Chapter 2.

LIGHT VEHICLES

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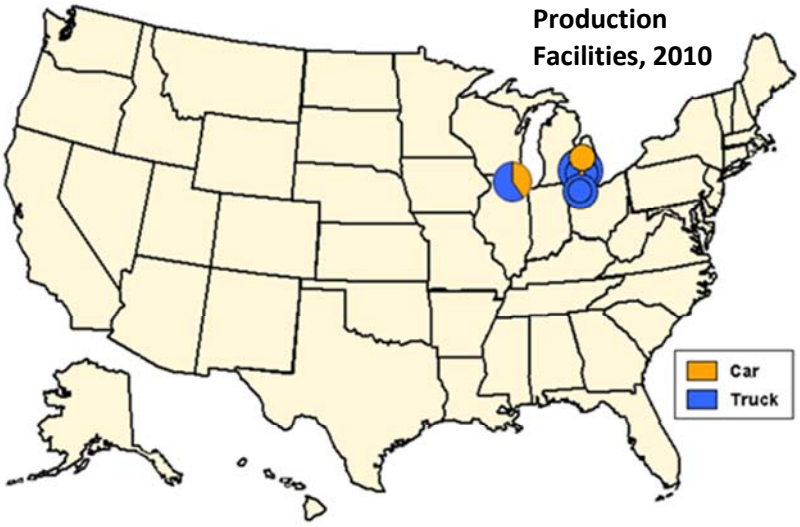
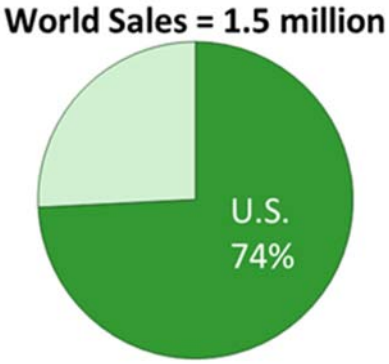
Chrysler Company Profile

Number of U.S. Employees	
18,300	
Corporate Average Fuel Economy, Model Year 2011	
Domestic Cars	29.9 mpg
Import Cars	None
Light Trucks	24.3 mpg
Number of Alternative Fuel Models, Model Year 2011	
Flex Fuel	10
Natural Gas	0
Propane	0
Hybrid Electric	0
Plug-In Hybrid Electric	0
Electric	0





Chrysler Plants	Type	2010 Production
Warren, MI	Truck	197,449
Toledo, OH - Supplier Park	Truck	144,685
Detroit, MI - Jefferson North	Truck	134,153
Sterling Heights, MI	Car	101,353
Belvidere, IL	Truck	100,839
Toledo, OH - North	Truck	91,973
Belvidere, IL	Car	67,586
Detroit, MI - Connor Ave.	Car	459

FIGURE 26. Chrysler Company Profile

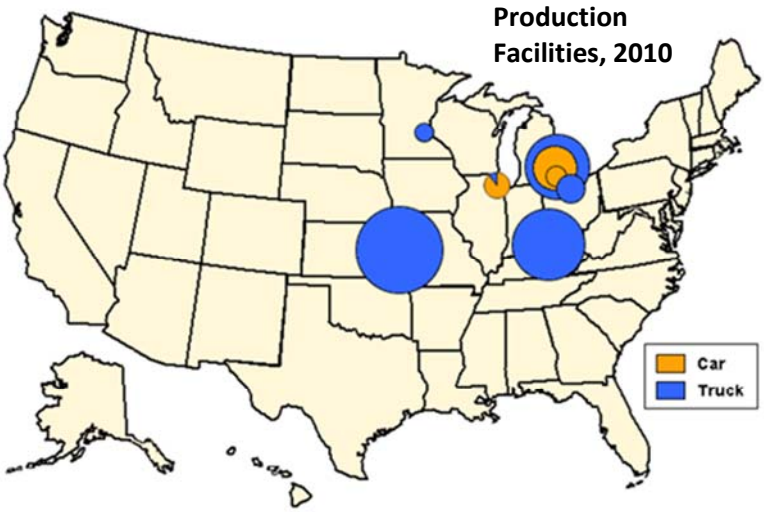
Fuel Saving Technologies

Chrysler emerged from bankruptcy in 2009, joined in an alliance with Fiat. By 2011, Fiat held a 58% share of Chrysler. This alliance brought some fuel savings technologies to Chrysler such as Fiat's Multiair technology that regulates the intake valves for the cylinders independently and increases power and torque while reducing emissions. Like other manufactures, Chrysler is increasing fuel economy throughout its' line-up by downsizing engines and shifting away from 8 cylinder and 6 cylinder engines in favor of more 4 cylinder engines. To meet consumer expectations for performance, Chrysler is also using turbocharging and direct injection to maximize engine output from their smaller engines while increasing efficiency.

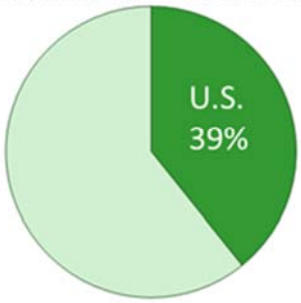
Chrysler has developed an 8 speed transmission for 2012 and is also working on a 9 speed transmission that is scheduled for 2013. Additionally, a 6 speed automatic double clutch transmission is being developed for 2012 which is mechanically similar to a manual transmission but with automatic shifting. An advantage of the double clutch transmission is that there is no loss of power between gearshifts. One clutch selects the odd gears (1, 3 & 5) while the other selects the even gears (2, 4 & 6) allowing for instantaneous shifts that maintain torque to the wheels at all times. Chrysler is also planning to bring an all-electric version of the Fiat 500 to market in 2012.

Ford Company Profile

Number of U.S. Employees	
75,000	
Corporate Average Fuel Economy, Model Year 2011	
Domestic Cars	32.4 mpg
Import Cars	None
Light Trucks	24.2 mpg
Number of Alternative Fuel Models, Model Year 2011	
Flex Fuel	12
Natural Gas	1
Propane	1
Hybrid Electric	5
Plug-In Hybrid Electric	0
Electric	1



World Sales = 4.9 million



Ford Plants	Type	2010 Production
Kansas City, MO	Truck	427,282
Louisville, KY	Truck	351,286
Dearborn, MI	Truck	313,327
Wayne, MI	Car	199,502
Avon Lake, OH	Truck	121,471
Chicago, IL	Car	99,137
Flat Rock MI	Car	77,586
St. Paul, MN	Truck	70,666
Chicago, IL	Truck	11,905
Detroit, MI	Truck	7,143

FIGURE 27. Ford Company Profile

Fuel Saving Technologies

Ford has been very successful in developing and marketing their EcoBoost technology that uses gasoline direct injection combined with turbocharging to increase engine output while also increasing efficiency. This has allowed Ford to downsize their engine offerings while providing comparable performance. Consumers have embraced this technology, as evidenced by the V6 EcoBoost version of the F150 outselling the V8 option. The EcoBoost technology is being deployed throughout Ford's line-up of vehicles from work trucks down to their smallest entry-level passenger cars. Other engine technologies include twin independent variable camshaft timing (Ti-VCT) and aggressive deceleration fuel shut-off, as well as active grille shutters that limit airflow to the engine compartment to improve aerodynamics at high speed.

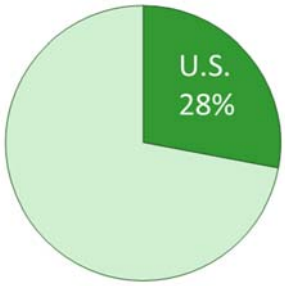
Ford has also developed transmission technology like the automatic 6 speed PowerShift transmission used in the 2011 Fiesta SFE (Super Fuel Economy). This transmission shifts automatically but uses a dry double clutch similar to a manual transmission but without the loss of power between shifts which improves efficiency. Ford is also developing an 8 speed automatic to be used across their lineup to improve efficiency and facilitate the downsizing of their engines.

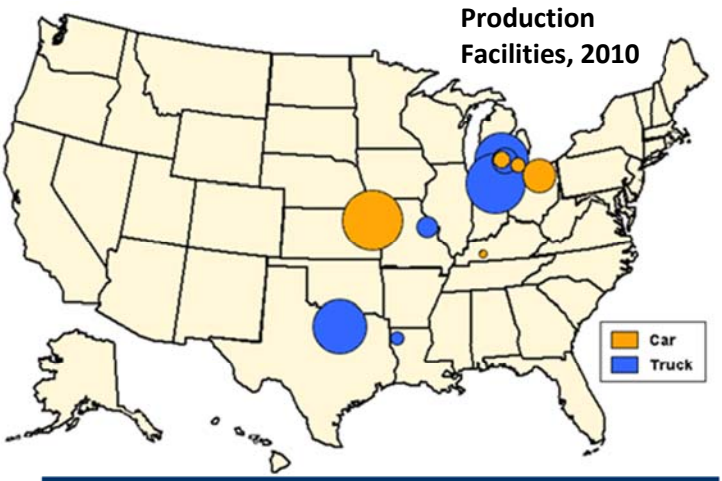
Ford has implemented full hybrid systems like those used in the Escape and Fusion hybrids and is planning to launch the Focus EV in 2012. Ford also worked with Azure Dynamics to produce the Transit Connect EV for 2011.

General Motors Company Profile

Number of U.S. Employees	
79,000	
Corporate Average Fuel Economy, Model Year 2011	
Domestic Cars	31.7 mpg
Import Cars	32.9 mpg
Light Trucks	23.1 mpg
Number of Alternative Fuel Models, Model Year 2011	
Flex Fuel	21
Natural Gas	0
Propane	0
Hybrid Electric	5
Plug-In Hybrid Electric	1
Electric	0

World Sales = 7.9 million





GM Plants	Type	2010 Production
Kansas City, KS	Car	309,436
Fort Wayne, IN	Truck	304,679
Arlington, TX	Truck	282,029
Lansing, MI - Delta	Truck	277,696
Lordstown, OH	Car	158,099
Flint, MI	Truck	114,969
Wentzville, MO	Truck	91,016
Lansing, MI - Grand River	Car	65,480
Hamtramck, MI	Car	51,896
Shreveport, LA	Truck	48,449
Bowling Green, KY	Car	15,791

FIGURE 28. General Motors Company Profile

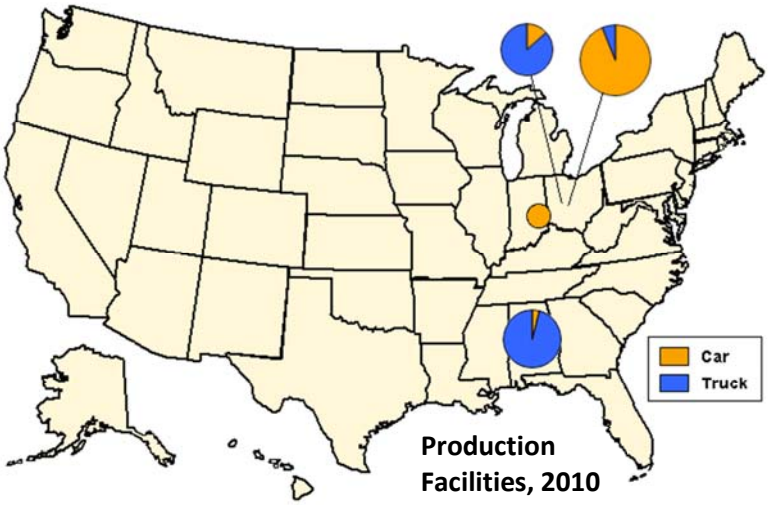
Fuel Saving Technologies

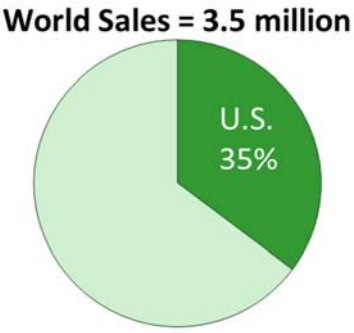
General Motors has implemented a wide range of technologies to achieve greater fuel efficiency. In late 2010, GM launched the Chevrolet Volt, which was the first commercially available plug-in hybrid to reach the market. On full-sized trucks and SUVs where towing is important, GM has offered a Two-Mode hybrid system beginning with the 2008 model year that provides the benefits of hybrid technology while still providing towing capability. In addition to these robust and costly hybrid drivetrain technologies, GM is also implementing lower cost "stop-start" hybrid technologies that it has termed eAssist. The eAssist technology was introduced in the Buick LaCrosse and Regal for 2011 and will be offered in the redesigned 2013 Chevrolet Malibu as well.

GM is using smaller displacement engines by employing direct injection and turbo-charging to increase performance while improving efficiency. This technology is finding its way into entry-level vehicles like the Chevrolet Cruze and Chevrolet Sonic. Aerodynamics, both passive like air dams and underbody panels, as well as dynamic technologies like active shutters in the front grille that close at higher speed to improve aerodynamics, are increasingly used to boost efficiency. General Motors has also been a proponent of E85 flex-fuel vehicles and brought to market the first turbocharged E85 flex-fuel vehicle with 2011 Buick Regal. GM will also be introducing the all-electric Spark EV for the 2013 model year and will be introducing a diesel version of the Chevrolet Cruze that same year.

Honda Company Profile

Number of U.S. Employees	
25,000	
Corporate Average Fuel Economy, Model Year 2011	
Domestic Cars	34.9 mpg
Import Cars	42.8 mpg
Light Trucks	26.2 mpg
Number of Alternative Fuel Models, Model Year 2011	
Flex Fuel	0
Natural Gas	1
Propane	0
Hybrid Electric	3
Plug-In Hybrid Electric	0
Electric	0





Honda Plants	Type	2010 Production
Marysville, OH	Car	320,011
Lincoln, AL	Truck	261,090
East Liberty, OH	Truck	213,543
Greensburg, IN	Car	95,116
East Liberty, OH	Car	33,200
Marysville, OH	Truck	20,550
Lincoln, AL	Car	10,992

FIGURE 29. Honda Company Profile

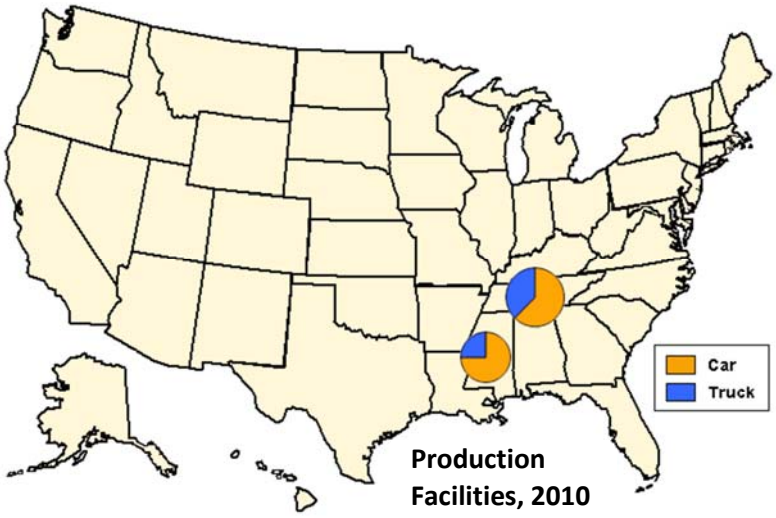
Fuel Saving Technologies

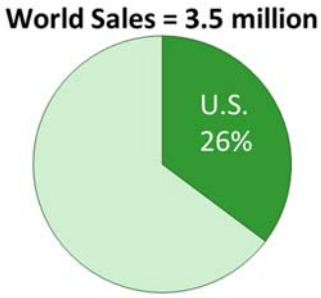
Honda began using cylinder deactivation or variable cylinder management (VCM) beginning with the top trim level of the 2005 Odyssey and it is now standard in the newly redesigned 2011 Odyssey. It has also been used in select trim levels of the Accord since 2008. This provides the power of a larger displacement engine while providing the efficiency of a smaller engine when power is not needed.

Honda is also actively developing and deploying hybrid technology. The Insight and CR-Z are hybrid-only models while the Civic Hybrid is based on the standard Civic model. Honda is pursuing hybrid technologies and spreading them across more of their lineup and a fully electric vehicle is planned for the U.S. market in the form of 2012 Honda Fit EV. Honda has been the only major manufacturer to produce a natural gas vehicle for the U.S. consumer market and has also developed hydrogen fuel cell technology which led to the development of the FCX Clarity. In 2008, the FCX Clarity became the first commercial fuel cell vehicle available to consumers – as a leased vehicle for those living in Southern California.

Nissan Company Profile

Number of U.S. Employees	
11,200	
Corporate Average Fuel Economy, Model Year 2011	
Domestic Cars	34.6 mpg
Import Cars	33.4 mpg
Light Trucks	24.8 mpg
Number of Alternative Fuel Models, Model Year 2011	
Flex Fuel	2
Natural Gas	0
Propane	0
Hybrid Electric	1
Plug-In Hybrid Electric	0
Electric	1





Nissan Plants	Type	2010 Production
Smyrna, TN	Car	175,651
Canton, MS	Car	171,216
Smyrna, TN	Truck	105,623
Canton, MS	Truck	57,748

FIGURE 30. Nissan Company Profile

Fuel Saving Technologies

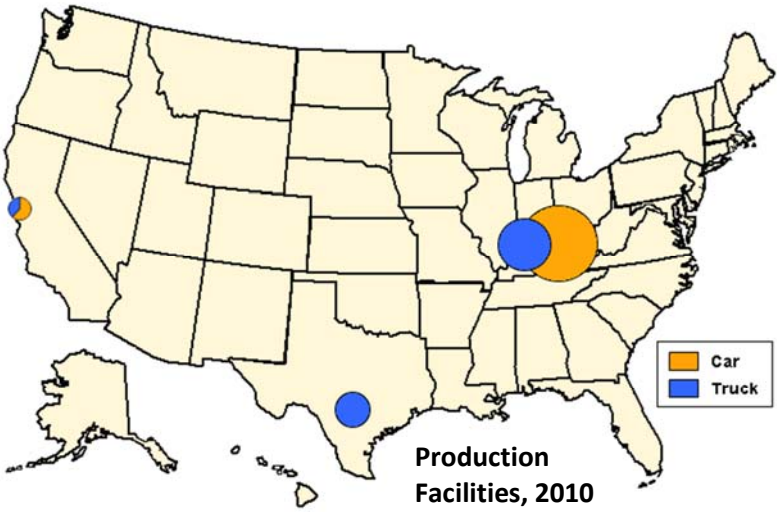
Of the major manufacturers, Nissan has been the most aggressive in promoting electric vehicles not only in the United States but also around the world. Nissan launched the 2011 Leaf EV in the U.S. market at the very end of calendar year 2010. Nissan has implemented full hybrid technology with the Altima Hybrid but has not spread this throughout their line-up.

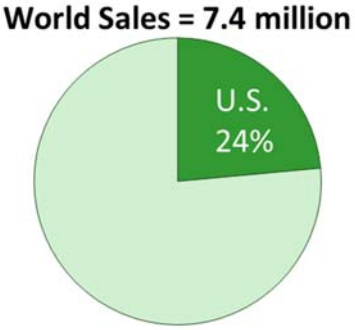
Though Nissan has employed gasoline direct injection with turbocharging, they have also developed a lower cost dual port injection system that produces similar benefits of better performance and an increase in fuel economy of about 4% over an engine with a single fuel injector. The 2012 Versa will be the first model to receive this new dual fuel injector technology.

Nissan has also been a leader in the development and implementation of continuously variable transmissions or CVTs. Nissan's CVT allows engines to operate at an optimum speed throughout the entire range of gear ratios which helps to improve efficiency. Without fixed gear ratios, the CVT provides smooth "stepless" acceleration and Nissan's XTRONIC CVT offers one of the widest gear ratio ranges in the industry. CVTs are typically used on vehicles with small displacement engines with limited torque. However, Nissan was the first to offer the CVT for engines as large as 3.5 liters and now offers them throughout their line-up including high-powered luxury vehicles.

Toyota Company Profile

Number of U.S. Employees	
29,000	
Corporate Average Fuel Economy, Model Year 2011	
Domestic Cars	32.6 mpg
Import Cars	42.6 mpg
Light Trucks	25.5 mpg
Number of Alternative Fuel Models, Model Year 2011	
Flex Fuel	2
Natural Gas	0
Propane	0
Hybrid Electric	8
Plug-In Hybrid Electric	0
Electric	0





Toyota Plants	Type	2010 Production
Georgetown, KY	Car	371,694
Princeton, IN	Truck	243,992
San Antonio, TX	Truck	150,098
Fremont, CA (NUMMI)	Car	63,318
Fremont, CA (NUMMI)	Truck	27,495

FIGURE 31. Toyota Company Profile

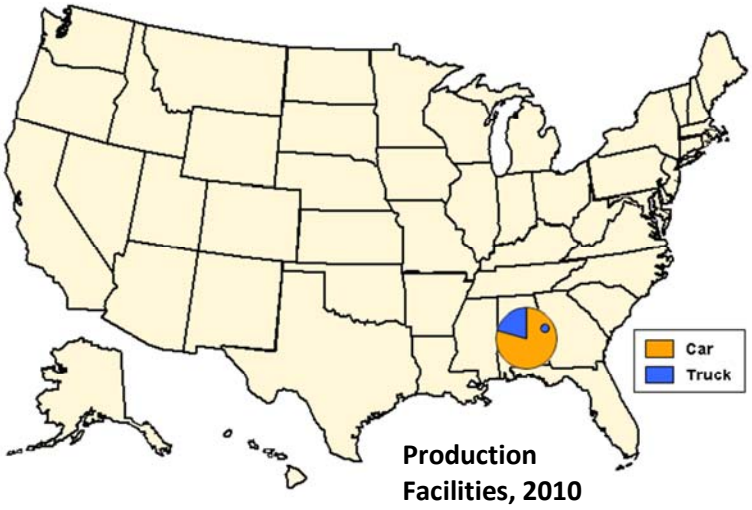
Fuel Saving Technologies

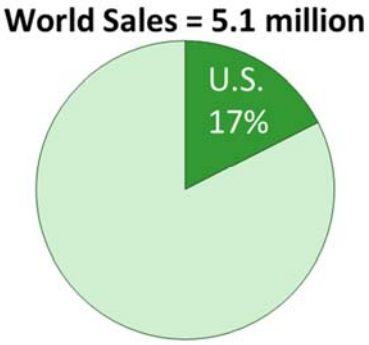
Toyota has been a dominant player in the development of hybrid technology and is expanding the Prius into a family of hybrid vehicles. The new Prius models will include a larger Prius that offers more cargo space called the Prius V as well as a smaller Prius that will get higher fuel economy than the current model that is referred to as the Prius C. A plug-in version of the standard Prius is also scheduled to arrive in the spring of 2012 with an all-electric range of about 15 miles. To reduce weight in the Prius models, aluminum was used in the hood, rear hatch, front stabilizer bar and brake calipers and high strength steel is used in the inner rocker panel, center pillar and roof reinforcement.

For conventional gasoline engine powered passenger vehicles, Toyota is employing direct injection and turbo charging on some models to increase engine output and efficiency. Toyota is also pursuing diesel engines for its larger vehicles like the Tundra and Sequoia where power, torque and towing capacity are particularly important. The 2012 Scion iQ EV will be Toyota's first all-electric vehicle for the U.S. market. Like other manufacturers, aerodynamics is an important part of Toyota's strategy for increasing fuel economy as evidenced by the standard Prius and plug-in Prius which have among the lowest coefficients of drag in the industry.

Hyundai Company Profile

Number of U.S. Employees	
5,000	
Corporate Average Fuel Economy, Model Year 2011	
Domestic Cars	None
Import Cars	35.7 mpg
Light Trucks	28.6 mpg
Number of Alternative Fuel Models, Model Year 2011	
Flex Fuel	0
Natural Gas	0
Propane	0
Hybrid Electric	1
Plug-In Hybrid Electric	0
Electric	0





Hyundai Plants	Type	2010 Production
Montgomery, AL	Car	238,387
Montgomery, AL	Truck	62,113
West Point, GA	Truck	17,320

Note: World sales figure includes Kia. All other data on the page are Hyundai only. Hyundai vehicles assembled in Alabama do not meet CAFE criteria for domestic vehicles due to the low percentage of domestic content.

FIGURE 33. Hyundai Company Profile

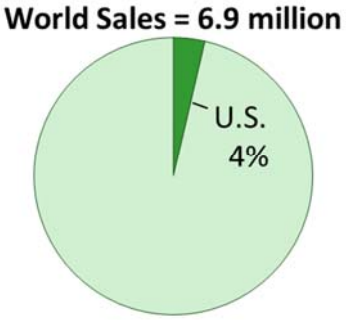
Fuel Saving Technologies

Hyundai has been very aggressive in their pursuit of fleet-wide improvement of fuel economy. Hyundai is employing a wide array of technologies to achieve their goals for higher fuel economy. A key component for achieving greater fuel economy is downsizing their engine offerings. In order to do this while still meeting consumer expectations for performance, Hyundai is combining weight reduction with high output turbocharged direct injection engines. The 2011 Hyundai Sonata is an example of this approach as Hyundai became the first manufacturer in the United States to offer a large sedan without a V6 option. The 2011 Sonata is offered with a base 2.4 liter gasoline direct injection (GDI) 4 cylinder engine that produces 200 horsepower or an optional 2.0 liter turbocharged engine that delivers 274 horsepower. The overall vehicle weight of the 2011 Sonata is 130 lbs. less than the outgoing model.

Aside from smaller high output engines and weight reduction, Hyundai is implementing a range of other technologies as well – from aerodynamics to hybrid drive trains. For example, the 2011 Sonata is also offered as a hybrid. These technologies are being deployed throughout their model line-up. In addition, Hyundai is developing diesel and fuel cell technology.

Volkswagen Company Profile

Number of U.S. Employees	
4,500	
Corporate Average Fuel Economy, Model Year 2011	
Domestic Cars	None
Import Cars	33.4 mpg
Light Trucks	27.2 mpg
Number of Alternative Fuel Models, Model Year 2011	
Flex Fuel	3
Natural Gas	0
Propane	0
Hybrid Electric	1
Plug-In Hybrid Electric	0
Electric	0



Volkswagen Plants	Type	2010 Production
Chattanooga, TN	Car	None

FIGURE 34. Volkswagen Company Profile

Fuel Saving Technologies

Volkswagen has long been dominant in producing light-vehicle passenger diesel models and is currently pushing a range of fuel efficient TDI diesel technologies under the name "BlueMotion". The Volkswagen Jetta uses a self-cleaning diesel emissions filter while the Tourareg uses the urea system to control NOx emissions. Volkswagen (including Audi) uses turbo charging and direct injection with both diesel and gasoline engines.

The TSI engines developed by Volkswagen use turbo charging and a supercharger with direct injection which makes it possible to downsize engines while meeting consumer expectations for performance. They are not only more efficient than a traditional port injection engines but also lighter with maximum torque at lower engine speeds. This technology combined with Volkswagen's 7 speed dry dual-clutch automatic transmission offers greater efficiency and uninterrupted torque between the engine and wheels.

Volkswagen has been developing hybrid systems for passenger vehicles and will be introducing a gas-electric hybrid Jetta model to the U.S. market in 2012. Also under development are pure electric models like the Volkswagen E-Up! and Audi e-Tron.

Top Eight U.S. Manufacturers Produce Only Half of World's Vehicles

The companies that made 90% of all vehicles produced in the United States in 2010 are together responsible for only about half of the vehicles produced worldwide. VW, which did not produce vehicles in the United States until 2011, held 8% of World production in 2010. Hyundai produced 6% of the World's vehicles and only 4% of U.S. vehicles. Toyota had a consistent producer share of 10% in the United States and the World. Many companies, like recent upstarts in China and India, comprise the other 50% of world production. The U.S. produces about 10% of the world's vehicles.

U.S. Light Vehicle Production 2010 **World Vehicle Production 2010**

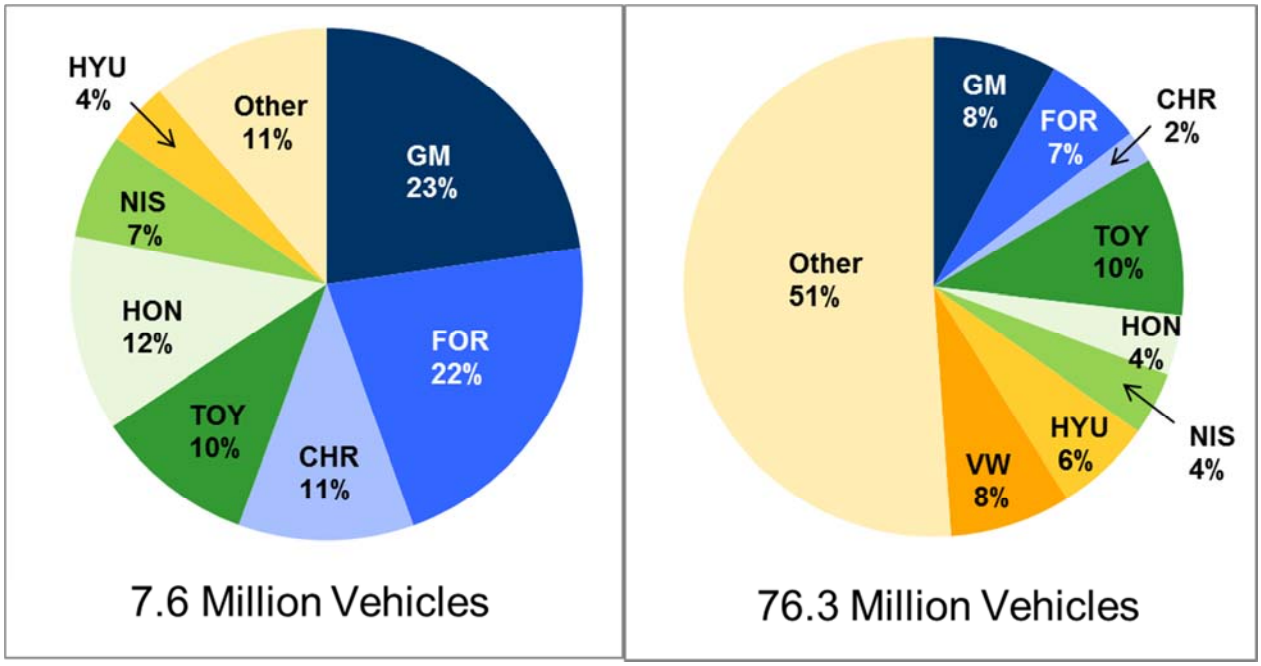


FIGURE 35. Production of U.S. and World Vehicles in 2010 by Manufacturer

Note: World production includes heavy vehicles, which are a small share of total production.

Source:
Wards AutoInfoBank.

U.S. Sales Volumes Rose in 2010, Reversing Downward Trend

From 2006 to 2009, car and light truck sales declined each year. The trend reversed in 2010, with sales climbing slightly over 2009 levels. Even with the increase, about 30% fewer cars and light trucks were sold in 2010 than in 2006. Most of the major manufacturers experienced drastic sales declines over this period. The exceptions are Hyundai and Nissan. Hyundai sold 24% more cars in 2010 than in 2006. Nissan also experienced a small increase (7%) in car sales.

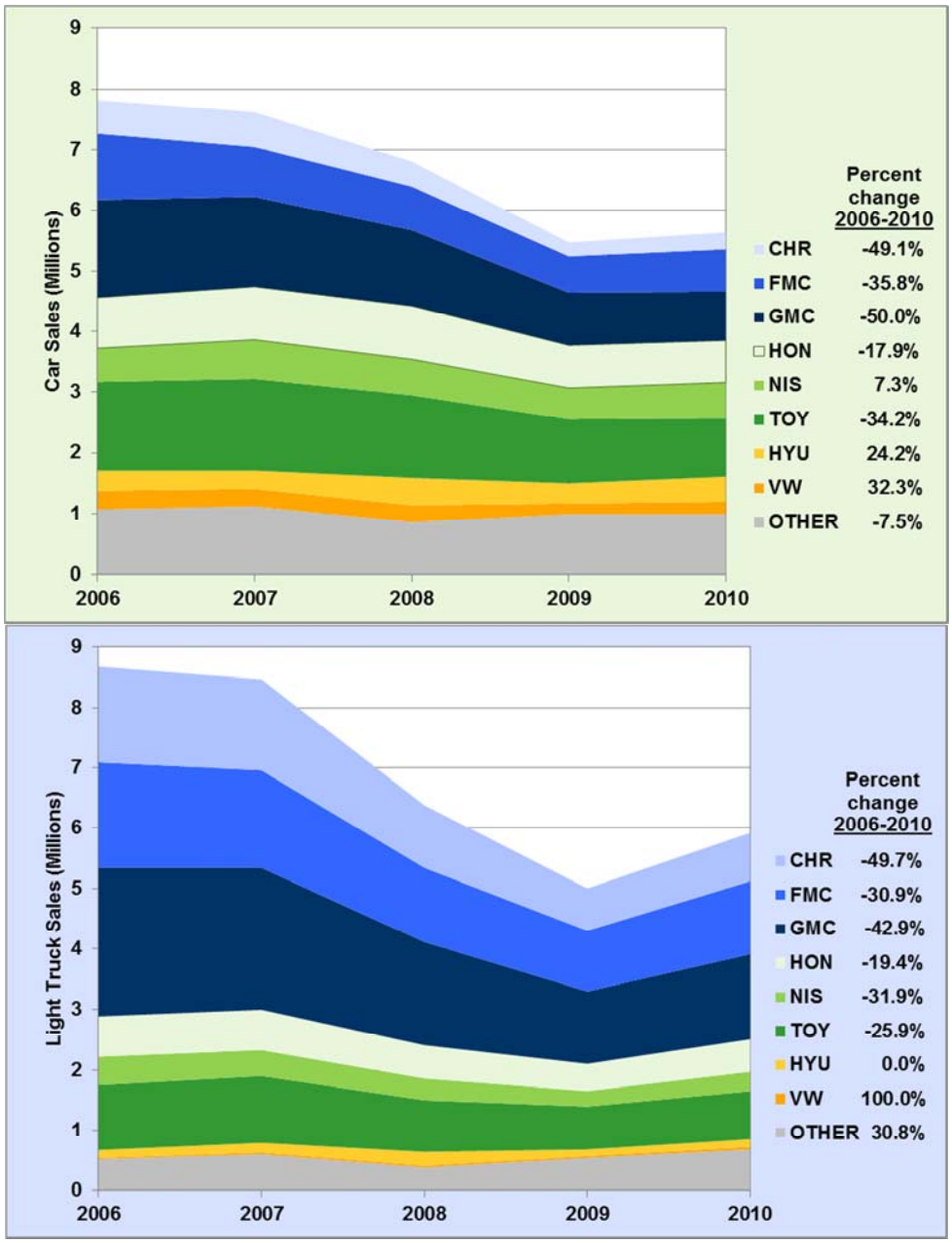


FIGURE 36. New Light Vehicle Sales by Manufacturer, 2006-2010

Source:
Wards AutoInfoBank.

Market Share Shifted Among Manufacturers

Smaller manufacturers are gaining market share. In the car market, General Motors, Ford, Chrysler, and Toyota all lost market share from 2006 to 2010, while Hyundai, Nissan, and Honda gained. The three domestic manufacturers accounted for two-thirds of light truck market share in 2006, but only 58% in 2010.

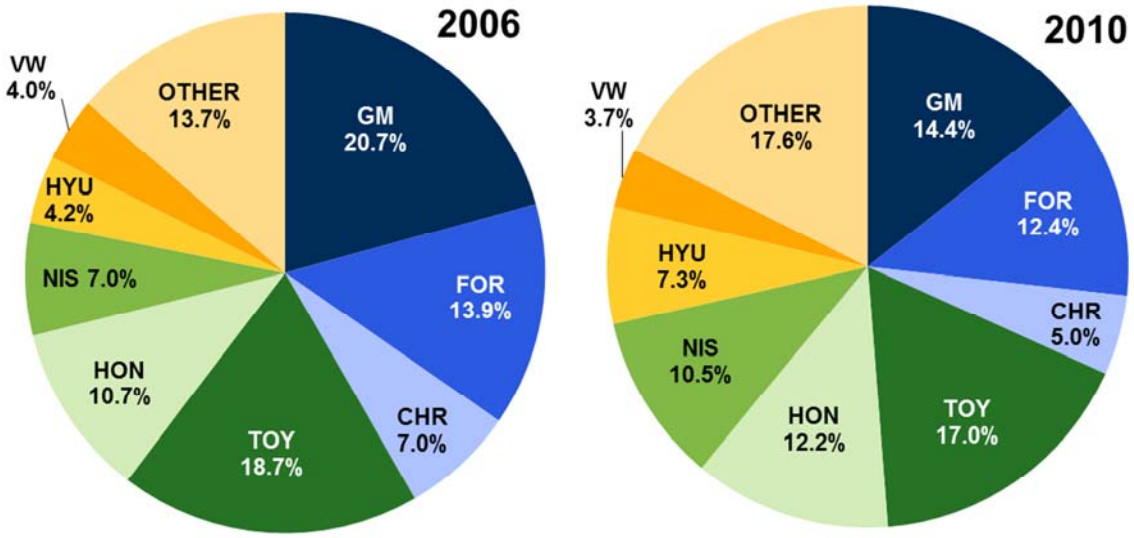


FIGURE 37. New Car Market Share by Manufacturer, 2006 and 2010

Source:
Ward's AutoInfoBank

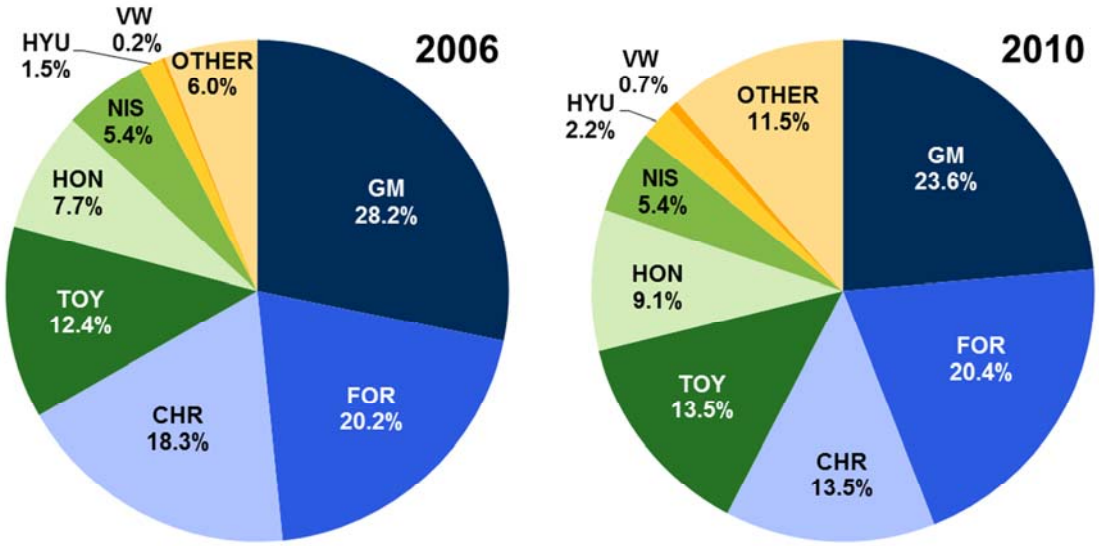


FIGURE 38. New Light Truck Market Share by Manufacturer, 2006 and 2010

Source:
Ward's AutoInfoBank.

Engine Size Has Been Fairly Stable

Average sales-weighted engine size for cars and light trucks did not vary significantly for many of the manufacturers over the past five years, though light trucks showed more variation than cars. In general, GM, Ford and Chrysler have larger engines than the other major manufacturers. Yearly fluctuations are typically a result of the introduction or elimination of a model. Volkswagen's dramatic decrease in truck engine size is a reflection of their limited truck offerings in 2008 followed by the introduction of the small 2.0 liter, 4-cylinder Tiguan in the 2009 model year.

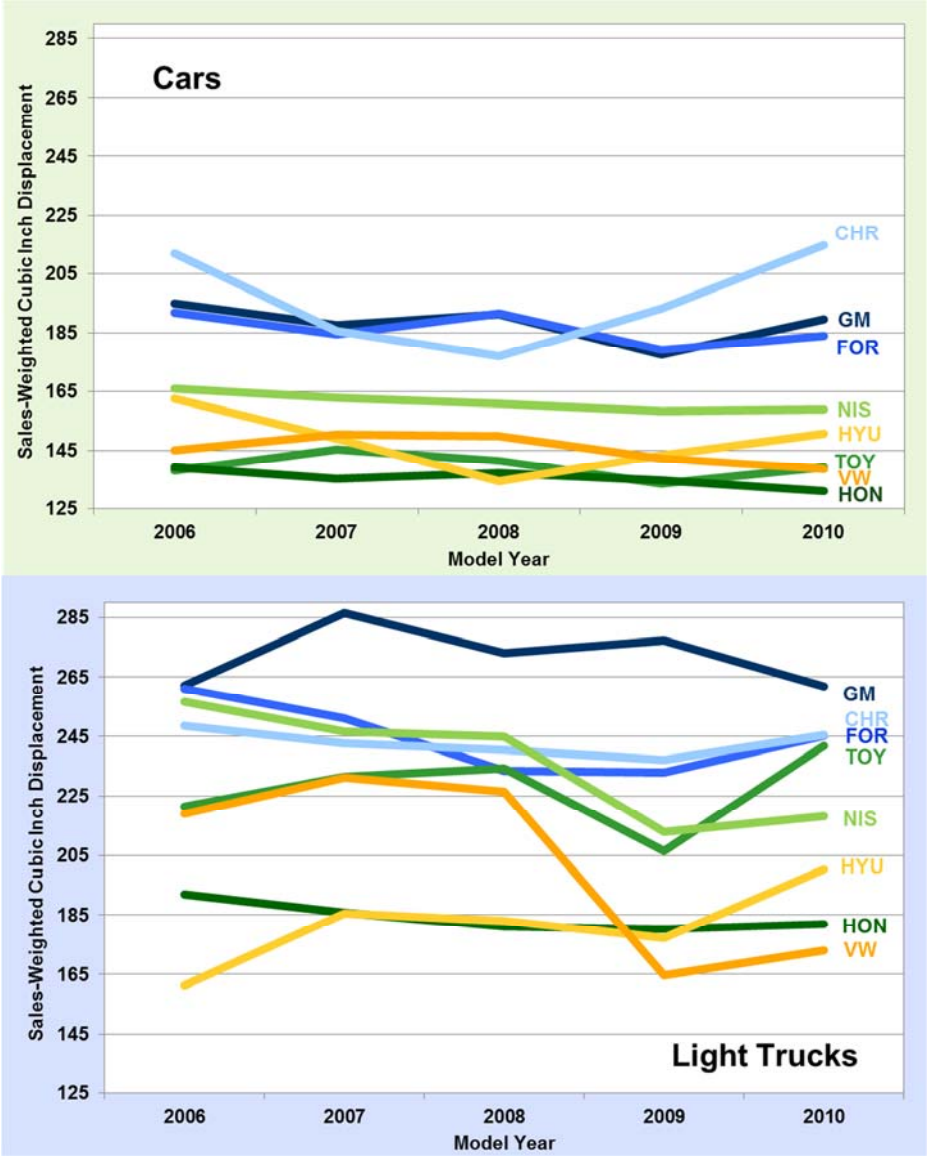


FIGURE 39. Car and Light Truck Engine Size by Manufacturer

Source:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

Horsepower is Up in 2010

Engine displacement and horsepower are often closely related. However, advancements in engine design and overall engine technology can increase horsepower without increasing the engine size. Chrysler, GM, Ford, Toyota, and Hyundai have increased average sales-weighted horsepower in 2010 model year (MY) cars. In light trucks, Toyota and Hyundai have increased horsepower significantly from 2009 to 2010. Nissan and VW had a large decline in light truck horsepower between 2008 and 2009.

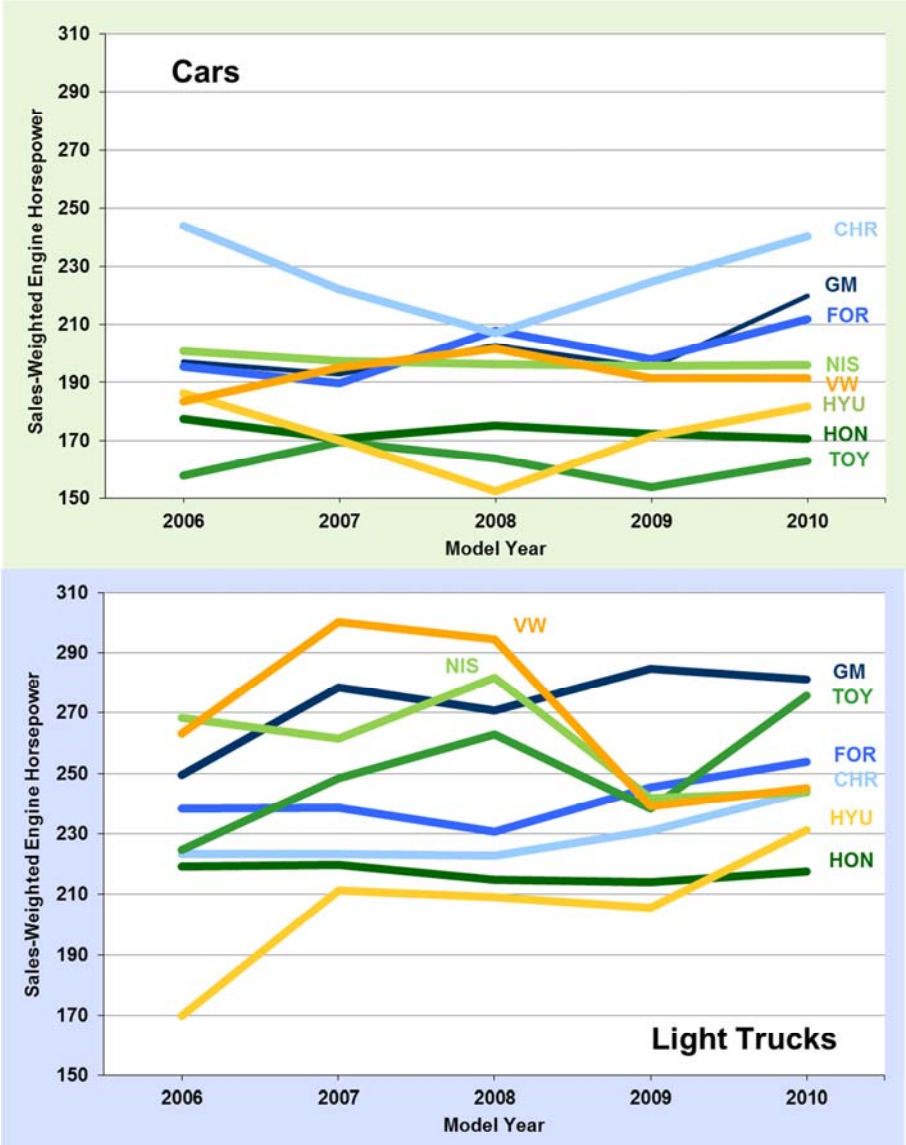


FIGURE 40. Car and Light Truck Horsepower by Manufacturer

Source:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

Fuel Economy Improvement is Small Compared to Increase in Horsepower

Despite a 110% increase in horsepower and 34% decrease in 0-60 time from 1980 to 2010, the fuel economy of vehicles improved 17.2%. All of these data series are sales-weighted averages. The weight of the vehicle appears to have an inverse relationship with fuel economy.

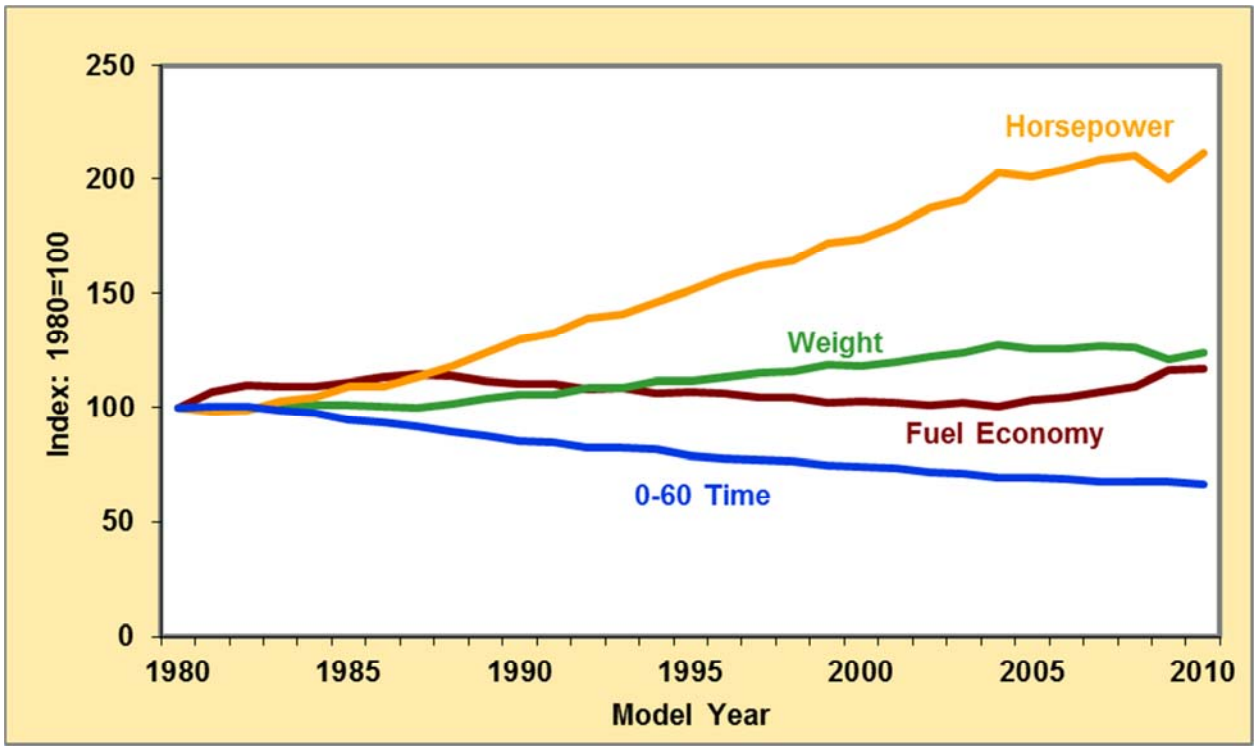
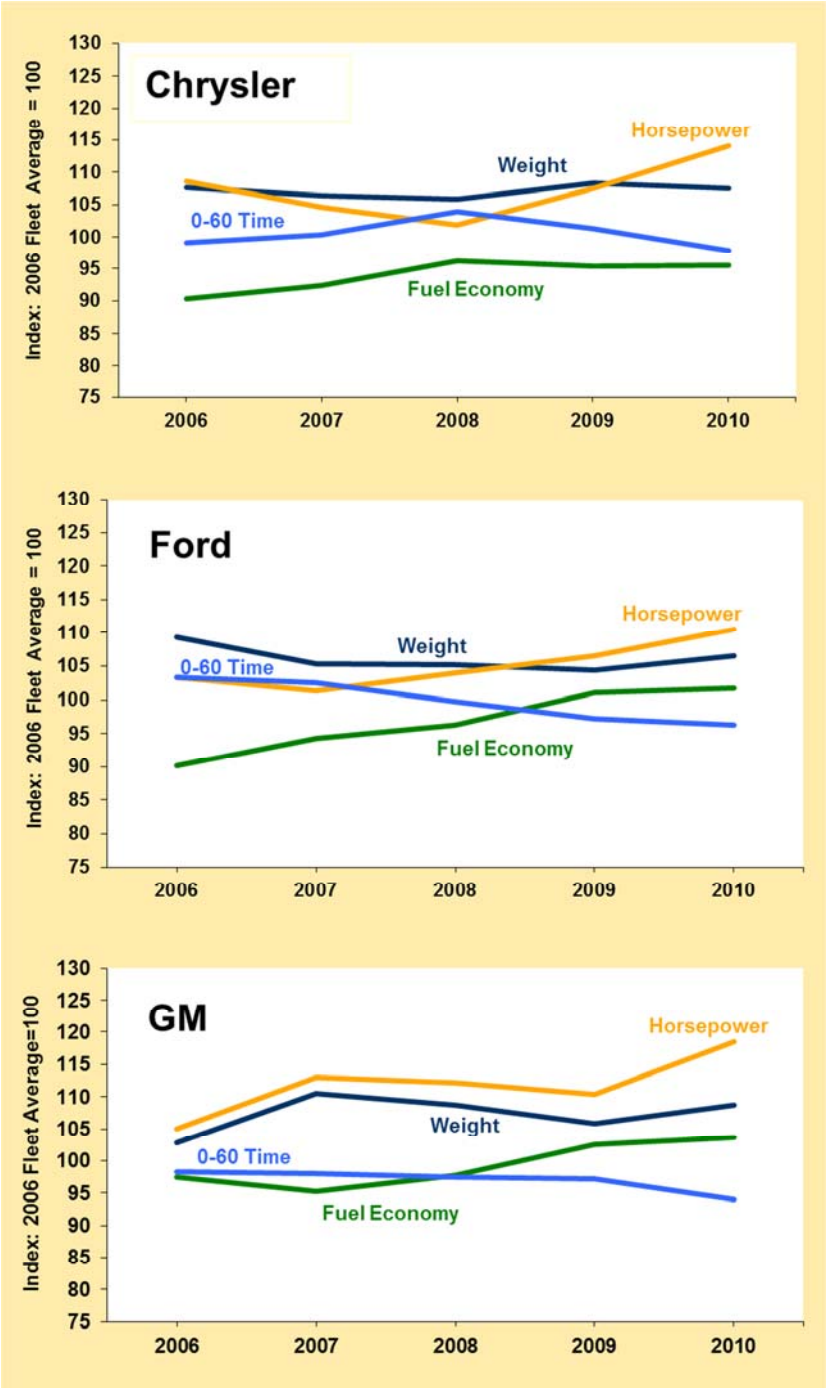


FIGURE 41. Characteristics of Light Vehicles Sold, 1980-2010

Note: Data are sales-weighted.

Source:
U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

Horsepower Above Fleet Average and Fuel Economy Near Fleet Average for Detroit 3 Manufacturers



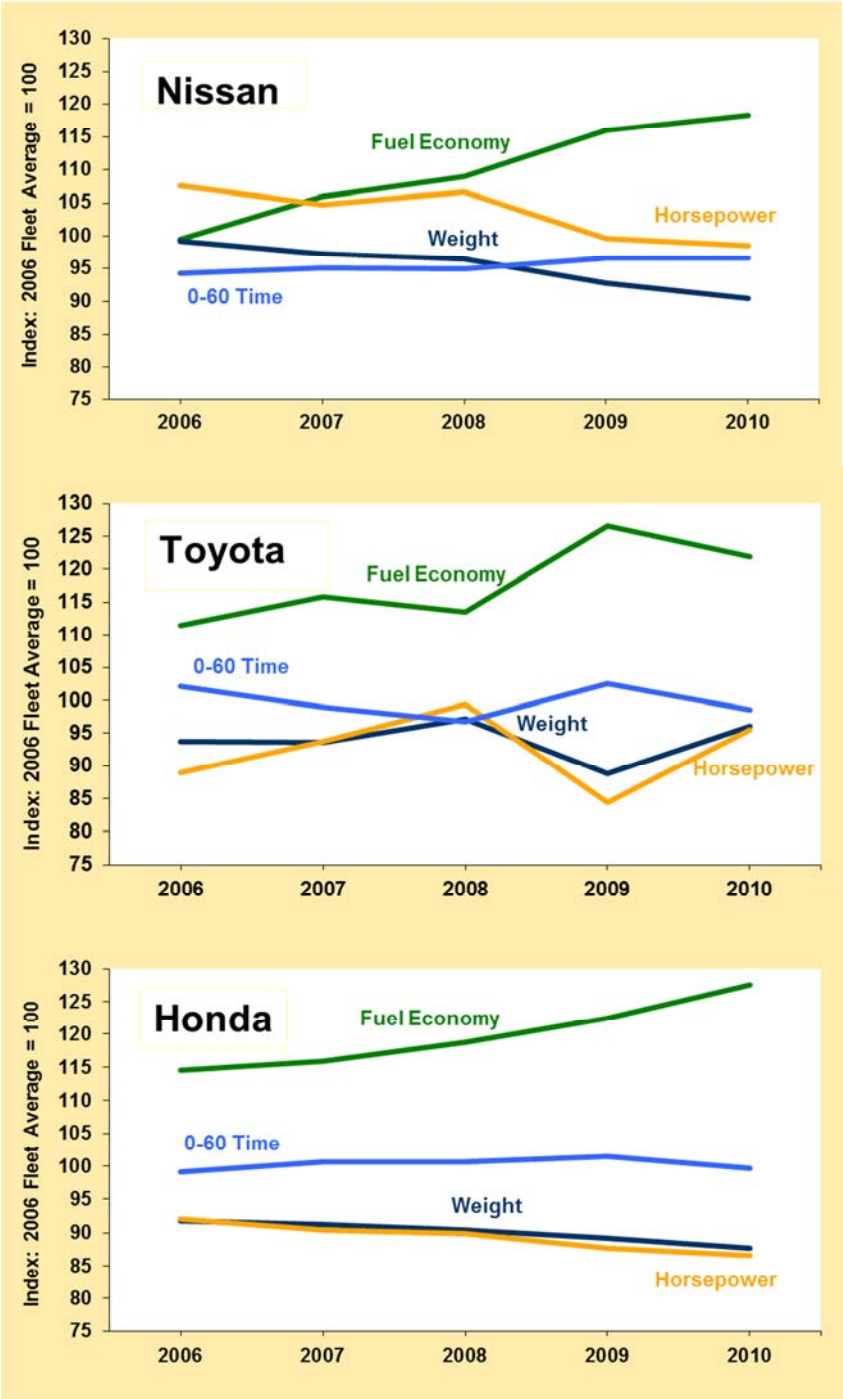
These sales-weighted averages show that all of the Detroit 3 manufacturers are increasing the horsepower and decreasing the 0-60 times of the light vehicles they sell. Vehicle weight for all three has fluctuated slightly up and down as they try to use more lightweight materials while adding additional features on the vehicles. Ford made the biggest improvement in fuel economy over the five year period – a 13% improvement from 2006 to 2010. In the same time frame, Chrysler and GM both had a 6% improvement in fuel economy. Fuel economy in 2006 was below the fleet average (below 100 on the graph) for all three manufacturers.

FIGURE 42. Characteristics of Detroit 3 Light Vehicles Sold, 2006-2010

Source:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

Fuel Economy Above Fleet Average and Weight Below Fleet Average for Japanese Manufacturers



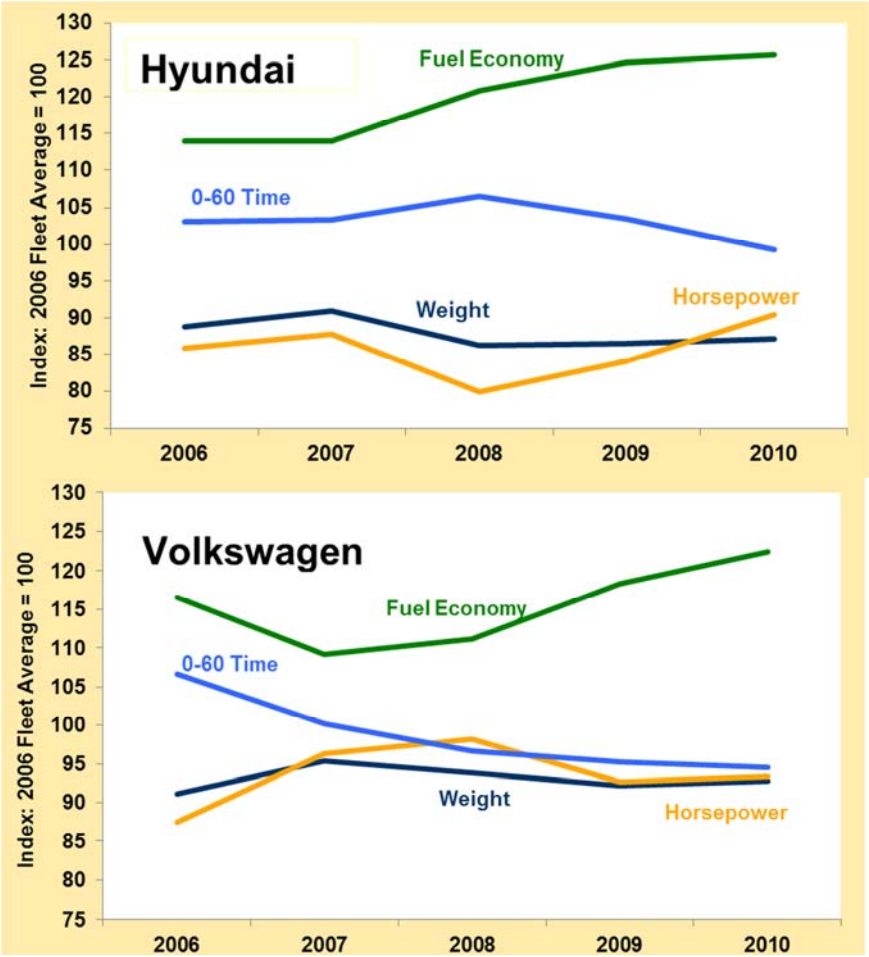
These sales-weighted averages show that the fuel economy of these Japanese manufacturers has been at or above the fleet average (above 100 on the graph) over the last five years. Nissan had the greatest fuel economy improvement of any manufacturer – 13% over the five year period. Unlike the Detroit 3, these Japanese manufacturers have not increased horsepower or 0-60 times in the last five years. In fact, horsepower is lower for Nissan and Honda, and up by 7% for Toyota. Weight for all three manufacturers was below fleet average.

FIGURE 43. Characteristics of Japanese Light Vehicles Sold, 2006-2010

Source:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

Fuel Economy Above Fleet Average and Horsepower Below Fleet Average for Other Large Manufacturers



These sales-weighted averages show that both Hyundai and Volkswagen have improved fuel economy since 2007. Even in 2006 the fuel economy for both companies' light vehicles was higher than the fleet average (higher than 100 on the graph). Volkswagen decreased 0-60 time by 11% from 2006 to 2008, while horsepower rose 7% overall in the five year period. Despite that increase, horsepower was below the fleet average for both manufacturers.

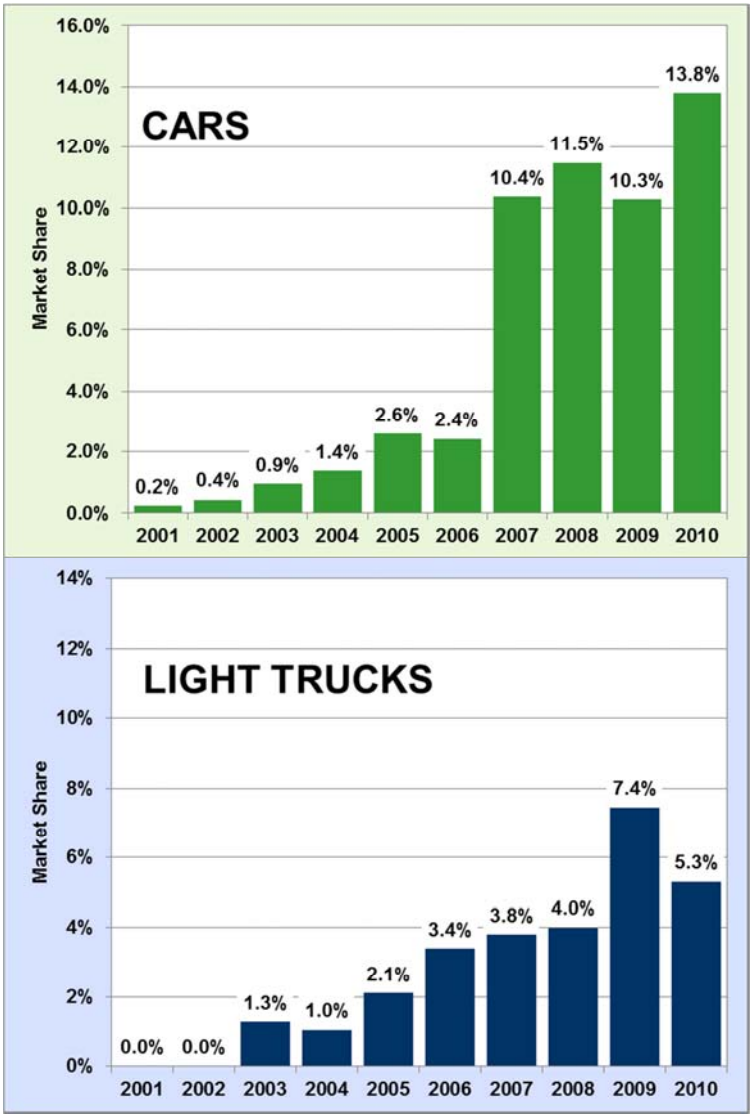
FIGURE 44. Characteristics of Light Vehicles Sold by Other Large Manufacturers, 2006-2010

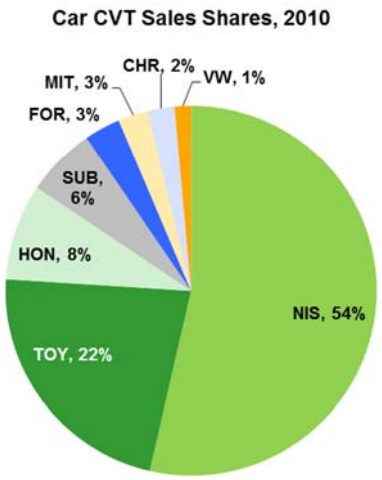
Source:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

Nearly 14% of Cars Sold Have Continuously Variable Transmissions

Continuously variable transmissions (CVT) offer an infinite number of gear ratios that allow the engine to operate at peak efficiency throughout the entire range of vehicle speeds which improves fuel efficiency. Though CVT technology has been around for many years, the sales of vehicles with CVTs began slowly and have climbed to 13.8% of car and 5.3% of light truck market share. With CVT making up a relatively small percentage of all transmissions, changes to model offerings with CVTs can have a pronounced effect on the year to year percentages shown in the graphs below. Nissan sold more than half of the cars and the light trucks in 2010 that were equipped with CVT.





Note: MIT = Mitsubishi
SUB = Subaru

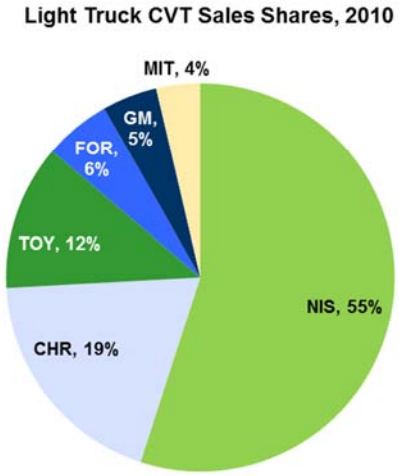


FIGURE 45. CVT Market Share, 2003-2010 and CVT Manufacturer's Share, 2010

Source:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

The Number of Transmission Speeds has been Increasing

The number of transmission speeds in new light vehicles has been growing. A greater number of gears improve fuel economy and performance by more closely matching the wheel speed to the optimum engine speed. Four-speed transmissions were the norm for cars and light trucks until the mid-2000's when transmissions of 5 speeds or more began dominating the market. The market share grew for 6 and 7-speed cars and light trucks in 2010. Continuously variable transmissions (CVT) are also making their way into the market.

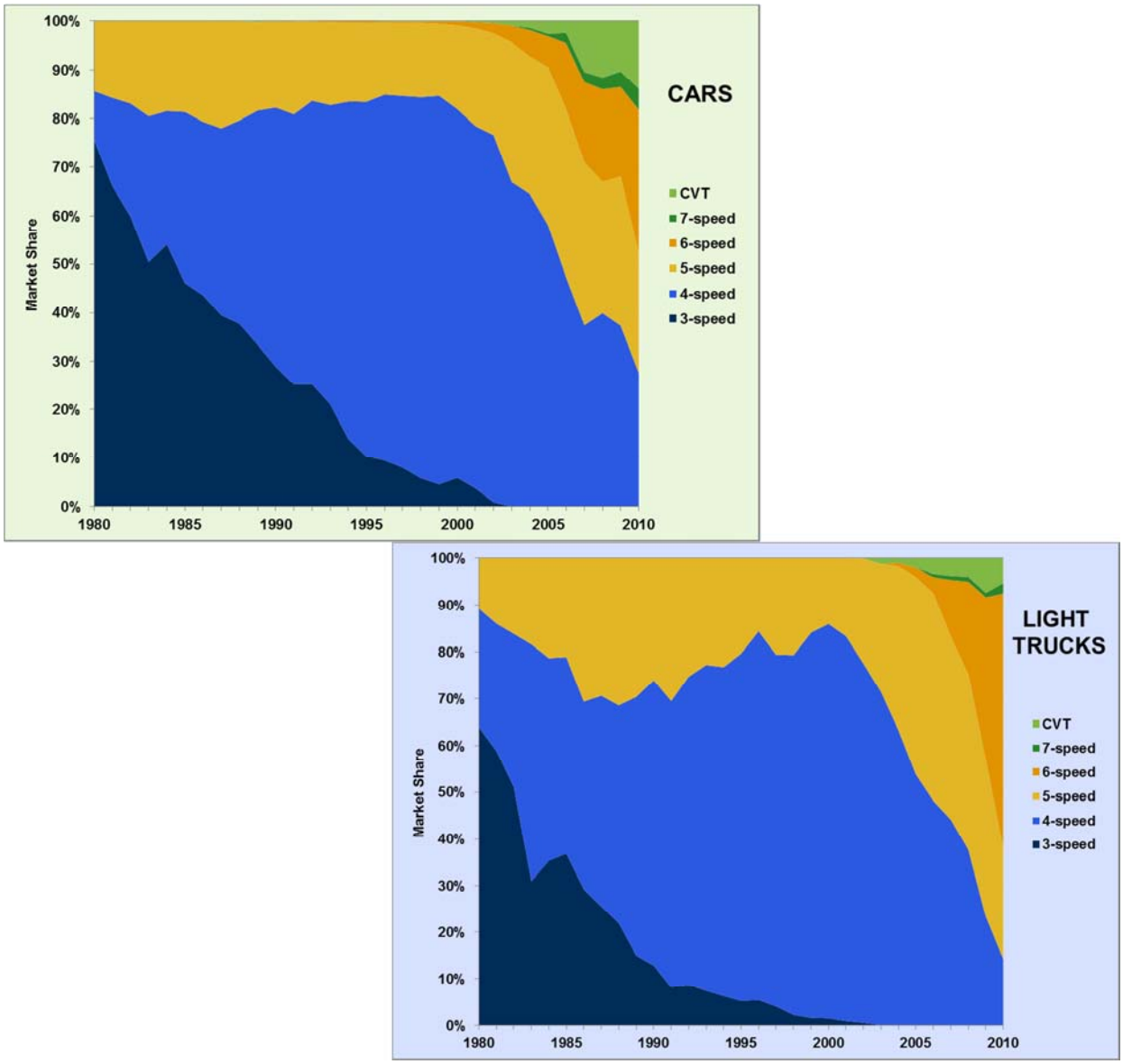


FIGURE 46. Market Share of Transmission Speeds, 1980-2010

Source:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

VW, Toyota, GM, and Ford Use Gasoline Direct Injection in Cars

VW began using gasoline direct injection (GDI) in cars in model year (MY) 2008 and nearly 50% of the cars it sold in MY 2010 were GDI. Chrysler, Nissan, Honda, and Hyundai (not pictured) have used port fuel injection exclusively since the mid-1990's. VW also sold diesel cars over the years, while the other large manufacturers have not sold diesels since the 1980's.

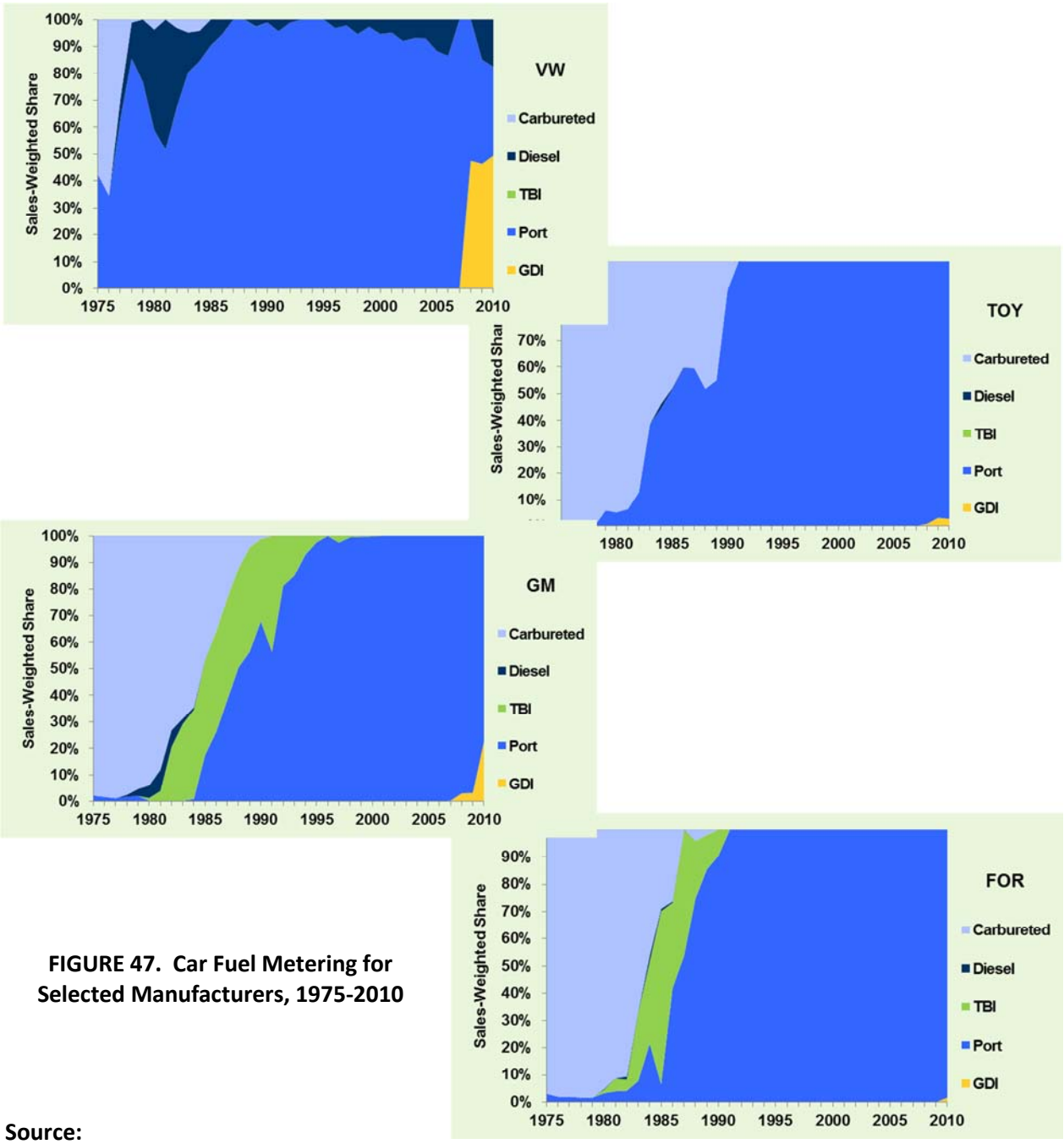


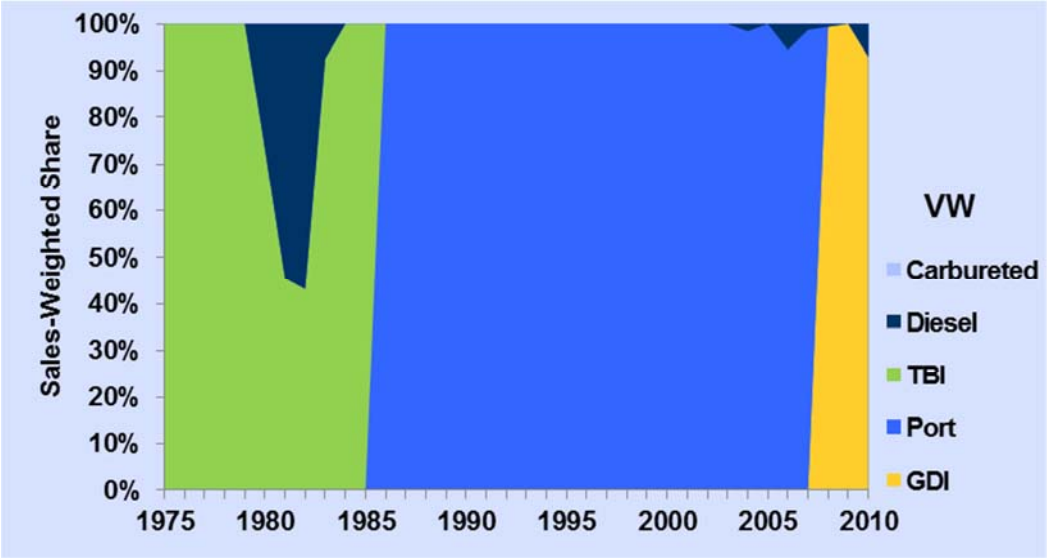
FIGURE 47. Car Fuel Metering for Selected Manufacturers, 1975-2010

Source:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

VW and GM Use Gasoline Direct Injection in Light Trucks

VW has used gasoline direct injection (GDI) in more than 92% of trucks since model year (MY) 2008. Diesels make up the remainder of VW trucks. GM used GDI in 9% of trucks in 2009 and 41% in 2010. All other manufacturers have sold port fuel injected trucks exclusively since the mid- 1990s with throttle body injection (TBI) or carbureted engines before that time.



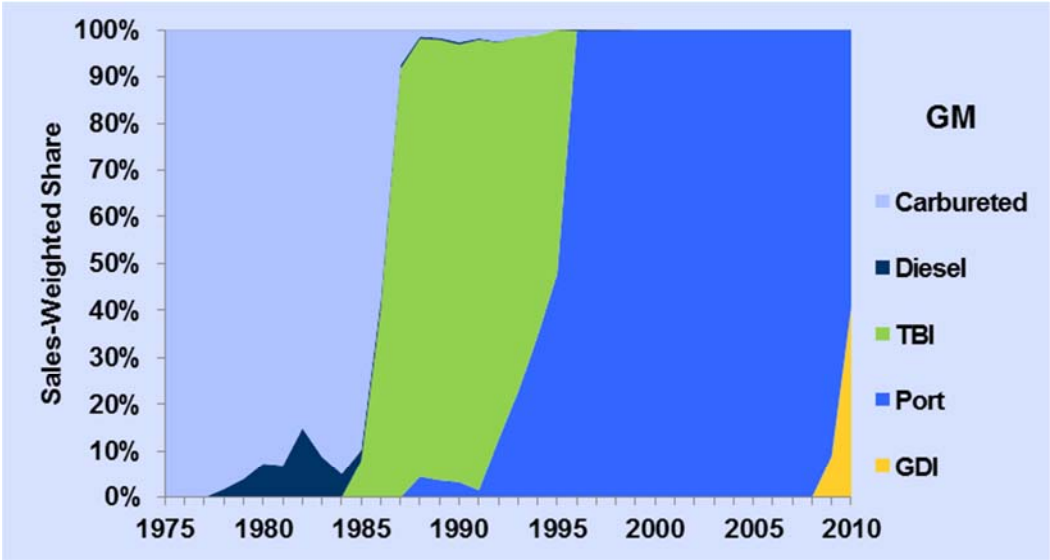


FIGURE 48. Light Truck Fuel Metering for Selected Manufacturers, 1975-2010

Note: Light trucks include pickups, sport utility vehicles, and vans.

Source:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

Number of Light Vehicle Diesel Models Increase

In the early 1980's gas prices were high, the economy was in a downturn, and the cost of a gallon of diesel fuel was much less than that of a gallon of gasoline. Many manufacturers at that time produced diesel cars and light trucks. In model year (MY) 1984, there were 101 different models of light vehicles with diesel engines, including many common models like the Chevrolet Chevette, Ford Escort, Buick Regal, and Toyota Camry. Diesel engines in light vehicles, however, were not widely embraced by American consumers, with many finding them noisy, dirty, and hard to start in cold weather. By MY 2000, Volkswagen was the only manufacturer selling diesel light vehicles. Recently, advanced diesel technologies, combined with a nationwide switch to ultra-low-sulfur diesel fuel, have given light vehicle manufacturers new impetus to invest in diesel models. In MY 2011, five different manufacturers have thirteen light vehicle models for sale with clean diesel engines that meet current emission standards.

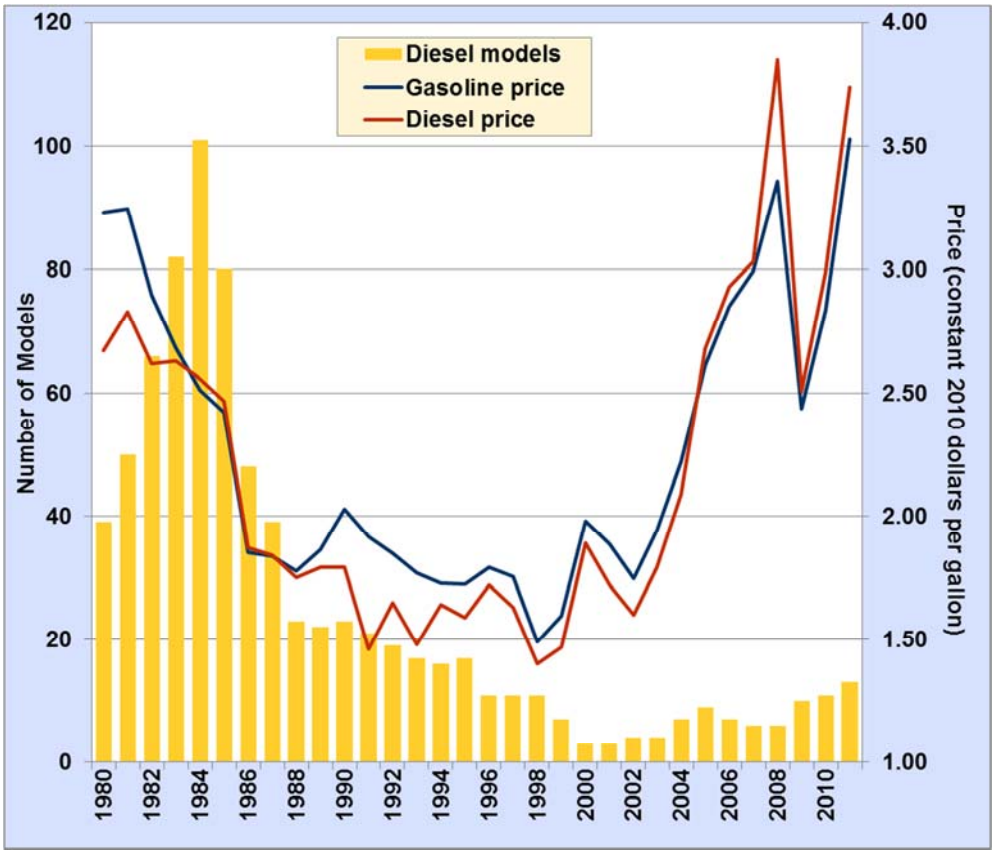


FIGURE 49. Number of Diesel Models and the Price of a Gallon of Gasoline and Diesel, 1980-2011

Sources:

U.S. Department of Energy and U.S. Environmental Protection Agency, Fuel Economy Guide website, June 2011. http://www.fueleconomy.gov

Energy Information Administration, "Gasoline and Diesel Fuel Update," http://www.eia.gov/oog/info/gdu/gasdiesel.asp

GM, Ford, Chrysler and Hyundai Sell Small, Medium, and Large Cars

GM has had a fairly consistent mix of small, medium and large cars over the years. The large car market share for Ford has been declining in recent model years, while the mid-size car market has increased. Chrysler's large and medium car markets increased from MY 2008 to 2010. Hyundai entered the large car market in 2006 when 58% of Hyundai cars sold were large.

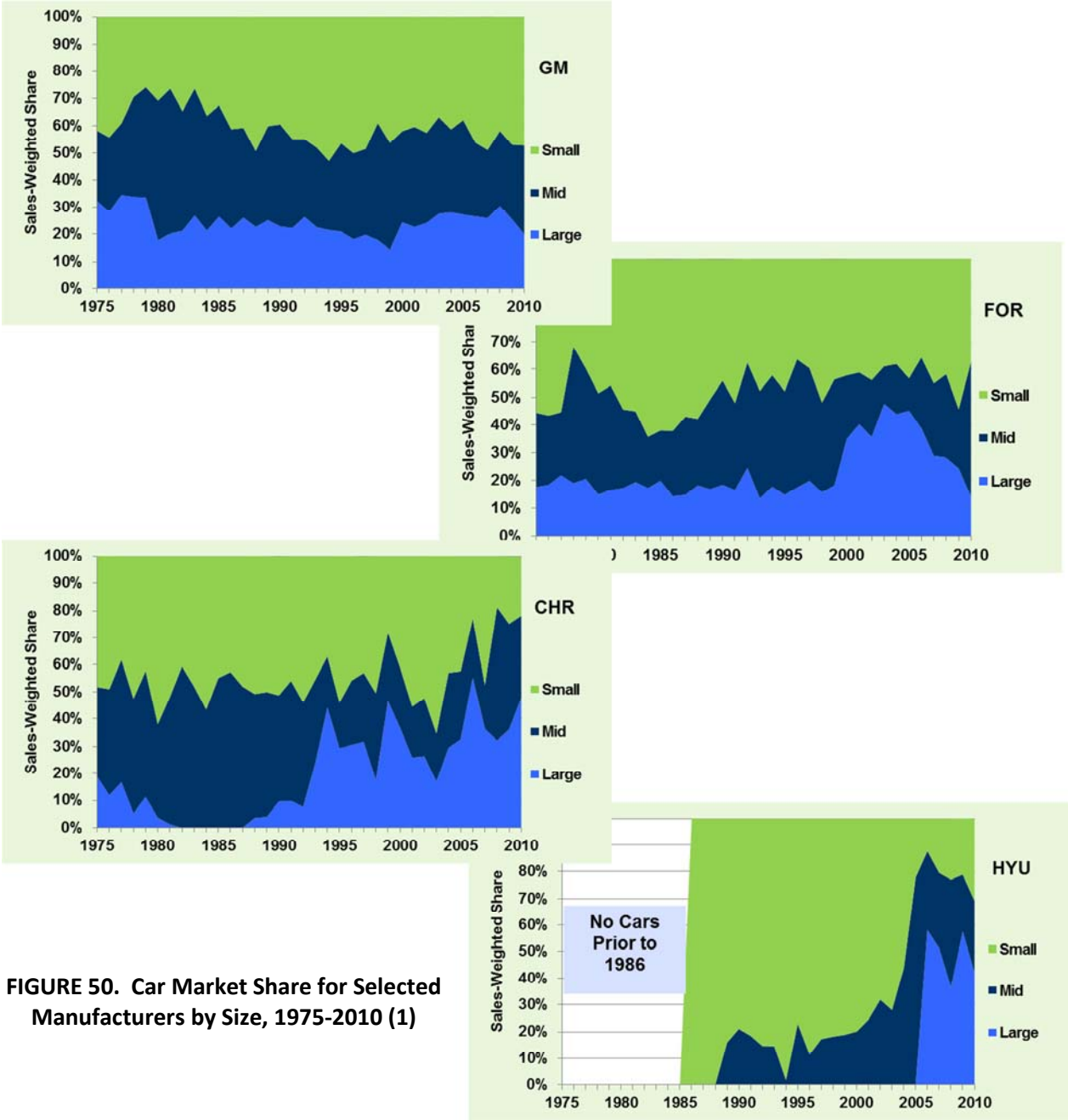


FIGURE 50. Car Market Share for Selected Manufacturers by Size, 1975-2010 (1)

Source:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

Toyota, Honda, Nissan and VW Sell Mainly Small and Mid-Size Cars

In model year (MY) 2010 VW's small cars made up more than 91% of their market. Toyota's market in MY 2010 was about half and half for small and mid-size cars, with about 1% large cars. Honda began selling large cars in MY 2008 when the Accord was redesigned and classified as large instead of mid-size. Nissan moved from selling nearly all small cars to selling nearly all mid-size cars.

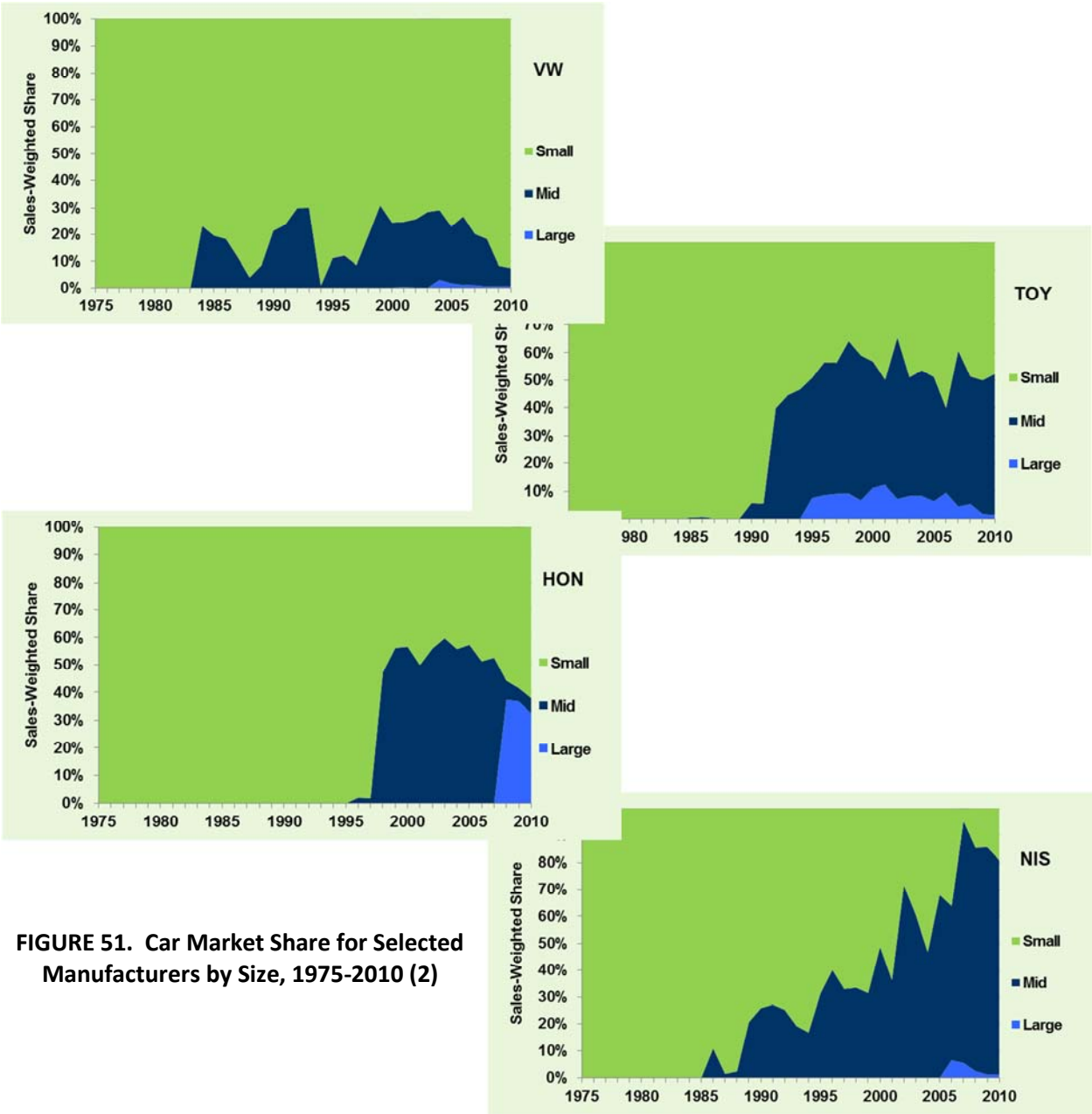


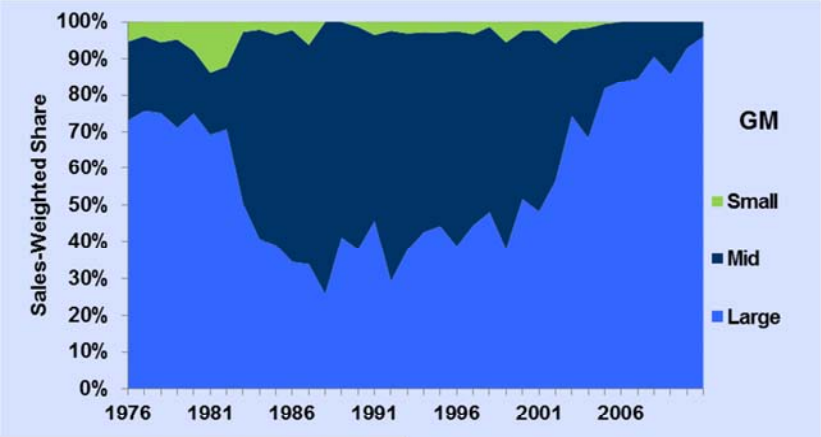
FIGURE 51. Car Market Share for Selected Manufacturers by Size, 1975-2010 (2)

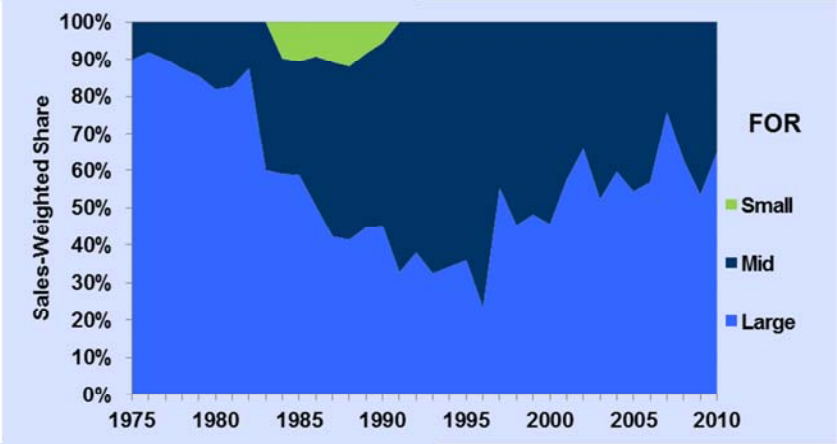
Source:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

GM and Ford Have High Market Share for Large Light Trucks

Large trucks were 96% of GM's light truck market in model year (MY) 2010 and 65% of Ford's market. Chrysler is the only Detroit 3 company still making small trucks.





Note: Light trucks include pickups, sport-utility vehicles, and vans.

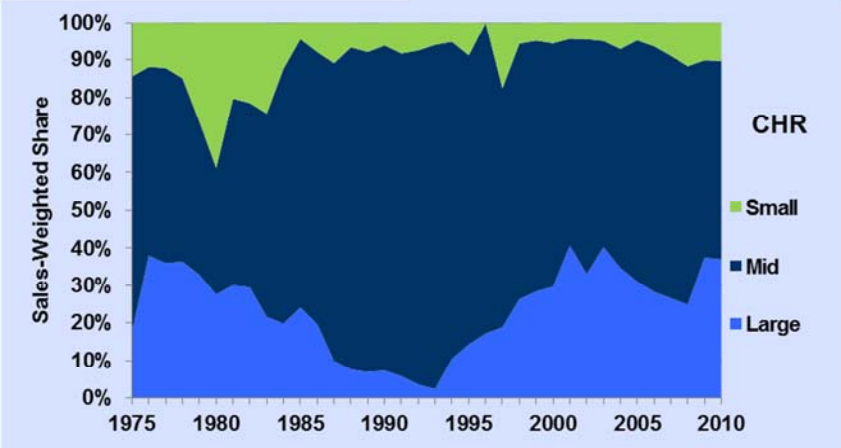


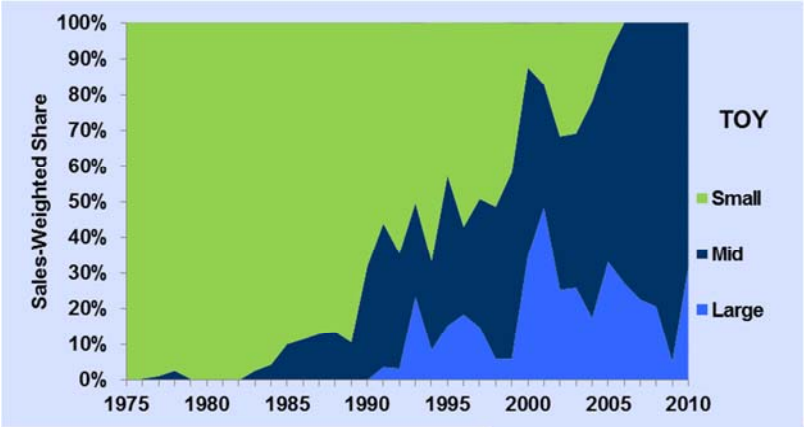
FIGURE 52. Light Truck Market Share for Selected Manufacturers by Size, 1975-2010 (1)

Source:

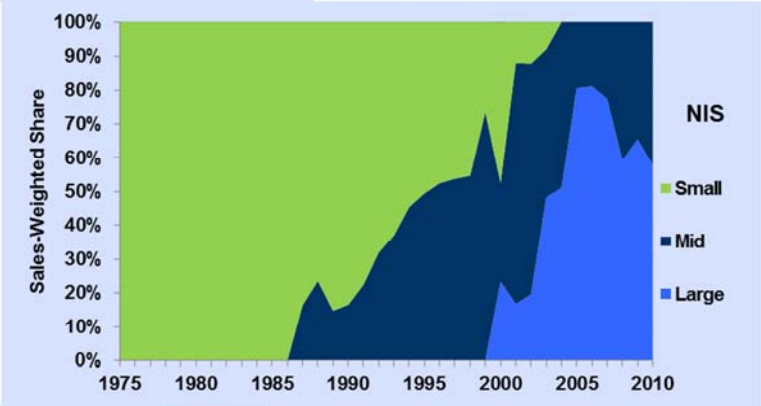
U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

Toyota, Nissan and VW Moved to Larger Light Trucks

Toyota, Nissan and VW predominantly sold small light trucks until the 1990's. Toyota now sells mostly mid-size pickups. More than half of Nissan and VW light truck sales in model year (MY) 2010 are large, with the others being mid-size trucks. Hyundai and Honda (not pictured) both sold mostly mid-size trucks over the last ten years, with less than 10% large trucks for each.



Note: Light trucks include pickups, sport-utility vehicles, and vans.



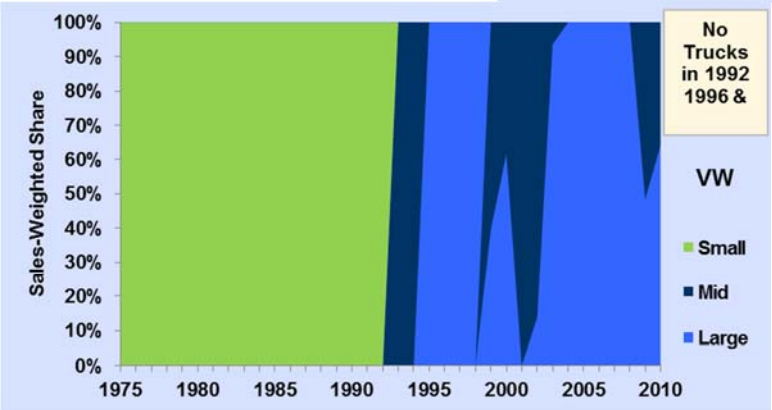
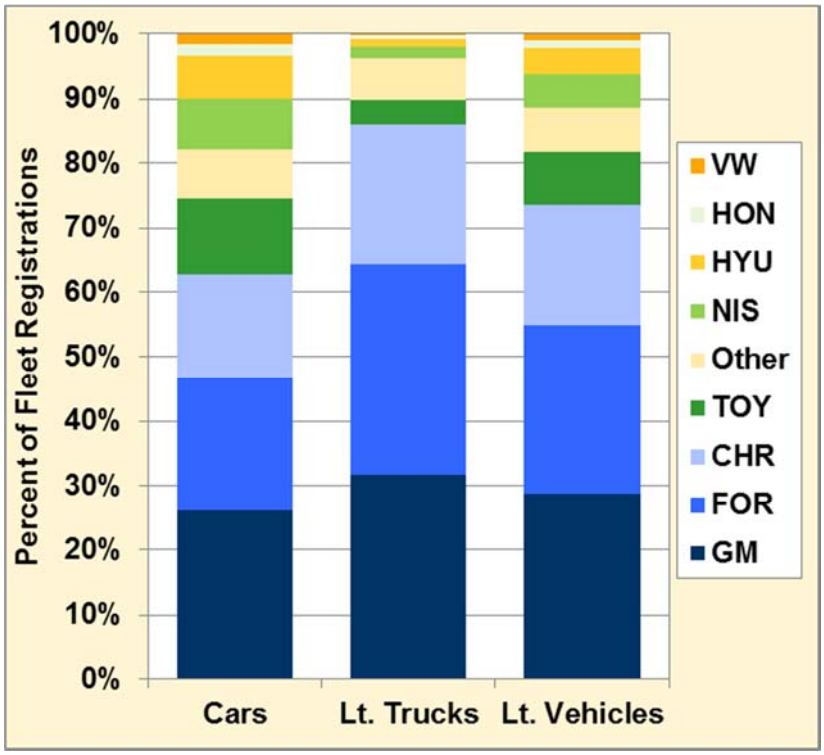


FIGURE 53. Light Truck Market Share for Selected Manufacturers by Size, 1975-2010 (2)

Source:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

Detroit 3 Dominate New Fleet Registrations in 2010



Ford, GM, and Chrysler together accounted for 63% of new fleet car registrations and 86% of the new fleet light truck registrations in 2010. New registrations are often used as a proxy for sales. Of the top eight manufacturers, Honda and VW had the smallest share of new fleet registrations and GM had the largest share.

Though GM and Ford had more new fleet registrations in 2010 than Chrysler, Chrysler had the largest proportion of fleet vehicles vs. total – total being the sum of fleet vehicles and retail vehicles. Over 60% of the new Chrysler cars registered in 2010 were registered to fleets. Honda had only 2.5% of total new vehicles registered to fleets.

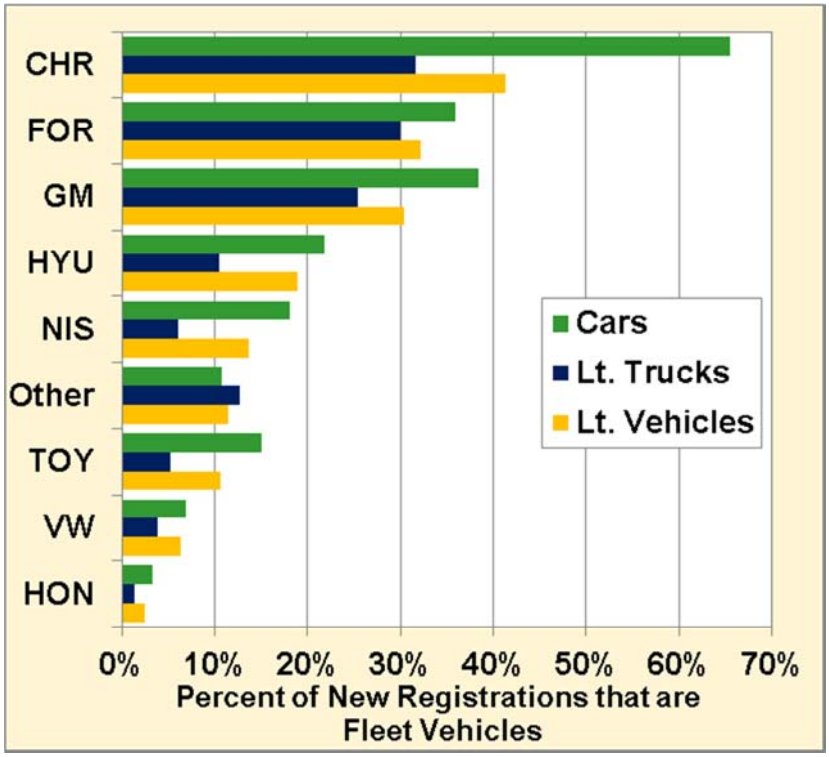


FIGURE 54. New Fleet Registration Data by Manufacturer

Source:

Bobit Publishing Company, *Automotive Fleet Factbook 2010*.

http://www.automotive-fleet.com/statistics

Chevrolet Impala Was the Top New Fleet Car in 2010

The Chevrolet Impala topped the list of new cars which were registered to fleets in 2010. New registrations are often used as a proxy for sales. Over sixty-seven percent of the new Impalas registered in 2010 were fleet vehicles, most of them in rental fleets. The Ford Crown Victoria was the top model for government fleets, likely due to law enforcement. The Ford Fusion was the model with the most new registrations in commercial fleets, possibly due to the high fuel economy of the Fusion.

TABLE 4. Top 25 New Registrations of Cars in Fleets in 2010

Make	Model	Commercial	Government	Rental	Total Fleet	Total Retail	Total	% Fleet vs Total
Chevrolet	Impala	13,231	11,016	91,641	115,888	54,794	170,682	67.9%
Chevrolet	Malibu	10,396	4,353	57,234	71,983	129,997	201,980	35.6%
Dodge	Charger	1,701	8,324	53,336	63,361	18,074	81,435	77.8%
Ford	Fusion	33,609	3,035	26,312	62,956	122,269	185,225	34.0%
Toyota	Camry	7,157	225	52,206	59,588	259,710	319,298	18.7%
Ford	Focus	5,176	2,739	44,130	52,045	115,164	167,209	31.1%
Toyota	Corolla	4,308	142	47,403	51,853	215,545	267,398	19.4%
Chevrolet	Cobalt	1,434	262	49,746	51,442	61,368	112,810	45.6%
Dodge	Avenger	713	5,246	33,238	39,197	13,448	52,645	74.5%
Nissan	Versa	2,343	36	36,057	38,436	55,280	93,716	41.0%
Chrysler	Sebring	1,358	25	32,145	33,528	9,686	43,214	77.6%
Nissan	Altima	3,143	106	28,522	31,771	173,711	205,482	15.5%
Hyundai	Sonata	871	59	29,720	30,650	138,406	169,056	18.1%
Ford	Crown Victoria	951	29,576	13	30,540	2,078	32,618	93.6%
Hyundai	Elantra	567	19	29,081	29,667	83,848	113,515	26.1%
Ford	Taurus	16,051	1,249	11,650	28,950	39,728	68,678	42.2%
Dodge	Caliber	502	56	27,948	28,506	13,455	41,961	67.9%
Chrysler	300	1,035	65	22,410	23,510	15,238	38,748	60.7%
Mercury	Grand Marquis	218	31	23,092	23,341	6,629	29,970	77.9%
Chevrolet	Aveo	527	37	21,455	22,019	19,900	41,919	52.5%
Hyundai	Accent	564	13	17,299	17,876	32,507	50,383	35.5%
Nissan	Sentra	1,347	42	15,431	16,820	70,755	87,575	19.2%
Ford	Mustang	425	58	14,594	15,077	55,738	70,815	21.3%
Pontiac	G6	91	858	12,646	13,595	6,438	20,033	67.9%
KIA	Forte	133	8	13,405	13,546	51,387	64,933	20.9%

Source:

Bobit Publishing Company, *Automotive Fleet Factbook 2010*.

http://www.automotive-fleet.com/statistics

Ford F-Series Was the Top New Fleet Truck in 2010

The Ford F-series topped the list of new light trucks which were registered to fleets in 2010. New registrations are often used as a proxy for sales. About 22% percent of the new Impalas registered in 2010 were fleet vehicles, the majority of them in commercial fleets. The F-Series was also the top model for government fleets. The Chevrolet HHR and the Chrysler Town & Country were the models with the most new registrations in rental fleets.

TABLE 5. Top 25 New Registrations of Trucks in Fleets in 2010

Make	Model	Commercial	Government	Rental	Total Fleet	Total Retail	Total	% Fleet vs Total
Ford	F Series	62,440	25,817	15,986	104,243	366,586	470,829	22.10%
Ford	Econoline	32,284	14,136	28,042	74,462	21,018	95,480	78.00%
Chevrolet	Silverado	37,614	9,575	20,099	67,288	279,669	346,957	19.40%
Dodge	Caravan	15,380	8,357	35,716	59,453	40,322	99,775	59.60%
Chevrolet	HHR	4,769	505	51,443	56,717	20,924	77,641	73.10%
Ford	Escape	26,283	3,057	25,224	54,564	121,584	176,148	31.00%
Chrysler	Town & Country	2,070	88	50,387	52,545	56,258	108,803	48.30%
Chevrolet	Express	22,511	7,833	9,797	40,141	14,869	55,010	73.00%
Chevrolet	Tahoe	2,444	7,910	16,932	27,286	48,217	75,503	36.10%
Ford	Explorer	5,031	5,482	16,699	27,212	21,020	48,232	56.40%
Chevrolet	Traverse	3,635	266	21,623	25,524	76,535	102,059	25.00%
Dodge	Ram	10,049	2,819	11,892	24,760	142,687	167,447	14.80%
Dodge	Journey	4,194	197	16,400	20,791	32,387	53,178	39.10%
Chevrolet	Suburban	1,689	2,300	16,679	20,668	24,290	44,958	46.00%
Ford	Ranger	17,195	3,013	351	20,559	32,318	52,877	38.90%
Ford	Edge	5,624	341	14,304	20,269	86,722	106,991	18.90%
Chevrolet	Equinox	9,670	263	8,789	18,722	108,246	126,968	14.70%
Jeep	Grand Cherokee	1,582	219	15,105	16,906	39,966	56,872	29.70%
Toyota	Sienna	6,140	396	8,794	15,330	76,340	91,670	16.70%
KIA	Sorento	720	19	12,049	12,788	68,978	81,766	15.60%
Hyundai	Santa Fe	637	19	12,125	12,781	71,233	84,014	15.20%
Jeep	Patriot	3,412	97	8,695	12,204	20,650	32,854	37.10%
Jeep	Liberty	1,596	709	9,243	11,548	35,813	47,361	24.40%
Ford	Expedition	2,096	4,013	4,611	10,720	25,618	36,338	29.50%
KIA	Soul	301	2	10,078	10,381	45,156	55,537	18.70%

Source:

Bobit Publishing Company, *Automotive Fleet Factbook 2010*.

http://www.automotive-fleet.com/statistics

Fleet Management Companies Remarket Vehicles On-Line

The top ten fleet management companies owned or managed over 3 million vehicles in 2010. They remarketed 11% of those vehicles during the year. Remarketing is often done by auctioning the vehicles through established auction houses. However, remarketing vehicles on-line is becoming more common. Twenty-six percent of the vehicles remarketed by the top ten fleet management companies were remarketed on-line. Donlan and Emkay remarketed over 80% of their vehicles on-line.

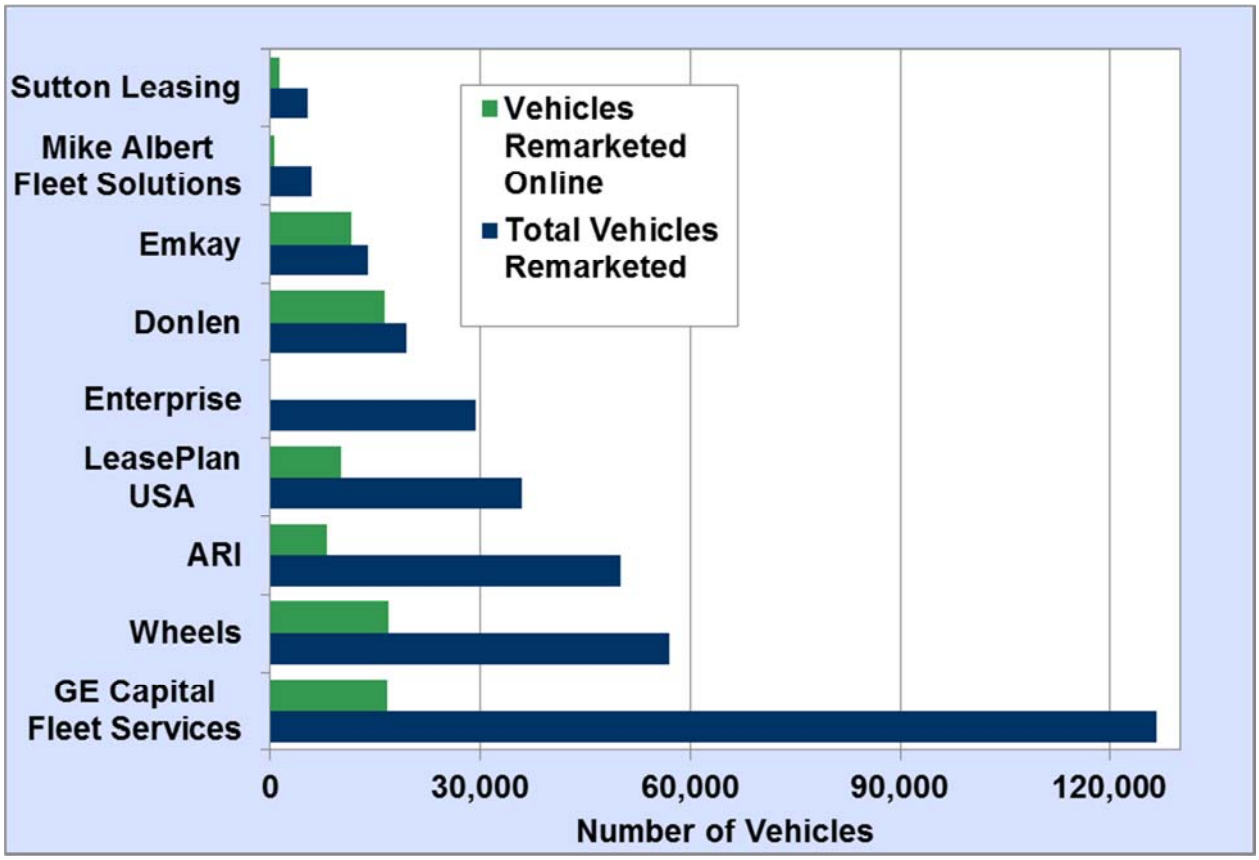
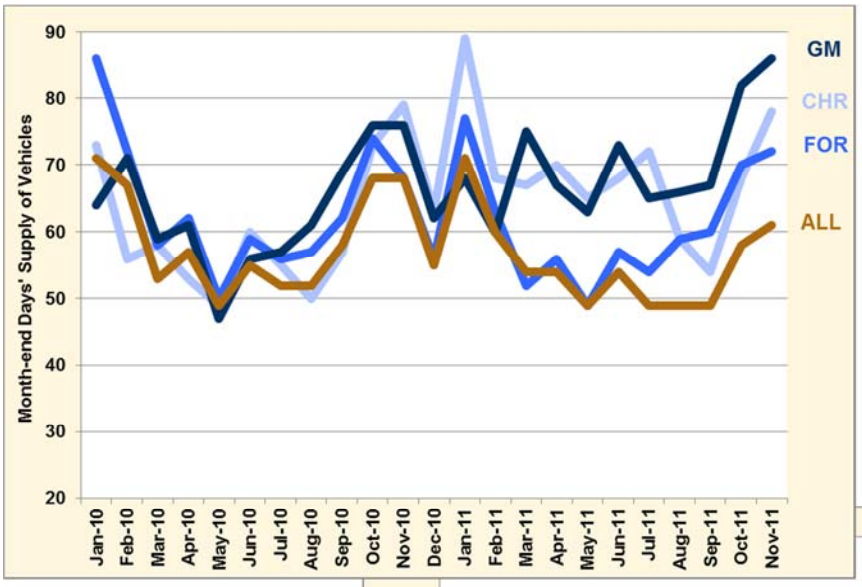


FIGURE 55. Vehicles Remarketed by the Top Ten Fleet Management Companies, 2010

Note: Data for PHH Arval remarketing and data for Enterprise on-line remarketing were not available.

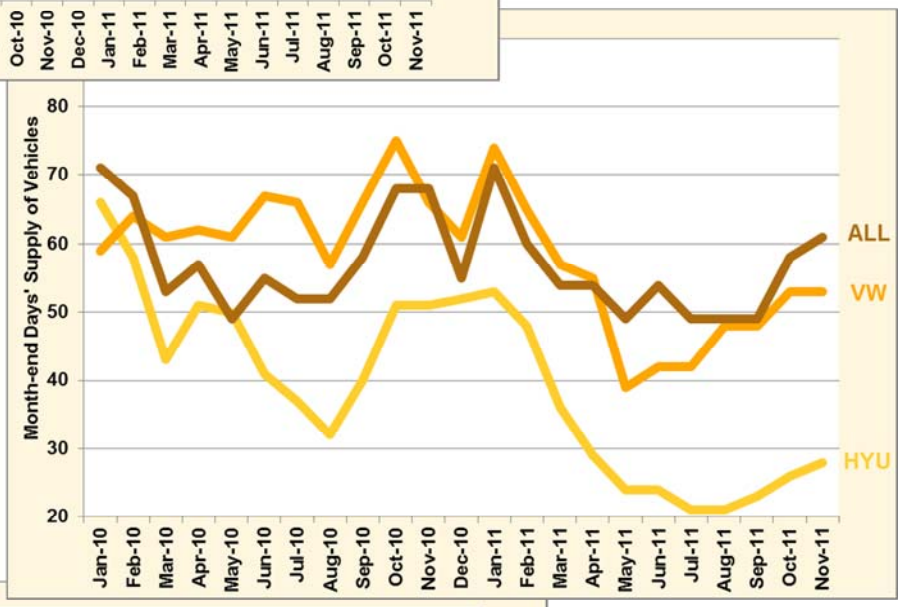
Source:
Bobit Publishing Company, *Automotive Fleet Factbook 2010*.
http://www.automotive-fleet.com/statistics

Light Vehicle Inventory Supplies Change Rapidly



Light vehicle inventories change quickly throughout the year because they are affected by so many different variables: Dealer or manufacturer financial incentives, economic news, supply disruptions.

With Honda, Toyota, and Nissan supply disruptions due to Japan's March 2011 earthquake/ tsunami and the October 2011 flood in Thailand, Hyundai sales are up and the supply has decreased significantly.



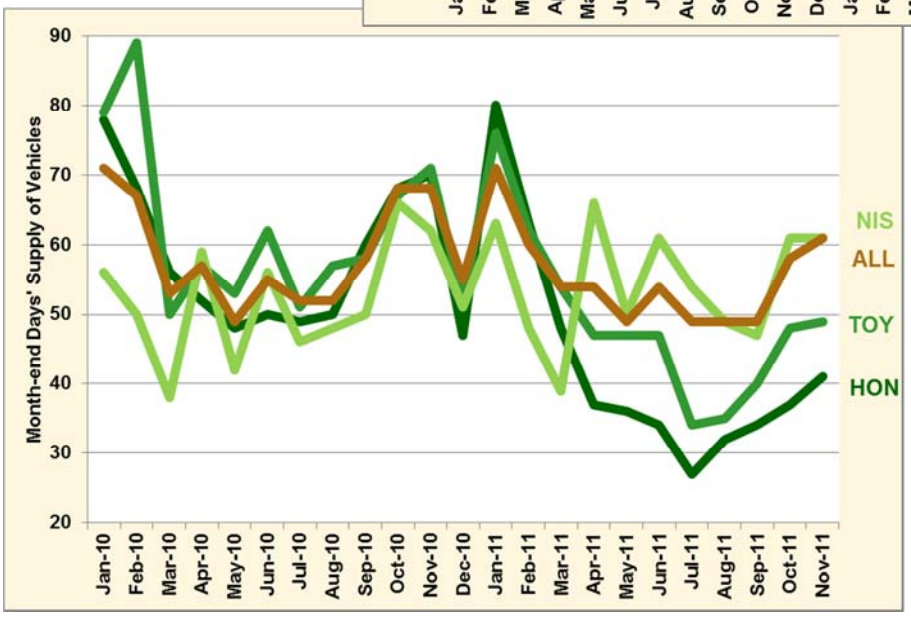


FIGURE 56. Monthly Inventory Supplies by Manufacturer, 2010-2011

Note: ALL = Average of all manufacturers.

Source:
Ward's Autoinfobank.
http://wardsauto.com

Many Tier 1 Suppliers Sell More in Europe and Asia than in North America

In the automotive industry, a Tier 1 supplier is a company that sells directly to the original equipment manufacturer (OEM). Globally, Robert Bosch GmbH is the top supplier with nearly $34 billion in parts sales to OEMs in 2010. Within the top ten suppliers, only one – Magna International, Inc. – has the majority (52%) of its sales to North America. The other companies in the top ten sell to North America, but sell more in Europe or Asia.

TABLE 6. List of Top Ten Tier 1 Global Suppliers

			Market Share				
Rank	**Company**	**Company Headquarters**	**North America**	**Europe**	**Asia**	**Rest of World**	**Total**
1	Robert Bosch GmbH	Germany	14%	53%	27%	6%	100%
2	Denso Corp	Japan	17%	13%	68%	2%	100%
3	Continental AG	Germany	19%	58%	19%	4%	100%
4	Aisin Seiki Co.	Japan	13%	8%	78%	1%	100%
5	Magna International, Inc.	Canada	52%	43%	0%	5%	100%
6	Faurecia	France	18%	66%	9%	7%	100%
7	Johnson Controls, Inc.	United States	41%	49%	10%	0%	100%
8	ZF Friedrichshafen AG	Germany	12%	61%	19%	8%	100%
9	LG Chem	South Korea	1%	6%	84%	9%	100%
10	Hyundai Mobis	South Korea	19%	10%	71%	0%	100%

Note: Rank based on total global OEM automotive parts sales in 2010.

Source:

Crain Communications, *Automotive News Supplement,* "Top 100 Global Suppliers," June 2011.
http://www.autonews.com/

Top U.S.-based Tier 1 Suppliers Sell Globally

There are 11 U.S.-based companies in the top 50 automotive global suppliers. Of these companies, none has more than half of its parts sales in North America.

TABLE 7. U.S.-based Tier 1 Suppliers in the Top 50

Rank	Company	Percent North America Sales	Products
7	Johnson Controls, Inc.	41%	Seat systems, interior electronics, door panels, instrument panels, center and floor consoles, lead-acid and hybrid vehicle batteries
11	TRW Automotive Holdings Corp.	30%	Steering, suspension, braking and engine components; fasteners, occupant-restraint systems, electronic safety and security systems
12	Delphi Automotive	33%	Mobile electronics; powertrain, safety, steering, thermal controls and security systems; electrical/electronic architecture; in-car entertainment technologies
14	Lear Corp.	34%	Seating and electrical power management systems
22	Visteon Corp.	17%	Climate-control systems, electronics, interiors and lighting
27	Dana Corp.	49%	Axles, driveshafts, sealing and thermal management products; off-highway vehicle transmissions, tire management products
29	Cummins, Inc.	40%	Diesel engines
30	DuPont	30%	Paint and coatings, high-performance polymers, elastomers, renewable sourced polymers, fibers and fluoropolymers; battery separator and electronic material technologies, fabricated products, advanced composite materials, specialty chemicals, lubricants, refrigerants, films, bio-based fuels
31	BorgWarner	25%	Turbochargers, engine valve-timing and ignitions systems; emissions thermal and transmission-clutch systems; transmission-control and all-wheel-drive systems
36	Tenneco, Inc.	46%	Emission-control systems, manifolds, catalytic converters, diesel aftertreatment system, catalytic reduction mufflers, shock absorbers, struts, electronic suspension products and systems
44	Federal-Mogul Corp.	28%	Pistons, rings, cylinder liners, piston pins, bearings, valve seats and guides, gaskets, seals, heat shields, friction materials, systems protection

Note: Rank based on total global OEM automotive parts sales in 2010.

Source:

Crain Communications, *Automotive News Supplement,* "Top 100 Global Suppliers," June 2011 and June 2007. http://www.autonews.com/

U.S.-based Tier 1 Suppliers Have Been Diversifying Globally over the Past Five Years

There are nine U.S. automotive parts suppliers that sold more than $5 billion in parts to original equipment manufacturers (OEM) in 2010. These nine companies have been diversifying their customer base over the last five years; every one of them increased their share of sales to Asia and decreased their share of sales to the United States from 2006 to 2010. Likely, China and India are the growing Asian markets.

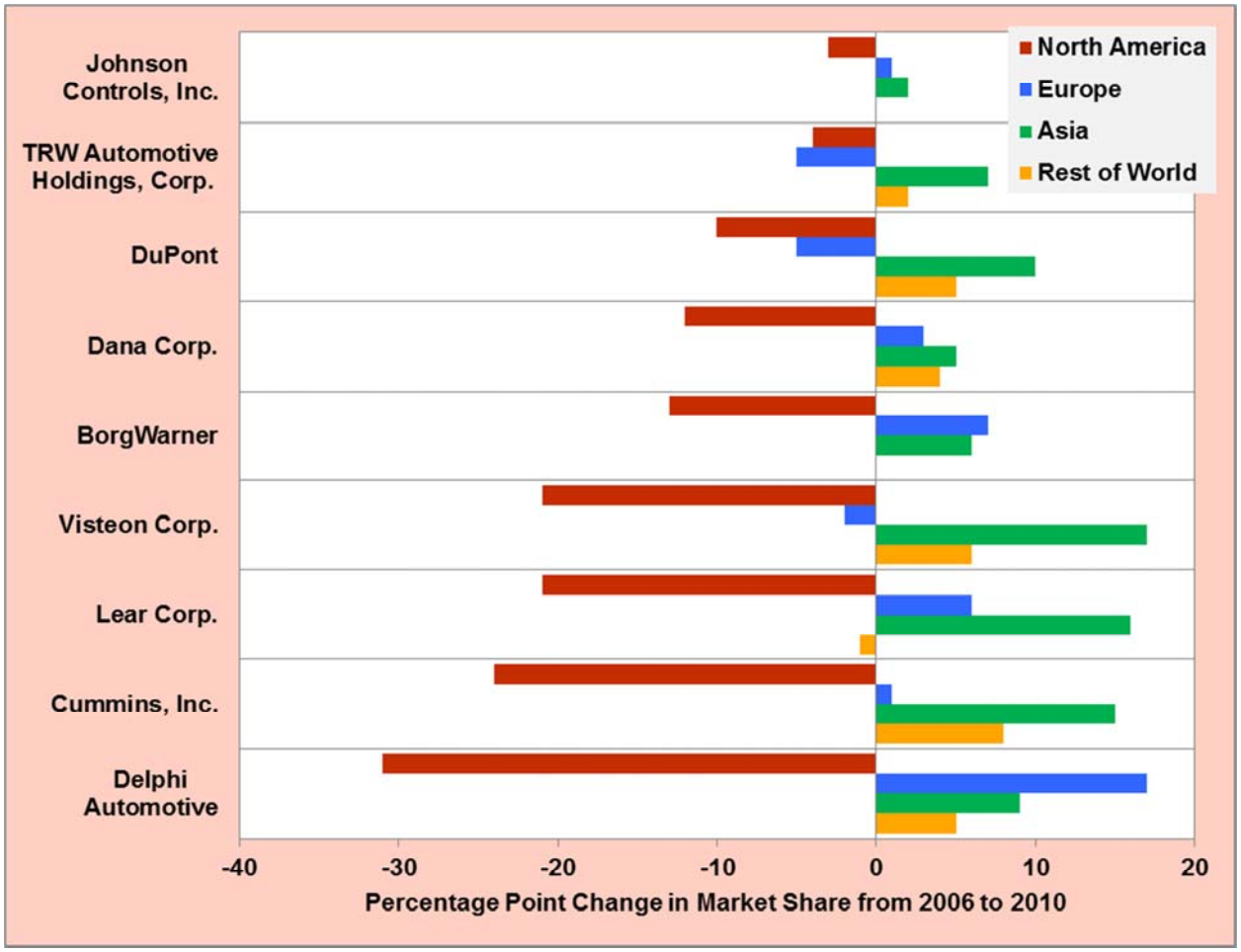


FIGURE 57. Change in Market Share of Top U.S.-based Tier 1 Suppliers, 2006-2010

Source:

Crain Communications, *Automotive News Supplement,* "Top 100 Global Suppliers," June 2011 and June 2007. http://www.autonews.com/