson, and F. An, *Estimating Trade-Offs along the Path to the PNGV 3X Goal*, presented at the Transportation Research Board 80th Annual Meeting, Washington, DC, January 2001.

[a]The 1995 composite midsize vehicle is an average of a Chevrolet Lumina, Chrysler Concord, and Ford Taurus. The fuel economies were projected using the National Renewable Energy Laboratory's Advanced Vehicle Simulator (ADVISOR) model.

When comparing data between countries, one must realize that different countries have different testing cycles to determine fuel economy and emissions. This table compares various statistics on the European, Japanese, and U.S. testing cycles [for fuel economy measurements, the U.S. uses the formula, 1/fuel economy = (0.55/city fuel economy) + (0.45/highway fuel economy)]. Most vehicles will achieve higher fuel economy on the U.S. test cycle than on the European or Japanese cycles.

Table 7.27
Comparison of U.S., European, and Japanese Driving Cycles

	Time (seconds)	Percent of time stopped or decelerating	Distance (miles)	Average speed (mph)	Maximum speed (mph)	Maximum acceleration (mph/s)
Japanese 10/15 mode test cycle	631	52.3	2.6	14.8	43.5	1.78
New European Driving Cycle (NEDC)	1,181	24.9	6.84	20.9	74.6	2.4
U.S. EPA city cycle (LA4)[a]	1,372	43.2	7.5	19.5	56.7	3.3
U.S. EPA highway cycle	765	9.3	17.8	48.2	59.9	3.3
U.S. Corporate Average Fuel Economy cycle	2,137	27.9	10.3	29.9	59.9	3.3

Source:
Santini, D., A. Vyas, J. Anderson, and F. An, *Estimating Trade-Offs along the Path to the PNGV 3X Goal*, presented at the Transportation Research Board 80th Annual Meeting, Washington, DC, January 2001.

[a]The actual Federal Procedure (FTP), which is also the test for emissions certification, repeats the first 505 seconds of the Federal Urban Driving Simulation cycle, hot started, after a 10 minute hot soak. Starting with Model Year 2001, the emissions test-but not the fuel economy test-incorporates a supplemental cycle that simulates aggressive urban driving, coupled with an added air conditioning load.

Total traffic fatalities were lower in 2000 than in 1975. Thirteen percent of traffic fatalities in 2000 were not vehicle occupants (pedestrians, cyclists, etc.).

Table 7.28
Occupant Fatalities by Vehicle Type and Nonoccupant Fatalities, 1975–2000

	1975	1980	1985	1990	1995	1999	2000	2000 share
Vehicle occupant fatalities by vehicle type								
Passenger car								
Subcompact	3,834	7,299	7,993	8,309	6,791	4,930	4,718	11.3%
Compact	614	927	2,635	5,310	6,899	6,967	6,933	16.6%
Intermediate	1,869	3,878	4,391	4,849	4,666	4,743	5,131	12.3%
Full	10,800	11,580	6,586	4,635	3,413	2,908	2,259	5.4%
Unknown	8,812	3,765	1,607	989	654	1,270	1,451	3.5%
Total	**25,929**	**27,449**	**23,212**	**24,092**	**22,423**	**20,818**	**20,492**	**49.0%**
Truck								
Light	4,856	7,486	7	8,601	9,568	11,243	11,418	27.3%
Large	961	1,262	977	705	648	758	741	1.8%
Total	**5,817**	**8,748**	**7,666**	**9,306**	**10,216**	**12,001**	**12,159**	**29.1%**
Other Vehicles								
Motorcycle	3,189	5,144	4,564	3,244	2,227	2,472	2,862	6.8%
Bus	53	46	57	32	33	58	22	0.1%
Other/unknown vehicle type	937	540	544	460	392	457	714	1.7%
Total	**4,179**	**5,730**	**5,165**	**3,736**	**2,652**	**2,987**	**3,598**	**8.6%**
TOTAL vehicle occupant fatalities	**35,925**	**41,927**	**36,043**	**37,134**	**35,291**	**35,806**	**36,249**	**86.7%**
Nonoccupant fatalities								
Pedestrian	7,516	8,070	6,808	6,482	5,584	4,906	4,739	11.3%
Pedalcyclist	1,003	965	890	859	833	750	690	1.6%
Other	81	129	84	124	109	149	143	0.3%
Total	**8,600**	**9,164**	**7,782**	**7,465**	**6,526**	**5,805**	**5,572**	**13.3%**
TOTAL traffic fatalities	**44,525**	**51,091**	**43,825**	**44,599**	**41,817**	**41,611**	**41,821**	**100.0%**

Source:
Traffic Safety Facts 2000, Washington, DC, December 2001, pp. 18 and 110. (Additional resources: www.nhtsa.dot.gov)

In 2000, the fatality rate for vehicle occupants per 100 million vehicle miles are surprisingly similar for passenger cars and light trucks—1.3 and 1.2 fatalities per 100 million vehicle miles, respectively. However, the injury rate per 100 million vehicle miles is much lower for light trucks (94) than for passenger cars (130).

Table 7.29
Light Vehicle Occupant Safety Data, 1975–2000

	1975	1980	1985	1990	1995	1999	2000
	Passenger cars						
Fatalities	25,929	27,449	23,212	24,092	22,423	20,862	20,492
Injuries (thousands)	[a]	[a]	[a]	2,376	2,469	2,138	2,052
Vehicle-miles (billions)[b]	1,030	1,107	1,249	1,427	1,478	1,567	1,582
Rates per 100 million vehicle miles							
Fatalities	2.5	2.5	1.9	1.7	1.5	1.3	1.3
Injuries	[a]	[a]	[a]	167	167	136	130
	Light trucks (10,000 lbs. or less)						
Fatalities	4,856	7,486	6,689	8,601	9,568	11,265	11,418
Injuries (thousands)	[a]	[a]	[a]	505	722	847	887
Vehicle-miles (billions)[b]	204	295	389	556	750	903	944
Rates per 100 million vehicle-miles							
Fatalities	2.4	2.5	1.7	1.5	1.3	1.2	1.2
Injuries	[a]	[a]	[a]	91	96	94	94

Source:
U.S. DOT, National Highway Traffic Safety Administration, *Traffic Safety Facts 2000*, Washington, DC, December 2001, pp. 22, 24.
(Additional resources: www.nhtsa.dot.gov)

[a]Data are not available.
[b]Vehicle-miles are estimated by the National Highway Traffic Safety Administration and do not match Federal Highway data.

In 2000, nearly 38% of all passenger car and light truck fatal crashes were single-vehicle crashes. Because there are so many passenger cars on the roads compared to the other vehicle types, total passenger car crashes are half of total crashes. Most crashes are multiple-vehicle crashes with property damage only.

Table 7.30
Crashes by Crash Severity, Crash Type, and Vehicle Type, 2000

	Fatal		Injury		Property damage only		
Vehicle type	Single-vehicle crash	Multiple-vehicle crash	Single-vehicle crash	Multiple-vehicle crash	Single-vehicle crash	Multiple-vehicle crash	Total crashes
Passenger cars	10,208	17,288	363,000	2,033,000	717,000	3,750,000	6,891,000
Light trucks[a]	7,934	12,361	195,000	1,015,000	447,000	2,174,000	3,851,000
Large trucks[b]	802	4,128	17,000	83,000	104,000	247,000	456,000
Buses	100	222	1,000	12,000	7,000	35,000	56,000
Motorcycles	1,302	1,638	26,000	27,000	3,000	11,000	70,000
Total	**20,346**	**35,637**	**602,000**	**3,170,000**	**1,278,000**	**6,217,000**	**11,324,000**
Share	0.2%	0.3%	5.3%	28.0%	11.3%	54.9%	100%

Source:
U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 2000*, Washington, DC, December 2001, pp. 72, 74, 76, 80, 82.

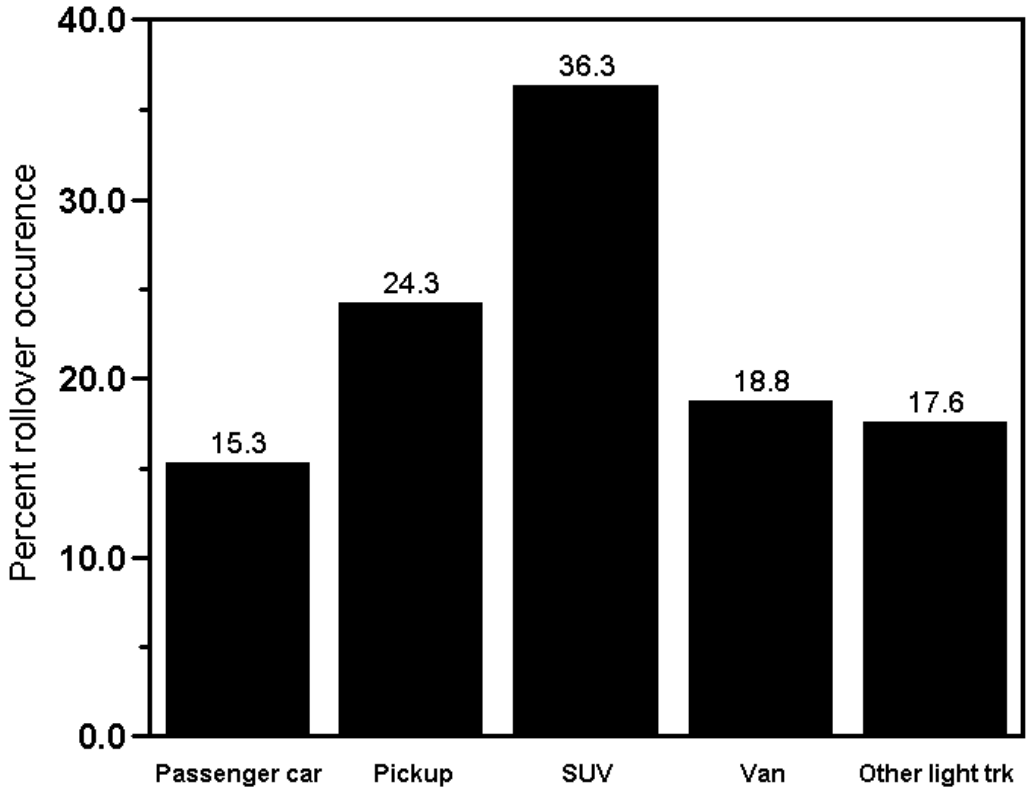
Note:
Multiple-vehicle crashes cannot be totaled over vehicle type due to duplication of accidents between vehicle types.

[a] Trucks 10,000 lbs. gross vehicle weight rating or less, including pickups, vans, and utility vehicles.

[b] Trucks over 10,000 pounds gross vehicle weight rating including single-unit trucks and truck tractors.

For fatal crashes in 2000, sport-utility vehicles (SUVs) had the highest rollover rate (36.3%) while passenger cars had the lowest (15.3%). This does not mean that the rollover caused the fatality, just that a vehicle in the crash rolled over.

Figure 7.8. Percent Rollover Occurrence in Fatal Crashes by Vehicle Type, 2000



Source:
U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 2000*, Washington, DC, December 2001, p. 64.