FINAL REPORT

Contract 02-310
Project No. 008545

Analysis of Auto Industry and Consumer Response to Regulations and Technological Change, and Customization of Consumer Response Models in Support of AB 1493 Rulemaking –

The Response of the Auto Industry and Consumers to Changes in the Exhaust Emission and Fuel Economy Standards (1975-2003): A Historical Review of Changes in Technology, Prices, and Sales of Various Classes of Vehicles

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October 18, 2004

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ACKNOWLEDGMENTS

This report was submitted in fulfillment of Contract 02-310, Analysis of Auto Industry and Consumer Response to Regulations and Technological Change, and Customization of Consumer Response Models in Support of AB 1493 Rulemaking, by the Institute of Transportation Studies at the University of California, Davis (ITS-Davis) under the sponsorship of the California Air Resources Board. Work was completed as of October 18, 2004.

Table of Contents

List of Figures and Tables

Figures

Tables

Abstract

The objectives of this study were to assess the responses of the auto industry and consumers to changes in exhaust emission and fuel economy standards, relate qualitatively these responses to technology developments and changing economic factors, and correlate vehicle sales with vehicle attributes and macro-economic factors. Data regarding the characteristics, prices, and sales of vehicle models from many manufacturers was assembled and analyzed for the years from 1975 to 2003. The analysis indicated that changes in emissions and fuel economy regulations forced the industry to develop an impressive sequence of new and improved technologies that were rapidly introduced in light duty vehicles. Retail prices increased substantially over this time period, with about 1/3 of the increase due to government regulations and 67% due to increased quality of the vehicles. The increase in vehicle prices has been accommodated by increases in disposal income and creative financing of sales through longer loan periods and leasing. Differences were not uniform across vehicle classes. For instance, fuel economy and fuel price appeared to influence sales of midsize and large cars more than small cars. For large cars, engine horsepower was not as significant as fuel economy during the entire time period.

Executive Summary

The objectives of this study were (1) to assess the responses of the auto industry and consumers to changes in the exhaust emission and fuel economy standards that have occurred in the United States and California in the past thirty years (1975-2003), (2) to relate qualitatively these responses to technology developments and changing economic factors, such as vehicle prices, consumer income, inflation, and fuel prices over the same time period, and (3) to correlate quantitatively vehicle sales for the periods 1975-1985 and 1986-2001 for various vehicle classes to vehicle attributes and macro-economic factors using multiple regression analysis. The studies was done to provide information and data to the Research Division of the California Air Resources Board as they consider CO2 emission standards in response to directives in AB 1493 passed by the California Legislature in 2001. The primary thrust of the study was to perform a historical review of what has occurred in the auto industry between 1975-2003 and to assemble a large data base containing the characteristics, prices, and sales of vehicle models from many manufacturers for of the years from 1975 to 2003. The data base was then analyzed using SPSS, ACCESS, and EXCEL software to determine historical trends of vehicle, price, and sales parameters in response to changes in government regulations. The trends are shown graphically and in tabular form in the report. The data in the data base for the various vehicle models and size classes were also analyzed using multiple regression analysis techniques.

The historical review indicated that the changes in emissions and fuel economy regulations forced the industry to develop an impressive sequence of new and improved technologies that were rapidly introduced in passenger cars, vans, SUVs, and light duty trucks starting in about 1976. The result has been gasoline fueled, light duty vehicles with ultra-clean emissions (ULEV and SULEV) and improvements in fuel economy of 60-75% relative to comparable 1975 models. The MSRP prices (2001$) of the models in the various vehicle classes have increased between 1975-2001 by a factor of 1.5 to 2.0 based on the general consumer price index (cpi). The sales-weighted average MSRP price of vehicles has increased over the same period by 46% (a factor of 1.46). Of that increase 33% of the increase is due to government regulations and 67% is due to increased quality of the vehicles. The price analyses indicated that the actual prices of cars of constant quality increased slower in the period of interest than the general price index. If that had not been the case, the average price of cars between 1975 and 2001 would have increased by 73% rather than 46% in constant 2001$. The fuel economy of the new vehicles reached a peak in about 1987 and the fleet fuel economy for new vehicles has actual gone down as the sales of vans and SUVs has increased until in 2001 total sales of vans and SUVs are about the same as passenger cars. Total vehicles sales have been between 13-17 million annually since 1984 with most of the year-to-year fluctuation due to changes in the economic conditions. The increase in vehicle prices has been accommodated by increases in disposal income and creative financing of sales through longer loan periods and leasing. Vehicle sales have remained high in periods of favorable economic conditions through periods of significant changes in government regulations.

1. Introduction

This report is concerned with assessing the response of the auto industry and consumers to changes in exhaust emission and fuel economy standards since 1975. During the period 1975-2004, the emission standards, especially for passenger cars, have been tightened markedly in both the United States and California and the fuel economy (CAFE) standard was increased from 18 to 27.5 mpg from 1977-1985. These changes in the regulations have resulted in large changes in the technology incorporated into vehicles presently being marketed by the auto companies compared to vehicles marketed in 1975. The technology changes were introduced over the years as needed to meet the changing regulations. It is of interest to track historically the effect of these technology changes on the characteristics (size/weight, acceleration, and fuel economy), price, and sales of various classes of vehicles as a means of projecting how the auto industry and consumers would likely respond to possible future changes in regulations that would require significant reductions in CO2 emissions.

There are data available from many sources that are appropriate for this study and a relatively large fraction of the data is available over the internet making it relatively easy to transfer it into a single data base for analysis. Hence in the initial part of this study, a large data base was assembled that included technology, performance, emissions, fuel economy, price, and sales data for many of the vehicle models marketed by most of the auto companies in the world during the period 1975-2003. Much of the effort in the study was concerned with the analysis of this data using SPSS, ACCESS, and EXCEL software to determine the historical trends of the vehicle, price, and sales parameters in response to changes in the regulations and technology. These trends are shown graphically and in tabular form in the various sections of the report that follow.

1.1 Literature Review

A large body of literature is available that examines the many issues surrounding government regulation of the automobile industry. Gerard and Lave (May 2003), for example, argue that regulations stemming from the 1970 Clean Air Act led to significant technological changes and environmental improvements. There are many other studies that focus on the technology forcing nature of automotive industry regulation, particularly with respect to emissions control, and to a lesser extent, automobile safety (e.g. airbags). The CAFE standards are not, strictly speaking, a technology-forcing policy since automakers could meet the requirement through changes in the mix of vehicles offered. Three essays in a 1999 collection of essays (Gomez-Ibanez, 1999) on the topic of transportation economics and policy investigate three important aspects of government regulation and the auto industry. These include “The Politics of Controlling Auto Air Pollution” by Howitt and Altshuler, “Fuel Economy and Auto Safety Regulation: Is the Cure Worse than the Disease?” by Charles and Lester Lave, and “Technology-Forcing Public Policies and the Automobile” by Leone. Howitt and Altshuler discuss policy instruments intended to control auto emissions, and in the ‘future implications’ section of their paper, discuss the applicability of past regulations to future greenhouse gas emission policies. The Laves conclude that Federal legislation and regulation of automobiles focus almost exclusively on an immediate concern, and in the process, ignore possible system effects and behavioral changes. Due to the complex and interdependent nature of the transportation system, the authors believe that ‘solution-caused problems’ should be

better anticipated and handled. Leone offers another perspective with special attention paid to technology-forcing regulations. Leone argues that while technology-forcing mandates often achieve positive results, such policy measures should be approached with skepticism to ensure that the use of society's resources is optimized.

A number of books and government reports have emerged over the last 25 years that examine the complex nature of automobile regulation. Some of the more prominent examples include *Regulating the Automobile* (Crandall, 1986), *Corporate Strategies of the Automotive Manufacturers* (Schnapp, 1978), *Use of Advertising and Marketing Incentives to Promote Sales of Fuel Efficient Vehicles* (Donnelly, 1981), *Motor vehicle regulations (1992): Regulatory cost estimates could be improved , Assessing regulatory impacts (1981): The Federal experience with the auto industry*, *Cleaner Cars: The History and Technology of Emission Control Since the 1960s* (Mondt, 2000), and numerous other recordings of Congressional proceedings, Ph.D. theses and books. These sources tend to be dated (i.e. from the late 1970s into the 1980s) because that is the era when these regulations were both contentious and actively being enacted. A number of the more update analyses are identified and discussed in the following sections.

Emissions Control Requirements

Many relevant papers concerning the economic impacts of automobile emissions regulations can be found in the business and economics journal literature. Some notable examples are Bresnahan and Yao (1985, Wang, Kling and Sperling (1993, and Anderson and Sherwood (2002. For a fuller treatment of relevant emissions control literature, see Chen et al.(2003).

Safety and Occupant Protection Standards

Papers that deal with the economic impacts of occupant crash protection include Graham (1984), Gomez-Ibanez (1997), Mannering and Winston (1995), Peltzman (1975), Arnould and Grabowski (1981), Dunham (1997), and others. These papers examine costs and benefits and compliance costs, as well as offsetting behavior and societal costs. For a complete literature review of the relevant airbag and passive restraint literature, see Abeles et al.(2003).

CAFE Standards

CAFE standards have been the object of intense scrutiny by economists and other policy analysts since they were first adopted. In 1981, Gsellman (1981) questioned whether the 1981-84 standards could be achieved (Reference 20a). McNutt (1983) discusses the consumption effects achieved through U.S. fuel economy policy prior to 1983. Many economists have argued that CAFE only became a binding constraint on auto manufacturers after gasoline prices fell in the 1980s from a peak of $2.81 (2001$) in 1982. They concluded that CAFE standards increased when the market alone would have produced greater fuel efficiency because of the high fuel prices. When the CAFE standards stopped increasing in 1985, the sales mix corresponding to what consumers wanted to purchase required manufacturers to produce more fuel-efficient vehicles. (Leone, 1990). Manufacturers were thus forced to make larger price markups for their larger, less fuel efficient (lower mpg) vehicles, and smaller price markups for their smaller, more fuel efficient vehicles (Porter, 1999). A study looking at CAFE standards

and their impact on automobile prices for 1978-80 concluded that U.S. automakers initially adopted a strategy of adjusting relative automobile prices to meet the standards, but by the end of the period, automakers were meeting the standards by improving the design of their automobiles to enhance fuel economy, and by a fuel-price driven shift in consumer demand (Falvey,1986). A 1997 study concludes that CAFE standards may have contributed to the decline in average fuel efficiency of the new vehicle fleet by shifting sales toward vans, trucks, and SUVs that met lower CAFÉ standards than passenger cars. (Thorpe, 1997). The less stringent CAFE standards for the larger light-duty vehicles facilitated the large increase in the sales of those vehicles (particularly SUV) from about 20% of total light-duty vehicle sales in 1981 to over 50% in 2001. In 1998, Goldberg used a series of discrete choice models to compare CAFE standards with alternative policies with respect to sales, prices, and fuel consumption (Goldberg, 1998). The results of this study call into question the true achievements of CAFE standards. In 1997, Espey concluded that under current tailpipe emissions standards, increases in fuel economy would increase emissions of the new vehicle fleet and that significantly higher fuel taxes would be required to achieve the same level of pollution reduction (Espey, 1997). A number of other studies have investigated the offsetting costs and benefits of CAFE standards (Crandall, 1989, Dowlatabadi, 1996, Ross, 1994. There is evidence from these studies that supports the claim of offsetting effects that impact vehicle safety and emissions.

This literature review has indicated that past studies of the relationships between industry and consumer responses have been more narrowly focused than the study undertaken in the present project and for the most part were completed before the important developments of the 1990s. The previous studies have focused on a single type of regulation –fuel economy, emissions, or safety – and did not include consideration of the various classes of vehicles, including light trucks and SUVs. In addition, they did not span the complete period of 1975 to the present (2003). Also past studies did not have available for analysis an extensive data base of vehicle attributes and price characteristics like that compiled at UC Davis as part of the present study for the historical period of interest in which government regulations become a dominant consideration for the auto industry.

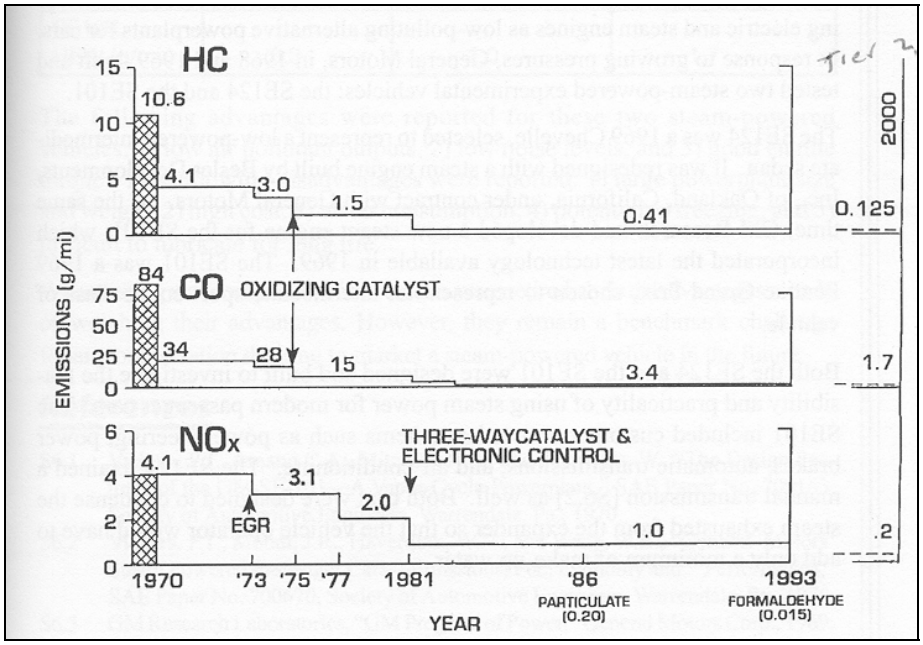
2. Changes in Regulations

2.1 Vehicle Emissions

Vehicle emissions have been regulated since the early 1960s starting with the control of crankcase emissions in 1961-63 and fuel evaporative and tailpipe emissions in 1970-71. The early emission standards were set primarily based on work done in California to reduce smog in the South Coast Air Basin. National vehicle emission standards resulted from the passage of the Clean Air Acts and amendments in 1963, 1965, 1967, and 1970. The emissions standards and how they have changed over the years are shown in Figure 1 (Reference 1). Up until 1975, it was possible to meet the standards by controlling engine spark timing and air-fuel ratio and using exhaust gas recirculation (EGR) and secondary air addition in the exhaust manifold. Unfortunately

these changes in the engine operation resulted in a significant fuel economy penalty at a time when the country was very concerned about the availability and price of oil.

Figure 1 U.S. Tailpipe Emission Regulations



Source: Mondt, Reference 1.

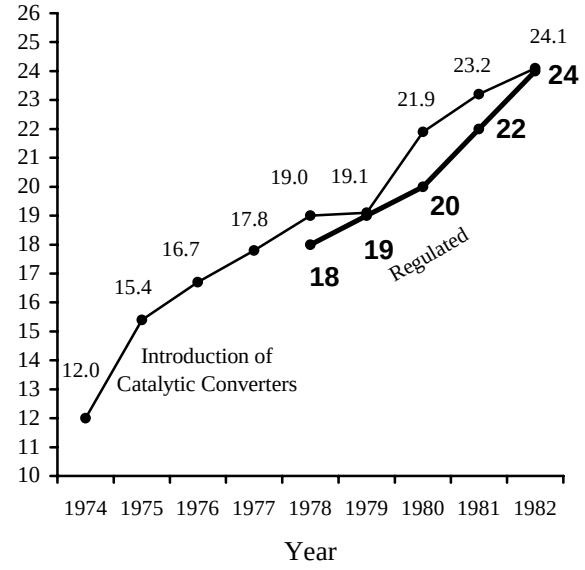
The more stringent emission standards mandated by the Clean Act of 1970 were implemented in 1975. These new standards (1.5 gm/mi HC, 15 gm/mi CO, and 3.0 gm/mi NOx) were met using an oxidation catalytic converter. This new technology was the beginning of a long series of technology improvements that resulted in both large decreases in emissions and significant increases in fuel economy. This is illustrated in Figure 2 (Reference 1) for the period 1975-1982. During this period, vehicle exhaust emissions were reduced to .4 gm/mi HC, 3.4 gm/mi CO, and 1.0 gm/mi NOx and the average fuel economy of the new car fleet doubled from 12 to 24 mpg. The large reduction in NOx emissions was made possible through the introduction of three-way oxidation/reduction catalytic converters, electronic ignition, fuel injection, and engine computer control. Improvements in these technologies in the period 1990-present have resulted in further reductions in vehicle emissions to the current California ULEV and SULEV standards. These California emission and the EPA Tier 2 standards are summarized in Table 1. Several auto companies are marketing mid-size passenger cars in 2003 that meet the SULEV standards and have near –zero evaporative emissions. In California, these vehicles are termed PZEVs (partial zero-emission vehicles). Hence the new technology introduced in automobiles in less than 30 years has resulted in the reduction of HC and NOx emissions by more than 99%.

2.2 Fuel economy (CAFE)

In 1975, the Congress passed the Energy Policy and Conservation Act which established Corporate Average Fuel Economy Standards (CAFE) for passenger cars. The

standards (Table 2) became effective in 1978 starting at 18 mpg increasing to 27.5 mpg in 1985. The rate of increase in mpg was highest in the period 1980-1984. Light truck CAFE standards were also established starting at 17.5 mpg in 1982 increasing to 20.7 mpg in 1996. These standards are currently applicable to light trucks, minivans, and sport utility vehicles. The light truck standard will increase by 1.5 mpg to 22.2 mpg in 2007.

Figure 2 Sales-weighted fuel economy history for GM cars



Source: Mondt, Reference 1.

The auto industry was successful in increasing fuel economy in the early years (1978-1985) when the standards were changing significantly from year to year. During that period, many vehicles (especially in the larger vehicle classes) were downsized with significant weight reductions. This redesign of the vehicles and the incorporation of engine improvements needed to meet the changes in the emission standards imposed in the same period resulted in large increases in fleet fuel economy. Since 1985, the fleet average fuel economy of passenger cars has changed very little remaining at about 28 mpg. Engines with variable valve actuation/timing and 4, 5, and 6 speed automatic transmissions with lockup in several of the gears have been introduced in more recent years. These technology improvements result in increased driveline efficiency and the potential for increased fuel economy, but the auto industry has utilized them to increase vehicle performance (decrease 0-60 mph acceleration times). Mid-size cars are now marketed (2003) with 4 cylinder (160 HP) engines and 4-speed automatic transmissions that have a composite fuel economy of 32 mpg (uncorrected), which is well above the CAFÉ standard of 27.5 mpg. These cars have a 0-60 mph acceleration time of 8.5 sec and meet the California SULEV emission standard (designated PZEVs).

Table 1 Federal and California Emission Standards

Federal Standards (g/mi – fleet average)			
	ULEV		Tier 2[(1)]
	Cars	LDT2	LDV, MDV
HC	0.09	0.13	0.09
CO	4.2	5.5	4.2
NO_x	0.3	0.5	0.07
California Standards (g/mi)			
	ULEV	SULEV	Tier 2 (Bin 5)
HC	0.04	0.01	.09
CO	1.7	1.0	4.2
NO_x	0.05	0.02	0.07
PM	0.01	0.01	0.01
1993 → 2003 (g/mi – fleet average)			
	HC	0.4 → 0.06	
	CO	1.7 → 1.0	
	NO_x	0.2 → 0.05	

(1) 120,000 mile durability, phased in by 2007 for all light-duty vehicles, phased in by 2009 for medium-duty vehicles (8,500 – 10,000 lbs.)

The improved engine and transmission technologies have also been utilized in the light truck, minivan, SUV classes of vehicles. This has resulted in composite fuel economies in 2003 of 22.2 mpg (uncorrected) for several light trucks, 24.6 mpg for several minivans, and 24.2 mpg for several mid-size SUVs. All these vehicles use 3 liter, V6 engines (220 HP), 4-speed automatic transmissions, and have 0-60mph acceleration times of about 8.5 sec. The CAFÉ fuel economy standard for these vehicles 20.7 mpg. Hence vehicles are presently being marketed that have fuel economies above the standard for 2007.

Table 2 Federal Fuel Economy Standards (CAFE)

Model Year	Cars	Light Trucks	Model Year	Cars	Light Trucks
1978	18.0	-	**1990**	27.5	20.0
1979	19.0	-	**1991**	27.5	20.2
1980	20.0	-	**1992**	27.5	20.2
1981	22.0	-	**1993**	27.5	20.4
1982	24.0	17.5	**1994**	27.5	20.5
1983	26.0	19.0	**1995**	27.5	20.6
1984	27.0	20.0	**1996**	27.5	20.7
1985	27.5	20.5	**1997**	27.5	20.7
1986	26.0	20.5	**1998**	27.5	20.7
1987	26.0	20.5	**1999**	27.5	20.7
1988	26.0	20.5	**2000**	27.5	20.7
1989	26.5	20.5	**> 2000**	27.5?	22.2 (phase-in by 2007)

Source: Reference 8, Tables 7.18 and 7.19.

3. Industry/consumer data base

In order to assess the response of the auto industry and consumers to the changes in emissions and fuel economy regulations from 1975-2003, it is necessary to study closely the changes in the characteristics of the vehicles marketed during that period and the prices and sales of those vehicles. Fortunately there are data available on most aspects of the automobile industry and the products they market from many sources including industry publications, consumer car magazines and buyers guides, and government agencies. A summary of data sources used in this study is given in Table 3.

Data on the production and sales of vehicles and components for each year are given in industry publications such as the Automotive News and Ward's Automotive Yearbooks. Data on vehicle and accessory prices are given in consumer magazines and buyer's guides as well as the industry publications. The data in these sources are given for the various models for each of the auto manufacturers. Fuel economy data (adjusted for real world driving) for the various vehicle models are given in the Fuel Economy Guide compiled annually by EPA and DOE. Dynamometer test data for emissions and fuel economy for many vehicle models are given in an electronic data base prepared by EPA (Reference 2). Detailed characteristics of many popular vehicle models are available in special issues of Consumers Report and car magazines such as Car and Driver and Road and Track. These publications independently test the various vehicles for acceleration, handling, and fuel economy and publish the results. Key sources of macro-economic and vehicle related price data are the Bureau of Economic Analysis in the United States Department of Commerce and the Bureau of Labor Statistics (BLS) in the Department of Labor. The BLS prepares annual summaries of the average price of automobiles with breakdowns of the contribution of various component groups to price changes.

A computer data base has been prepared using data obtained from the various sources given in Table 3. The vehicle data for each year (1975-2003) are organized by vehicle class and model using the model names given by the various manufacturers. Sales data are given by vehicle class, manufacturer, and model group. Sales of different models within a model group were difficult to find. Some such data are available in Reference 3. Macro-economic data from the Commerce and Labor Departments are included for each year of interest in the study. The types of data included in the UC Davis Vehicle Data base are summarized in Table 4. The database includes information on between 89 (1975) and 186 (2002) models for each year and in total contains about 9500 complete data entries. Experience with the database has shown it is easily and quickly accessed and analyzed using SPSS, ACCESS, and EXCEL. Data from the UC Davis Data base are given in Appendix II for selected vehicles and calculated average values for vehicle characteristics in the various classes are given in Appendix III.

Table 3 Data Sources used in the report and the assembly of the UC Davis Vehicle Database

Source	Data Description	
U.S. Environmental Protection Agency, Fuel Economy Guide Database, 1978-2002, See: http://www.epa.gov/otaq/fedata.htm.	See Table 2.	Database
U.S. Environmental Protection Agency, Test Car List Database, 1984-2002, See: http://www.epa.gov/otaq/tcldata.htm.	See Table 2.	
Ward's Communications (Various Years) *Ward's Automotive Yearbook*. Annual. New York: Primedia, Inc., 1970-2002.	See Table 2.	
Consumer Reports (Various Years) *Annual Auto Issue*. Mount Vernon, NY: Consumers Union. 1975-2003.	See Table 2.	
U.S. Department of Commerce, Bureau of Economic Analysis, Office of Automotive Affairs. See: http://www.ita.doc.gov/td/auto/qfact.html.	Average transaction price, motor vehicle output and sales, motor vehicle industry corporate profits, employment, and personal income.	Tables & Figures
U.S. Department of Labor, Bureau of Labor Statistics (2003) Consumer Price Index—All Urban Consumers, http://www.bls.gov/cpihome.htm.	Consumer Price Indices	
U.S. Department of Labor, Bureau of Labor Statistics (2003) Producer Price Index, http://www.bls.gov/ppihome.htm.	Producer Price Indices	
Automotive News (Various Years) *Market Data Book*. Detroit: Crain Communications, 1980-2003.	Confirmation and addition to Ward's data	
U.S. Census Bureau, Historical Income Tables - Households, See: http://www.census.gov/hhes/income/histinc/h05.html	Household Income	
Davis, Stacy G. (2002) *Transportation Energy Data Book: Edition 22*. Oak Ridge National Laboratory, U.S. Department of Energy. See: http://www-cta.ornl.gov/cta/data/Index.html	Comprehensive collection of relevant transportation data.	
Hellman, Karl H. and Heavenrich, Robert M. (2003) *Light-Duty Automotive and Fuel Economy Trends: 1975 Through 2003*. U.S. Environmental Protection Agency, Office of Mobile Sources, April 2003. (EPA420-R-03-006) See: http://www.epa.gov/otaq/cert/mpg/fetrends/r03006.pdf	Latest annual report tracking fuel economy and vehicle attribute trends.	

Table 4 Description and source of Data in the UC Davis Vehicle Database

Column Header	Description	EPA	Wards	CR
Year	Model Year	X		
Class	EPA Vehicle Class (available only for 1978-2003)	X		
Manufacturer	Manufacturer name (note that some manufacturers have been omitted)	X		
carline name	Model name (note that vehicle series are not distinguished)	X		
wheelbase	Length of wheelbase in inches		X	
curb weight	Curb weight in pounds		X	
gross vehicle weight	Gross vehicle weight (curb weight + maximum rated load + passenger weight) in pounds for light trucks only		X	
maximum rated load	Maximum rated load in pounds			X
horsepower	Net horsepower		X	
traction	Traction Control: Blank=none; 1=optional; 2=standard			X
abs	Anti-lock Brakes: Blank=none; 1=optional; 2=standard		X	
hp-ca	Net horsepower for California vehicles (only early imports)		X	
msrp	Manufacturer suggested retail price in nominal dollars		X	
airbag	Airbags: Blank=none; 1=driver; 2= dual; 3=side; 4=rear/side; 5=ceiling		X	
Towing Capability (lb.)	Towing capability in pounds (mostly light trucks)			X
0-30	Acceleration 0-30mph in seconds			X
0-60	Acceleration 0-60mph in seconds			X
45-65	Passing acceleration in seconds			X
195-mile trip fuel economy	Consumer Reports road trip test fuel economy in mpg			X
Fuel Econ City Driving	Consumer Reports city test fuel economy in mpg			X
Fuel Econ Express-wayDriving	Consumer Reports highway test fuel economy in mpg			X
cyl	Number of cylinders	X		
DISP CI	Engine displacement in cubic inches	X		
fuel system	Number of carburetor barrels or type of fuel injection: MPFI=multiport fuel injection; SFI=sequential fuel injection; IDI=indirect fuel injection; TBI=throttle-body injection; EFI=electronic fuel injection; VV=variable venture	X		
displ (liters)	Engine displacement in liters	X		
optional disp	Optional displacement in liters	X		
trans	Transmission type (A=automatic; M=manual; L=lockup)	X		
overdrive	OD=overdrive, EOD=electronic overdrive; AEOD=automatic overdrive	X		
catalyst	Y=catalyst; N=no catalyst	X		
drv	Drive axle type: FWD, RWD, 4WD	X		
cty	Adjusted city fuel economy	X		
hwy	Adjusted highway fuel economy	X		
cmb	Adjusted combined fuel economy	X		
ucty	Unadjusted city fuel economy	X		
uhwy	Unadjusted highway fuel economy	X		
ucmb	Unadjusted combined fuel economy	X		
fl	Fuel type: L=leaded gasoline; U=unleaded gasoline; D=diesel	X		
G	Gas guzzler vehicle	X		
eng dscr 1	Engine description 1	X		
eng dscr 2	Engine description 2	X		
eng dscr 3	Engine description 3	X		
trans dscr	Transmission description	X		
cls	Valves per cylinder (2000 and later)	X		

4. Industry response

In this section of the report, the industry response is described and analyzed in terms of historical trends in changes in technology, weight/size and performance characteristics, and prices for vehicles marketed in the various vehicle classes. These changes can be overlayed with the emissions and fuel economy regulations and economic activity in the years of interest (1975-2003). When possible, special consideration will be given to changes directly related to California emission standards that are in some years significantly different than those of most other states.

4.1 Historical review of technology changes

This review of technology changes in autos and other light duty vehicles is concerned with the period 1975 to the present. Development of emission control technology started in the 1960s (Reference 1) with the advent of the early emission standards in California and the Clean Air Acts of 1963 and 1965, but the technology developments of interest in this study are those that have been the major contributors to the achievement of the present ultra-clean vehicles (ULEV and SULEV) and the large improvements in fuel economy that followed the imposition of the CAFE standards in 1978. It is those technology changes along with the battery and electric driveline developments from the ZEV Mandate (Reference 4), which will form the foundation for future vehicle designs that can result in significant reductions in CO2 emissions from those vehicles. It is of interest to note that many of the technologies developed to meet the stringent emission standards have played a large role in improving fuel economy and the performance of the vehicles presently being marketed.

In this section, technologies are identified and the time periods in which they were introduced cited in relationship to the changing emissions and fuel economy regulations. For each of the technology changes, their consequences relative to improvements in vehicle emissions and fuel economy and the years of large scale introduction are presented in Appendix I. Time-lines for the introduction of the technologies are shown graphically in Figure 3 in a form that can be compared easily with a similar presentation of the time-lines for the changes in regulations. The technology time-lines will be used in later sections of the report to compare with time-based changes in vehicle price and sales.

As shown in Figure 3, the periods of most rapid technology change were the second half of the 1970s and the first half of the 1980s. The first changes in the 1970s were a downsizing of the cars both in terms of size (wheel base) and weight in order to increase fuel economy. This downsizing involved primarily the larger cars (mid- and full-size). Weight reductions of 1000-1200 lbs were achieved in the full-size cars. In addition, many of the car designs were changed to front-wheel drive as part of the downsizing. During this period, closer attention was given to aerodynamics with the resultant decrease of 10-20% in the drag coefficient of the vehicles. Further reductions in road load were achieved by the use of improved radial tires with lower rolling resistance. Accessory loads were reduced where possible. For example, electric radiator cooling fans replaced the fans driven off the engine. In general, maximum engine power was reduced with the utilization of 4 –cylinder engines and V-6s in place of V-8s. Vehicle acceleration times remained relatively unchanged during this period. Most of the larger

Figure 3 Timeline of Technology Change with Fuel Economy & Emissions Requirements Overlay

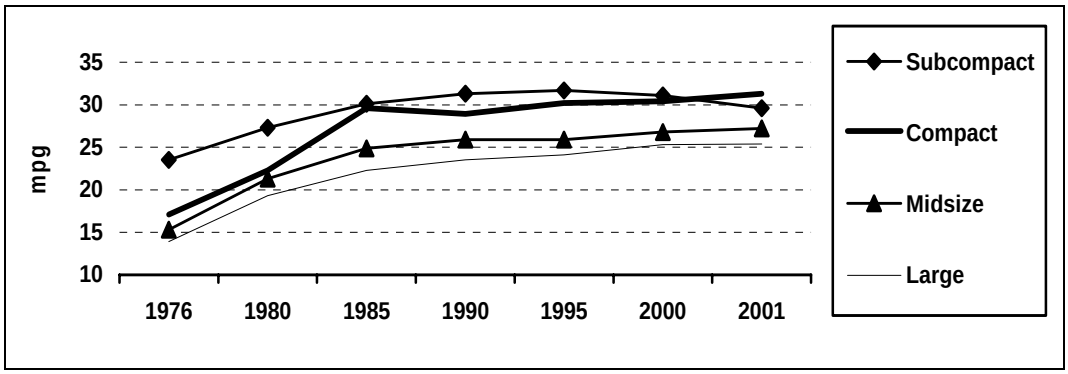
Year	Emissions	Fuel Economy	Technology
1975	←———	——————→	Radial Tires, Reduced C_D
1976	1.5g/mi HC		Oxidation Catalyst ←——————
1977	15g/mi CO		Front-wheel Drive Electronic Engine Control
1978	3.1g/miNO_x	18→	——————→ ←——————
1979		←19	Three-Way Catalysts ←—— Weight Reduction
1980		20→	——————→ ←——————
1981	———→	←22	4-Speed Automatic Trans- Electronic ignition and
1982	.41g/mi HC	24→	mission with Lockup SP fuel injection
1983	3.4g/mi CO	←26	V-6 Engines
1984	1.0g/miNO_x	27→	——————→
1985		←27.5	Computer control of
1986			engines; MP fuel injection
1987			
1988			←——————
1989			4-Valve per cylinder
1990			engines
1991		27.5→	
1992			Batteries and electric drives
1993			
1994			
1995			←——————
1996			Variable Valve Timing
1997			
1998	NLEV		5 & 6-speed Auto Trans-
1999	.09g/mi HC		mission with Lockup
2000	4.2g/mi CO		——————→ ←——————
2001	0.3g/miNO_x ———→		Ultra Clean Emissions
2002	Tier 2 (2007)		Hybrid-electric
2003	.07g/mi HC		powertrains
2004	4.2g/mi CO		
2005	.09g/miNO_x ←———		

cars used 3-speed automatic transmissions, but close attention was given to matching the gearing and shift strategy to the engine to improve fuel economy. As shown in Figure 4 (Reference 5), these technology changes resulted in marked improvements in the CAFE fuel economy (composite of FUDS and Highway) of all classes of passenger cars. The increase was 40-50% in each of the classes by 1980. In addition to the technology changes to improve fuel economy, there were changes to reduce emissions. The most significant of these changes was the use of a two-way oxidation catalytic converter in the exhaust system of the engine which permitted the optimization of the spark timing and EGR near that for the best engine efficiency at each torque and speed. As result of the use of the oxidation catalyst, the vehicle emissions were reduced from 3 to 1.5 gm/mi

HC, 28 to 15 gm/mi CO, and 3 to 2 gm/mi NOx and at the same time the fuel economy was improved as previously cited.

A second period of rapid technology change was initiated in early 1980s with the change in the emission standard to .4 gm/mi HC, 3.4 gm/mi CO, and 1 gm/mi NOx. These reductions in the emission standards lead to the use of a three-way, oxidation/reduction catalytic converter in place of the two-way, oxidation catalytic converter. For the three-way catalyst to function at high conversion efficiency for all three pollutants, the engine air-fuel ratio must be maintained very near (within about 1%) to stoichiometric. To operate the engine in this manner required several new engine technologies- namely, fuel injection, electronic ignition, an O2 sensor, and computer control of engine operation. By 1985, nearly all new passenger cars were equipped with these new technologies, which in addition to greatly reducing emissions, also resulted in continued improvements in fuel economy. Note from Figure 4 that the average CAFE fuel economy of small cars increased to 30 mpg, that of mid-size cars to 25 mpg, and that of large cars to 22 mpg. During this period, the 0-60 mph acceleration times decreased by about 1.5 seconds. This was the beginning of a trend in decreasing acceleration times that would continue up to the present time.

Figure 4 History of Passenger Car Fuel Economy (CAFE)

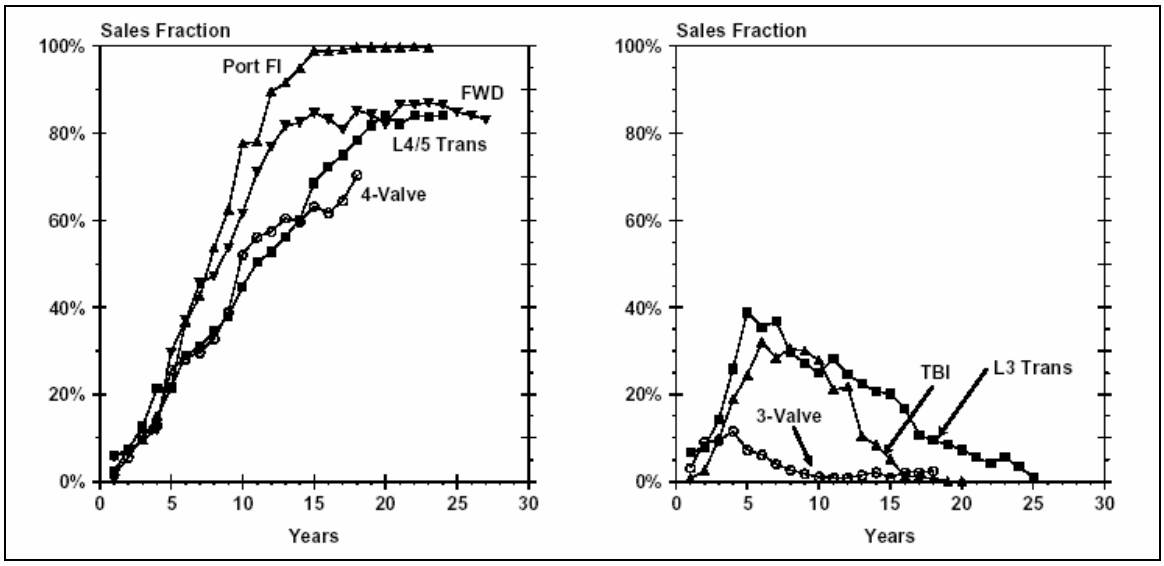


Source: Reference 8, Table 7.7.

In the period 1985-1995, the emissions and fuel economy standards remained essentially unchanged except for the beginning of the tightening of emission standards in California as part of the LEVI program. During this period, the auto industry refined the advanced engine control technologies introduced in the first part of the 1980s. In addition, there was considerable engine development resulting in the introduction of 4-valve per cylinder engines and increases in the compression ratio from 8.5 to 9.5 or higher. This resulted in higher engine efficiency and large improvements in engine specific power (HP/liter displacement). In addition, 4-speed automatic transmissions with lockup in 4^{th} gear were developed and utilized in the larger cars. The average CAFÉ fuel economy for small and mid-size cars remained essentially unchanged during this period, but the average fuel economy of the large cars increased to 25 mpg. The acceleration times decreased continuously reaching 10-11 seconds from 13 seconds ten years earlier. Hence the improvements in engine and transmission technologies developed from 1985-1995 were utilized primarily to improve vehicle performance rather than fuel economy. Nevertheless, these technology improvements were significant and

set the stage for even more impressive developments in the future. Note from Figure 5 that even for new technologies that have clear advantages, it takes 10-15 years before the old technology is almost completely replaced by the new technology.

Figure 5 Car Technology Penetration Years after Significant Use



Source: Reference 29, p.27, Figures 26 & 27.

Consider next the period from 1995 to the present (2003). During this period, the refinement of the engine and transmission technologies continued. In the case of engines, the multi-point fuel injection systems were developed, compression ratio was further increased with some engines having a ratio of 10 or greater, and variable valve actuation/timing was introduced by several auto companies. These new technologies resulted in further improvements in engine efficiency and exhaust emissions. By 2003, Honda, Toyota, Ford, Volvo, and several other manufacturers were marketing cars that meet the California SULEV standard (see Table 1). Most of the auto companies are marketing some cars that meet the California ULEV standard. Transmission development continued with the introduction of 5 –speed automatic transmissions with lockup in several gears. The combination of engine and transmission improvements has lead to significant improvements in fuel economy. For example, the 2003 Honda Accord has a composite CAFÉ fuel economy of 32.3 mpg along with its SULEV emissions. This fuel economy is 17% greater than the 27.5 mpg CAFÉ standard. The Accord has a 4 cylinder, 160 HP engine and a 5-speed automatic transmission resulting in a 0-60 mph acceleration time of 9 seconds. Many mid- and full-size cars have V-6 engines. These cars have lower fuel economy and better acceleration times than the 4-cylinder versions and presently meet only the ULEV emission standard. It can be expected that the advanced engine technologies cited above will be further improved and be used in most of the cars of all classes in the near future (within five years).

4.2 Historical review of changes in vehicle characteristics

There have been major changes in the characteristics of the vehicles marketed by the auto industry worldwide since 1975. These changes have accelerated in the last 10 years. Table 5 shows the changes in the sales fractions of light-duty vehicles in the various classes. In 1976, over 80% of vehicles sold were passenger cars with 56% of those cars being small cars (subcompact and compact). In 2000, less than 52% of the vehicles sold were passenger cars and only 47% were small cars. In recent years, the vehicle class with the most rapid sales increase has been sport utility vehicles (SUVs). In 2000, SUVs accounted for 20% of sales with mid-size SUVs being the largest fraction at 12.5%. Sales of vans and pickup trucks have increased from 1975 to 2000, but not as much as SUVs. The sales of pickup trucks increased from13% to nearly 17% in that period while sales of vans increased from 4.5% to 9.5%. In total, sales of trucks, vans, and SUVs accounted for 48% of sales in 2000. In 2002, the sales fraction was 50.6% and it is projected to increase to 52.8% by 2005 (Reference 6). Note in Table 5 that the total sales of light duty vehicles (cars, minivans, SUVs, and light trucks) have increased from about 14 million in 1976-8, to 15 million in the mid-1980s, and to 17 million in 2000.

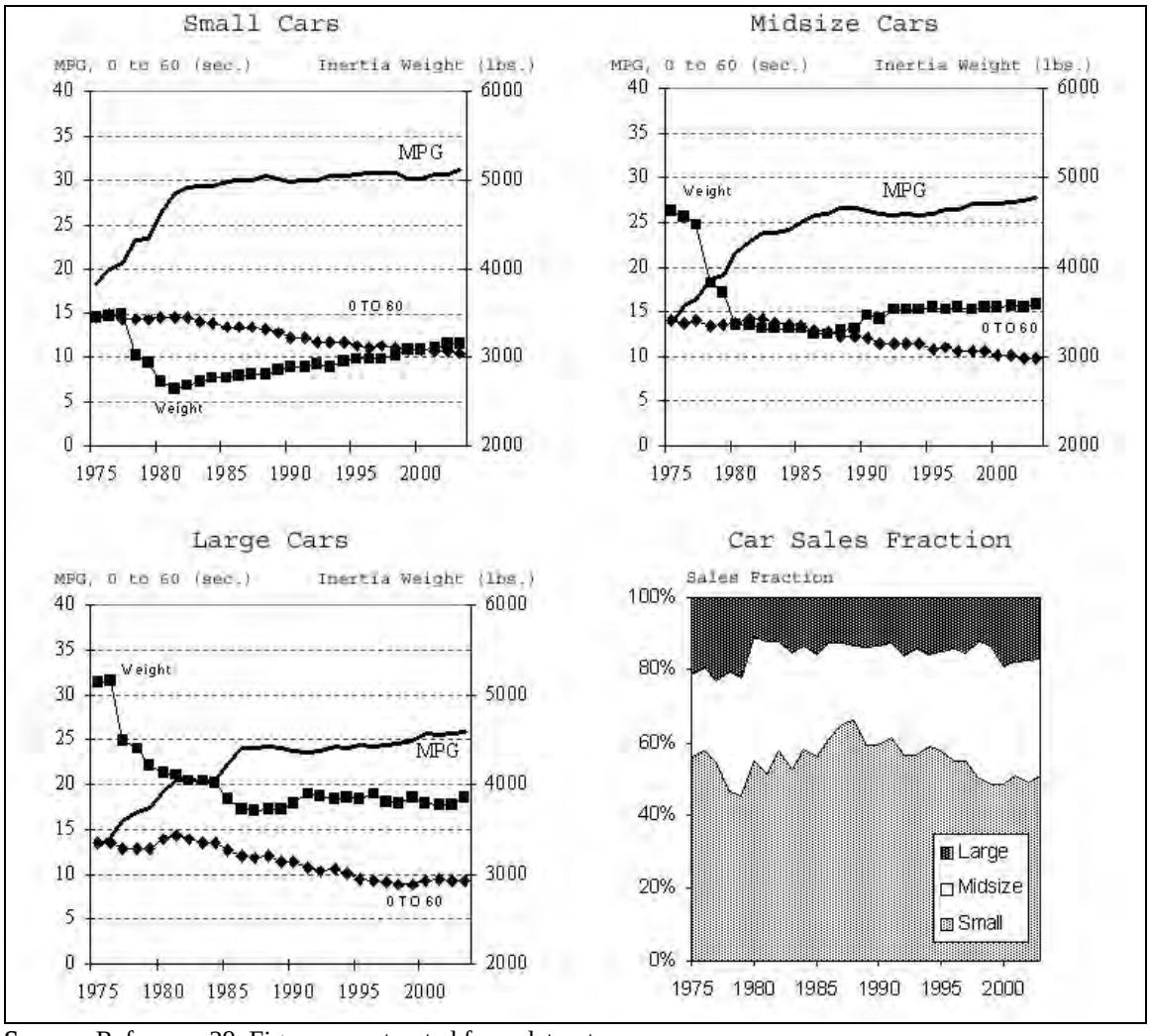
Table 5 Historical Vehicle Sales - Total and by class

Year	Car Sales (millions)			Car Sales (%)			Vans, SUVs, light.trks	Total Sales (millions)
	Domestic	Import	Total	small	midsize	large		
1975	7,053	1,571	8,624	55.4%	23.3%	21.3%	20.9%	10,905
1976	8,611	1,499	10,110	55.4%	25.2%	19.4%	22.6%	13,066
1977	9,109	2,074	11,183	51.9%	24.5%	23.5%	23.5%	14,613
1978	9,312	2,002	11,314	44.7%	34.4%	21.0%	25.2%	15,122
1979	8,341	2,332	10,673	43.7%	34.2%	22.1%	23.7%	13,984
1980	6,581	2,398	8,979	54.4%	34.4%	11.3%	21.4%	11,419
1981	6,209	2,327	8,536	51.5%	36.4%	12.2%	20.4%	10,725
1982	5,759	2,223	7,982	56.5%	31.0%	12.5%	23.6%	10,452
1983	6,795	2,387	9,182	53.1%	31.8%	15.1%	24.5%	12,166
1984	7,952	2,439	10,391	57.4%	29.4%	13.2%	27.1%	14,254
1985	8,205	2,838	11,043	55.7%	28.9%	15.4%	28.8%	15,501
1986	8,215	3,238	11,453	59.5%	27.9%	12.6%	28.6%	16,047
1987	7,081	3,197	10,278	63.5%	24.3%	12.2%	31.0%	14,888
1988	7,526	3,099	10,626	64.8%	22.3%	12.8%	31.1%	15,426
1989	7,073	2,825	9,898	58.3%	28.2%	13.5%	31.8%	14,508
1990	6,897	2,404	9,301	58.6%	28.7%	12.8%	32.8%	13,849
1991	6,137	2,038	8,175	61.5%	26.2%	12.3%	33.5%	12,298
1992	6,277	1,937	8,213	56.5%	27.8%	15.6%	36.0%	12,842
1993	6,742	1,776	8,518	57.2%	29.5%	13.3%	38.6%	13,869
1994	7,255	1,735	8,990	58.5%	26.1%	15.4%	40.2%	15,023
1995	7,129	1,506	8,635	57.3%	28.6%	14.0%	41.2%	14,688
1996	7,255	1,271	8,526	54.3%	32.0%	13.6%	43.3%	15,045
1997	6,917	1,355	8,272	55.1%	30.6%	14.3%	46.6%	15,069
1998	6,762	1,380	8,142	49.4%	39.1%	11.4%	47.3%	15,441
1999	6,979	1,719	8,698	47.4%	40.0%	12.5%	48.1%	16,771
2000	6,831	2,016	8,847	47.5%	34.3%	18.2%	48.7%	17,234
2001	6,325	2,098	8,423	50.9%	32.3%	16.8%	50.5%	17,021

Source: Reference 8, Table 7.6; Reference 5, Table 2.

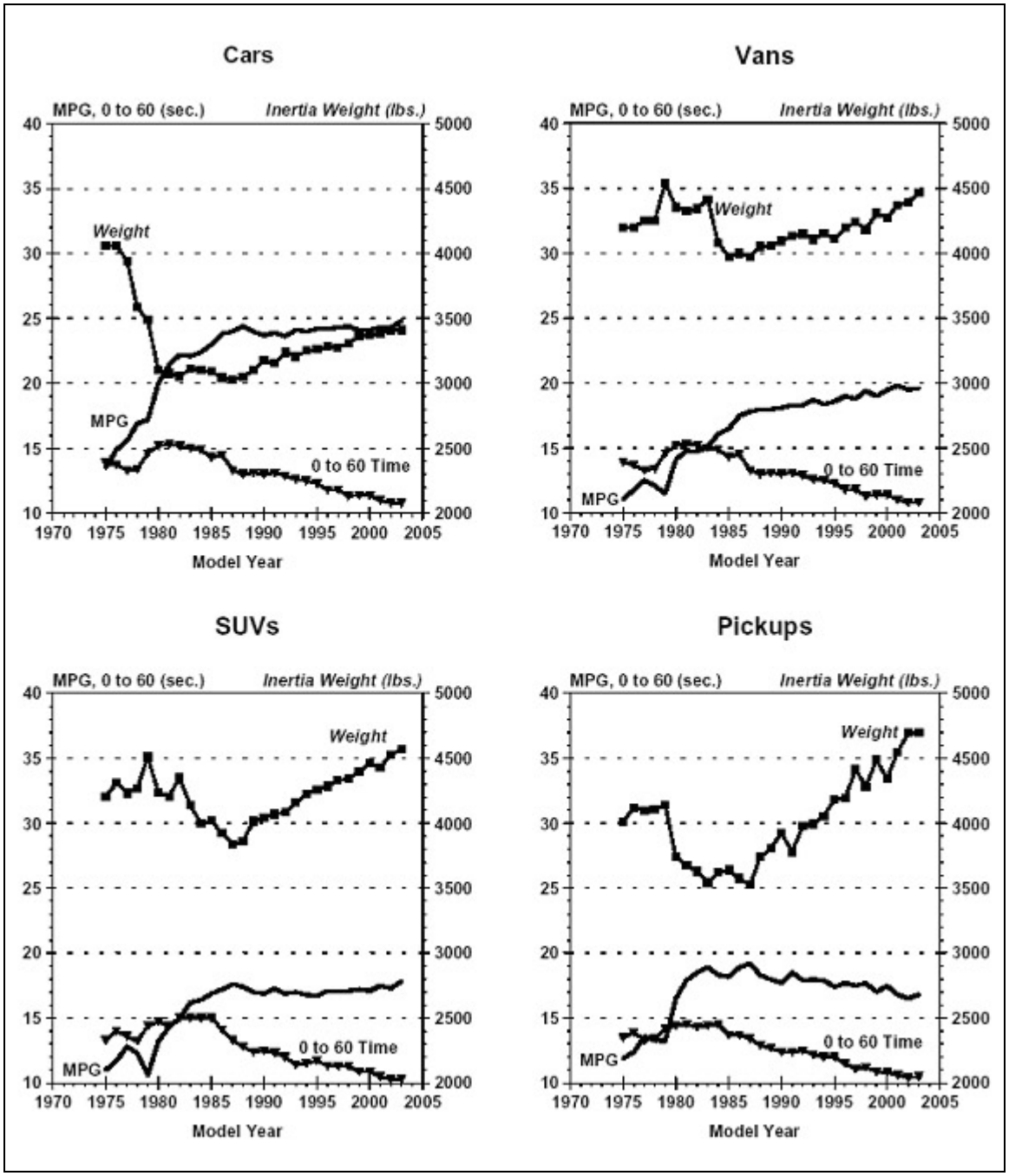
The changes in the characteristics of passenger cars since 1975 are shown in detail in Figure 6. The new technologies were introduced first in these vehicles to meet the emissions and fuel economy standards. To some extent the new technologies have also been used in the larger light duty vehicles, but not completely as the emissions and fuel economy requirements for the vans, SUVs, and light trucks were not as demanding as for passenger cars. The changes of vehicle characteristics for the larger light-duty classes are given in Figures 7 (Reference 5). The data shown in Figure 6 and 7 are for the mid-size models of each of the vehicle classes. As in the case of passenger cars, there has been a significant improvements in both the acceleration performance and fuel economy of vans, SUVs, and light-duty trucks since 1975. The 0-60 mph acceleration times have decreased from 15 to 10sec. This resulted from a small weight reduction and an increase in engine HP to 200-240 from 120-150 HP. As indicated in Figures 7, the fuel economy increased by 50-75% with most of the increase occurring before 1990.

Figure 6 Fuel Economy, Performance, Weight & Sales Fraction Trends for Cars (1975-2003)



Source: Reference 29, Figures constructed from datasets.

Figure 7 Fuel Economy, Performance and Weight Trends for Vehicles (1970-2003)



Source: Reference 29, p.36, Figures 33 – 36.

After 1990, except for the vans, the fuel economy of the larger light duty vehicles either was flat or showed a slight decrease. As in the case of passenger cars, the emission standards for the vans, SUVs, and pickup trucks were greatly reduced for all three pollutants – HC, CO, and NOx.. The small and mid-size models fall into the LDT2 category with GVWR between 3751 and 5750 lbs. The emission standards for these vehicles are .13 gm/mi HC, 5.5 gm/mi CO, and .3 gm/mi NOx (100,000 miles durability). The emission standards in 1975 were 2, 20, and 3.1 gm/mi for HC, CO, and NOx,

respectively. Hence even though, the large light-duty vehicles have significantly higher emissions than passenger cars their emissions have been greatly reduced since 1975 and their fuel economy has been significantly increased. Further improvements in both emissions and fuel economy will result when all the new technologies presently incorporated into the most advanced passenger cars are applied to the larger vehicles.

4.3 Historical Review of vehicle price changes

The price history and characteristics of a number of light-duty vehicles are given in Appendix II for 1975-2003. The price history for a selected number of those vehicles is shown in Figures 8-11. The prices shown are the MSRP for the baseline models for each year. The car models selected for plotting were ones that have been offered for sale for the complete period of interest or for a substantial fraction of it. Most of models selected remained in the same class for the entire period. The four figures include models from the compact, midsize and large car segments, as well as one for SUVs and minivans. Prices are given in 2002$ using the general consumer price index (Figure 12). Note that there is a steady increase in the price of the cars even in the adjusted real dollars. This is not surprising as the value of the vehicles to the car owner and society has continuously increased with greatly reduced emissions and improved fuel economy and the addition of many amenities, such as enhanced interiors, climate control, CD players, and cruise control, etc. In addition, over this period numerous safety regulations have been instituted, including driver side airbags. The cost of the air bags alone is likely to be at least several hundred dollars (Reference 7).

Figure 8 MSRP Trends in $2002 for a Selection of Compact Cars

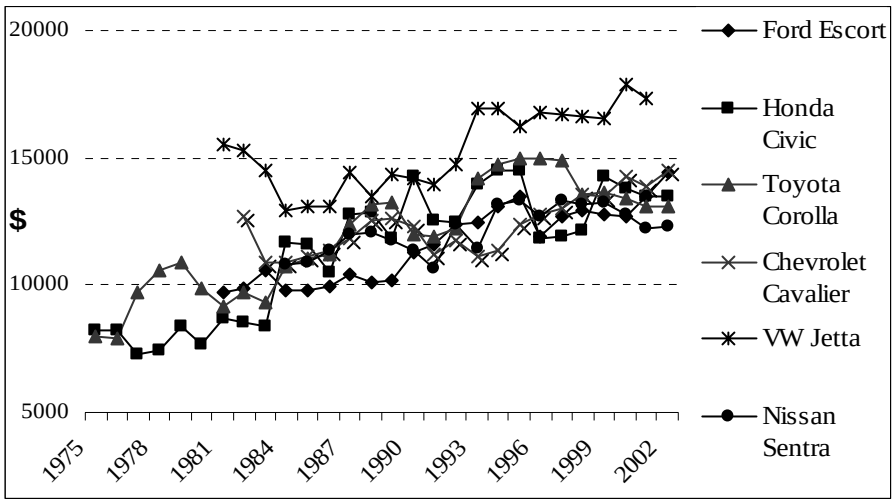


Figure 9 MSRP Trends in $2002 for a Selection of Midsize Cars

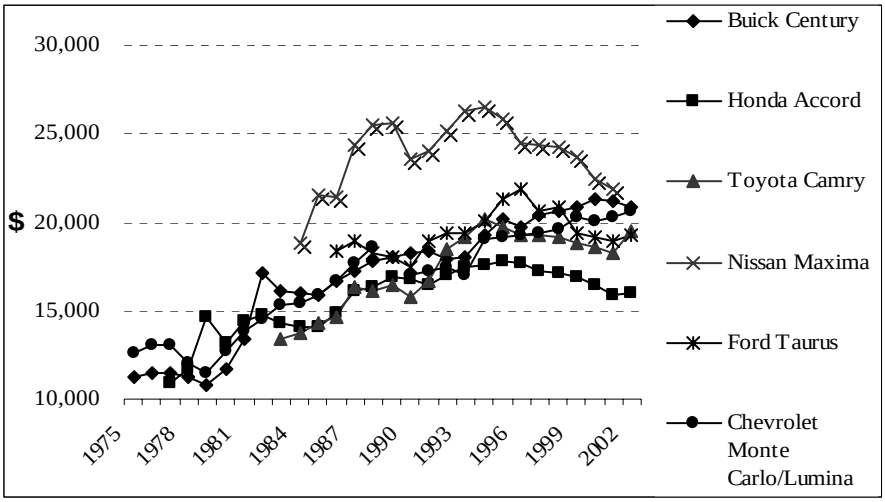


Figure 10 MSRP Trends in 2002$ for a Selection of Large Cars

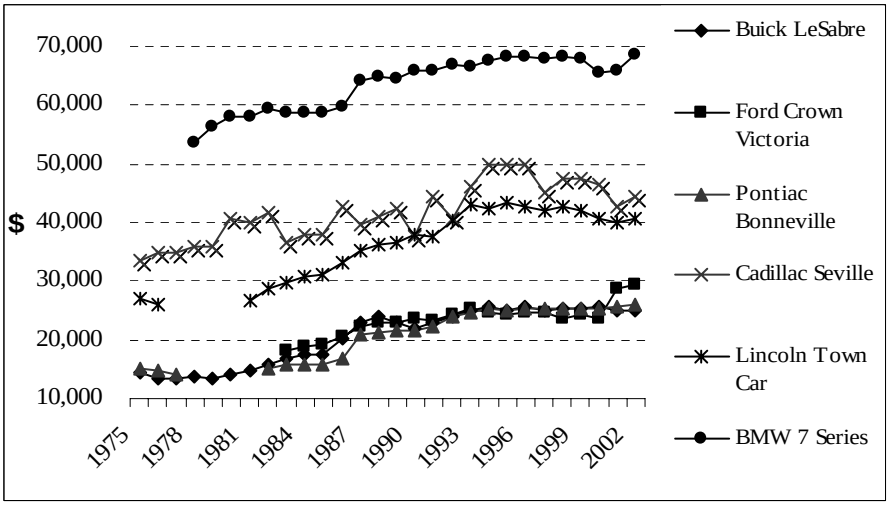
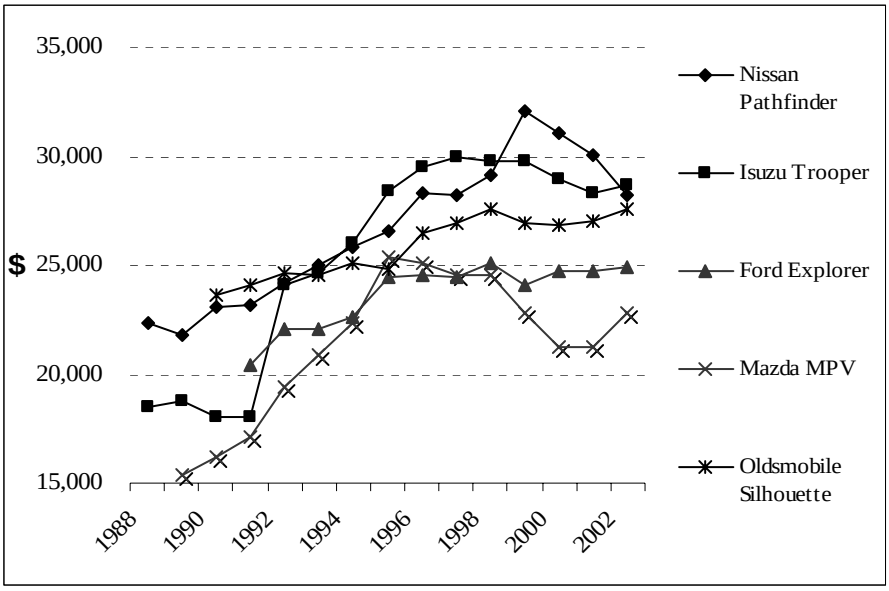


Figure 11 MSRP Trends in 2002$ for a Selection of SUVs and Minivans



The shape of the price curves vs. time (years) varies between the various vehicles with the periods of maximum rate of price increase occurring at different times. One would expect that the maximum price increases would occur for years in which new technology is added to the vehicles in response to changes in regulations whether the changes are in emission, fuel economy, or safety. A close look at the price data in Appendix 2 shows that in general this is the case if one considers two relatively short periods of time in which the technology changes were concentrated. These periods are 1977-1982 and 1990-94. Price increases occur nearly every year, but for the periods cited the price increases for many of the models are significant greater than the average for at least one year in the period. The new technology is integrated into the various models in different years as the models change. Also in some cases it appears that for marketing reasons the total cost of the new technology is included in price increases over several years rather than all in one year. In current dollars, the price increase from year to year can be as much as $1000-$2000 for the smaller cars and up to $3000-$4000 for the larger more expensive cars. Note that after 1995 the price increases are smaller than in the earlier years when regulations were changing significantly. Note also in Figure 12 that the consumer price index for new vehicles leveled off after 1995. The average list price increases in 2001$ for passenger cars are shown in Table 6 and Figure 13. The price increases are the largest in 1977-1982 and 1990-92 when there were large changes in the emissions and fuel economy standards.

Part of the vehicle price increase each year is due to improvements (higher quality and value of the vehicle to the buyer) in the vehicle and some is due to higher general costs to the manufacturer. These two costs on an average basis for all vehicles sold in a given year have been tracked by the Bureau of Labor Statistics (BLS). The data are included in Table 6 for the period 1970-2001. Note in Table 6 that the value/quality price increases are higher than average in the two periods cited previously both in terms of

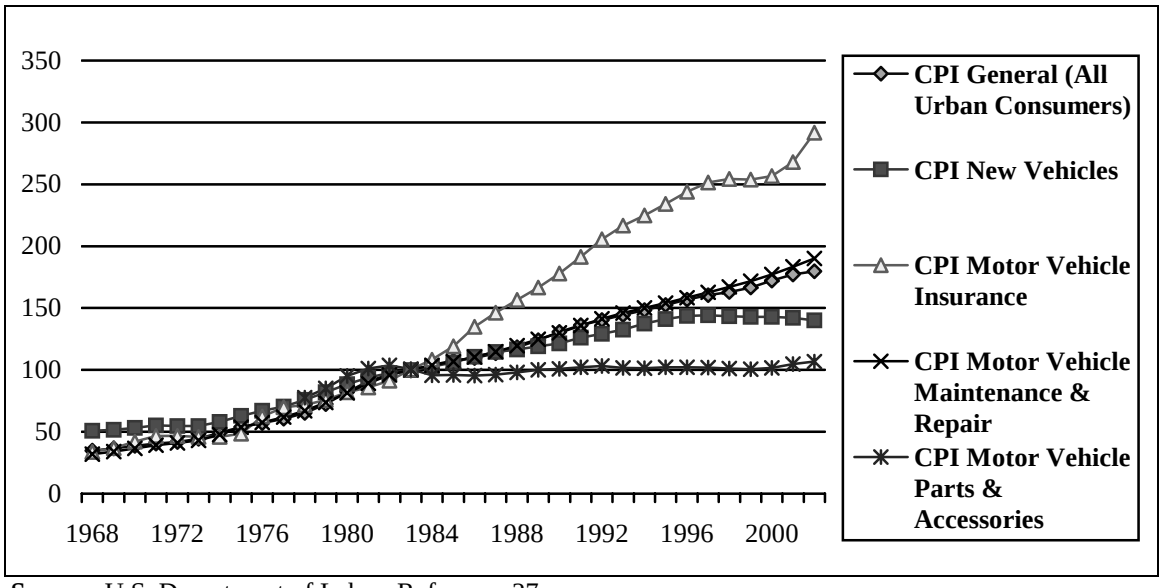
current dollars and 2000$. Most of the quality/value price increase is likely due to the introduction of new technology in the vehicles- both in the powertrain and for safety. The average quality price increases during the peak change years are in excess of $1000 in 2000$.

The question is often asked as to how the value of a new car increased over the years relative to the value of other products. One way of answering this question is to compare the general consumer price index (cpi) and the new vehicle consumer price index (vpi). It is seen in Figure 12 and in the table below that the cpi increases more rapidly than the vpi especially in the years after 1990. For the period 1975-2001, the ratio of the change in the two indices is 1.46 with the cpi showing the larger increase. This indicates that although the price of cars has increased significantly in real dollars over the period of interest, car buyers have gotten a better value for their money than purchasers of most other products.

Year	cpi	vpi	cpi/cpi1975	vpi/vpi1975	cp ratio
1975	53.8	62.9	1.0	1.0	1.0
1980	82.4	88.4	1.53	1.41	1.085
1985	107.6	106.1	2.0	1.69	1.183
1990	130.7	121.4	2.43	1.91	1.272
1995	152.4	139.0	2.83	2.21	1.28
1998	163.0	143.4	3.03	2.28	1.33
2000	172.2	142.8	3.2	2.27	1.41
2001	177.1	142.1	3.29	2.26	1.46

Source: World Almanac 2003, base year 1983=100

Figure 12 Trends in the Consumer Price Index for All Urban Consumers (1968-2002)



Source: U.S. Department of Labor, Reference 27.

The question is also often raised as to how much of the average price increase in constant dollars of vehicles over the period 1975-2001 has been due to government regulations and how much to improvements in the quality of the vehicles. This has been

estimated in the following manner. In current dollars, the sales-weighted average price of vehicles sold in 1975 was $4345 and in 2001 it was $20896. Applying the vpi index to the 1975 price, the price of the car of the same quality as 1975 would be $9820 in 2001$. Hence the price difference between the 1975 and 2001 quality cars would be $11076. It has been estimated in Ward's Automotive Yearbook (2002) that the price of regulations in 1975 was $586 resulting in a cost of $1324 in 2001$. Hence without government regulations the cost of the 1975 vehicle in 2001 would have been $8496 and the price difference with the 2001 models would have been $12400. The estimated total price of regulations in 2001 has been estimated by Ward's to be $4018. Hence the price of the 1975 vehicle with 2001 regulations would have been $12514 resulting in a price difference of $8382 due to quality improvements between 1975 and 2001. Hence the fraction of the price increase in 2001 due to quality improvements is **67.6%** and due to government regulation is **32.4%.**

Next consider what the price of the average vehicle sold would have been if the prices of vehicles had increased between 1975-2001 as fast as the general commodity index cpi. Without government regulations, the price of the 1975 vehicle in 2001 would have been $12368 (3.29 x 3759). Adding the same $12400 price differential determined previously, the price of a 2001 vehicle would be $24748. Hence the actual price in 2001 was 18.5% or $3872 less than it would have been had the auto industry price increases followed the general consumer price index. The average price of vehicles sold in constant dollars have increased by 46% between 1975-2001 rather than by 73% that would have been the case if the prices of the cars had increased the same as general sales items.

4.4 Vehicle prices in California

Questions have been asked as to how the prices of vehicles in California might differ from those in most other states because of the more stringent emission standards in California. The Federal and California standards began to be significantly different in 1993 with the implementation of the LEVI standards in California, which reduce the fleet average HC standard from .4 to .04 gm/mi and the NOx standard from .4 to .05 gm/mi by 2004. The lower limits of the California standards are ULEV and SULEV (see Table 1). The Federal emission standards, termed NLEV (National Low Emission Vehicle) or sometimes referred to as the 50-state standard, are .09 gm/mi HC, 4.2 gm/mi CO, and .3 gm/mi NOx. It is not surprising that the auto companies are certifying various models of their passenger cars to different standards ranging from NLEV to SULEV. The certification data given in the EPA emissions data base (Reference 2) indicates that for 2002 (the most recent data available) nearly all the cars are certified to HC less than .09 gm/mi and in some cases less than .05 gm/mi; the NOx certification values are in most cases less than .1 gm/mi and often less than .05 gm/mi; the CO certification values are nearly always less than 1 gm/mi. Even some minivans are being certified at very low values. For example, the Honda Odyssey with the 240HP V6 engine was certified at .057 gm/mi HC, .56 gm/mi CO, and .03 gm/mi NOx.

Discussions with technical contacts at Honda and Toyota indicated that those companies do not certify different models for California and the states with less stringent emission standards. In addition, when ULEV and SULEV models are available, they are

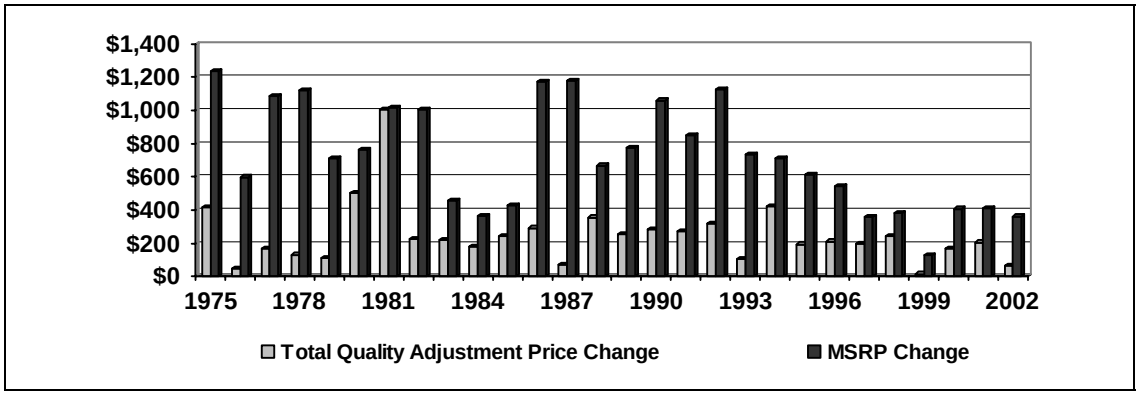
sold in all states and there is not a price premium charged anywhere. For example, the prices charged for the complete Honda line (Civic to Odyssey) is the same for all models regardless of where they are sold in the United States. This is likely the result of the Federal and California emission standards being set based on a fleet average. The fleet average standards for both HC and NOx are becoming more stringent, but there is allowance for the inclusion of vehicles with different levels of emissions. Even when the Tier 2 Federal standards are completely phased in by 2007 for light-duty vehicles, including most minivans and SUVs, and by 2009 for medium-duty vehicles (8500-10000 lbs GVWR), the California standards will be more stringent for all these vehicles. However, based on present emission certification and pricing practices of the auto industry, it can be expected that the prices of the vehicles will be the same in California and the other states.

Table 6 Retail Price Changes and Average Change in Transaction Price (1975-2002)

Year	Average Retail Equivalent Price of All Motor Vehicle Quality Changes for New Cars[1]		Average Change in MSRP for New Cars from Previous Year[1]		Average Change in Transaction Price for New Cars[2]
	(Current $)	(2000 $)	(Current $)	(2000 $)	(2000$)
1975	$129.90	$415.78	$386.00	$1,235.49	$336
1976	$15.60	$47.21	$198.00	$599.22	$553
1977	$59.15	$168.08	$382.30	$1,086.34	$124
1978	$50.12	$132.37	$424.49	$1,121.12	$327
1979	$46.35	$109.94	$300.30	$712.28	-$607
1980	$241.51	$504.71	$365.85	$764.56	-$412
1981	$530.85	$1,005.64	$536.14	$1,015.66	$1,051
1982	$126.32	$225.41	$562.64	$1,004.01	$769
1983	$128.04	$221.37	$263.92	$456.30	$689
1984	$110.08	$182.44	$221.70	$367.44	$516
1985	$151.45	$242.38	$268.20	$429.22	$92
1986	$186.50	$293.02	$745.52	$1,171.34	$933
1987	$47.13	$71.44	$776.38	$1,176.87	$413
1988	$245.56	$357.44	$458.66	$667.64	-$11
1989	$182.89	$253.98	$559.35	$776.77	-$323
1990	$216.40	$285.11	$804.91	$1,060.49	-$139
1991	$215.06	$271.90	$672.77	$850.59	-$253
1992	$259.79	$318.86	$917.30	$1,125.87	$485
1993	$89.10	$106.18	$616.54	$734.73	$55
1994	$363.63	$422.52	$612.74	$711.97	$697
1995	$173.35	$195.87	$543.21	$613.78	-$510
1996	$193.03	$211.85	$494.98	$543.25	$316
1997	$185.53	$199.05	$333.34	$357.64	$347
1998	$230.81	$243.84	$363.27	$383.77	$558
1999	$15.50	$16.02	$125.27	$129.48	-$161
2000	$169.05	$169.05	$408.42	$408.42	-$997
2001	$212.67	$206.79	$422.51	$410.82	$652
2002	$63.80	$65.38	$377.94	$361.76	NA

Sources: (1) U.S. Department of Labor, Reference 32 (2) U.S. Department of Commerce, Reference 26.

Figure 13 Average Changes in MSRP vs. Price Changes due to Quality Adjustments



Sources: U.S. Department of Labor, Reference 32 & U.S. Department of Commerce, Reference 26.

5. Consumer response

In this section of the report, the responses of consumers to changes in the characteristics and prices of the vehicles offered for sale by the auto industry are presented and analyzed based on historical trends in vehicle sales of various vehicle classes and macro-economic factors.

5.1 Historical review of vehicle sales

There are a number of sources (References 5,6, and 8) of vehicle sales information, including sales by class and vehicle characteristics, for the period 1970 to the present (2003). Such information is also available in the UC Davis Vehicle Data Base discussed in Section 3. Total sales of all light-duty vehicles and percent of sales by class are given in Table 5. As noted previously, the sales fractions of the larger light duty vehicles (vans, SUVs, and light trucks) have increased rapidly over the last ten years and are expected to increase further in the years ahead. At the present time (2003), the sales fraction of all cars has decreased to about 50% of the total vehicle sales. The sales fraction of mid-size cars has increased and that of small (subcompact and compact) cars has decreased over the years such that in 2000 the sales fraction for mid-size cars was 37% and that of small cars was 47% of the total automobiles sold. The sales fraction of small cars (subcompact and compact) peaked at 64.8% in 1988. Large cars are a relatively small percentage (15%) of the car market. About 23% of the cars sold in the United States in 2000 were imported. Import sales are largest in California and the Northeast. Total vehicle sales have fluctuated over the years, but with a general increase from about 14 million in the late 1970s to slightly over 17 million by 2000-2001.

All of the auto manufacturers offer multiple (two or three) versions of vehicles in each model group. The different vehicles in a model group can have different engines, transmissions, accessories, and/or interior/exterior trim. The key differences of interest in this study are those related to the powertrain – primarily the engine, which can significantly effect the emissions and fuel economy. In many instances, the model options are differentiated by the power rating of the engine and whether it is a 4-cylinder or V6 configuration. Information on sales of various models with different engines is given in Reference 3. Selected data from that database showing the sales breakdown for

a number of car, van, and SUV models using different size engines are given in Table 7. Note that unless performance is clearly the prime consideration to the buyer, the majority of the car buyers opt to purchase models with the lower power 4 cylinder engines when they have a choice. Buyers of vans and SUVs tend to purchase higher power V6 engines even when 4 cylinder engines are available. Within each model group, there is a significant price difference of at least $2000-$3000. Sales data seem to indicate that buyers tend to prefer the lower price options in the model group, but as indicated in Table 7, there are still significant sales of the higher priced vehicles in the group. Hence buyers are willing to pay several thousand dollars more if they feel they are receiving higher value in the vehicle, especially when they feel that high power is necessary.

Table 7 Sales Breakdown by Engine & Cam Type for 2002 Model Year

	Type	Small Car	Large Car	Minivan	Small Truck	Large Truck
Engine	L4 Gasoline	73.04%	25.33%	2.90%	20.48%	
	L4 Diesel	0.97%				
	L6 Gasoline	4.92%	0.48%		15.41%	0.82%
	V6 Gasoline	16.43%	60.51%	97.10%	57.22%	16.02%
	V8 Gasoline	2.87%	13.59%		5.42%	83.16%
	V12 Gasoline	0.01%	0.08%			
Cam	OHV	13.30%	31.30%	68.00%	20.70%	59.20%
	SOHC	32.30%	23.60%	3.20%	27.10%	32.80%
	DOHC	54.40%	45.00%	28.80%	52.20%	8.00%

Source: Reference 3, Martech Database.

5.2 Historical review of the effect of fuel prices and macro-economic factors on vehicle sales

In the previous section, total vehicle sales and sales by vehicle class were reviewed for the period 1970-2002, but there was no consideration of why the sales varied as they did or how changes in model prices affected their sales. In this section, the influence of the various factors affecting sales are assessed qualitatively to evaluate consumer responses to them.

First consider the effect of fuel prices on vehicle sales and fraction of sales in the various vehicle classes. The variation in the price of gasoline from 1975-2001 is shown in Table 8 in terms of current dollars, 1970$, and 2001$. The general consumer price index (cpi) was used to relate the various dollars. The table indicates that in real dollars the price of gasoline has varied significantly and was a maximum during the period 1977-1982 and was relatively flat and low during 1990-1994. Hence the level and large increase in gasoline prices would be expected to be market drivers in 1977-82 and changes in gasoline prices less of a factor in 1990-1994. Table 9 indicates that in 1977-1982 the high gasoline prices resulted in a large shift in the sales of passenger cars to smaller cars with higher fuel economy- compact to subcompact and large to mid-size cars. In addition, as shown in Table 6, the sales of US manufactured cars decreased and

the sales of imported cars increased from 1977-1982 as the market demanded smaller, high fuel economy cars. Total car sales decreased by about 30% during that period.

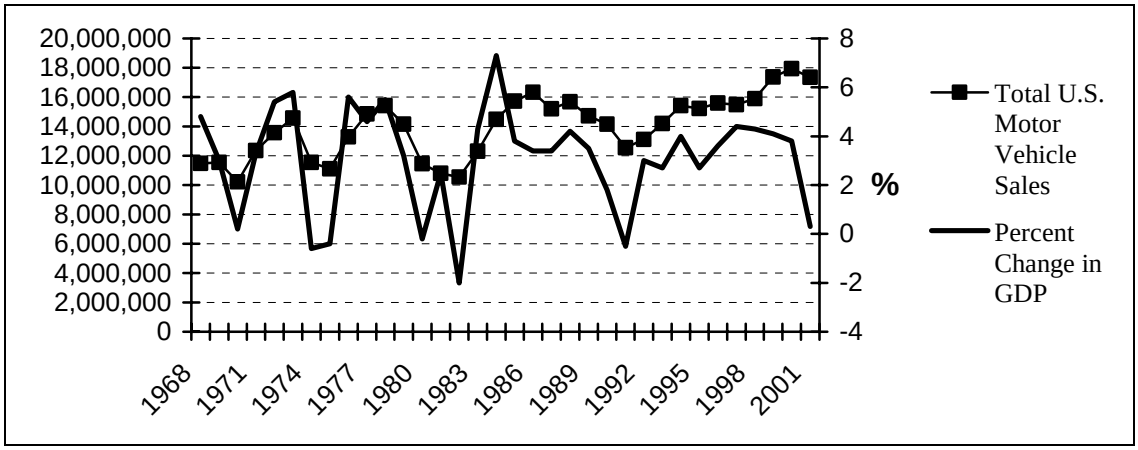
Table 8 Regular Unleaded Gasoline Prices during 1974-2002

Year	Unleaded Gasoline (current $/gal)	Unleaded Gasoline (1970$/gal)	Unleaded Gasoline (2001$/gal)
1974	$0.53	$0.43	$1.93
1975	$0.57	$0.42	$1.91
1976	$0.61	$0.42	$1.89
1977	$0.66	$0.41	$1.87
1978	$0.67	$0.38	$1.74
1979	$0.90	$0.48	$2.23
1980	$1.25	$0.59	$2.70
1981	$1.38	$0.62	$2.81
1982	$1.30	$0.56	$2.53
1983	$1.24	$0.50	$2.28
1984	$1.21	$0.46	$2.10
1985	$1.20	$0.44	$1.99
1986	$0.93	$0.32	$1.45
1987	$0.95	$0.31	$1.41
1988	$0.95	$0.29	$1.33
1989	$1.02	$0.30	$1.37
1990	$1.16	$0.32	$1.47
1991	$1.14	$0.30	$1.38
1992	$1.11	$0.30	$1.34
1993	$1.11	$0.29	$1.40
1994	$1.11	$0.29	$1.30
1995	$1.15	$0.29	$1.33
1996	$1.23	$0.31	$1.40
1997	$1.23	$0.30	$1.38
1998	$1.06	$0.25	$1.15
1999	$1.17	$0.27	$1.23
2000	$1.51	$0.34	$1.56
2001	$1.46	$0.32	$1.46
2002	$1.36	$0.29	$1.33

Source: U.S. Department of Energy, Reference 34.

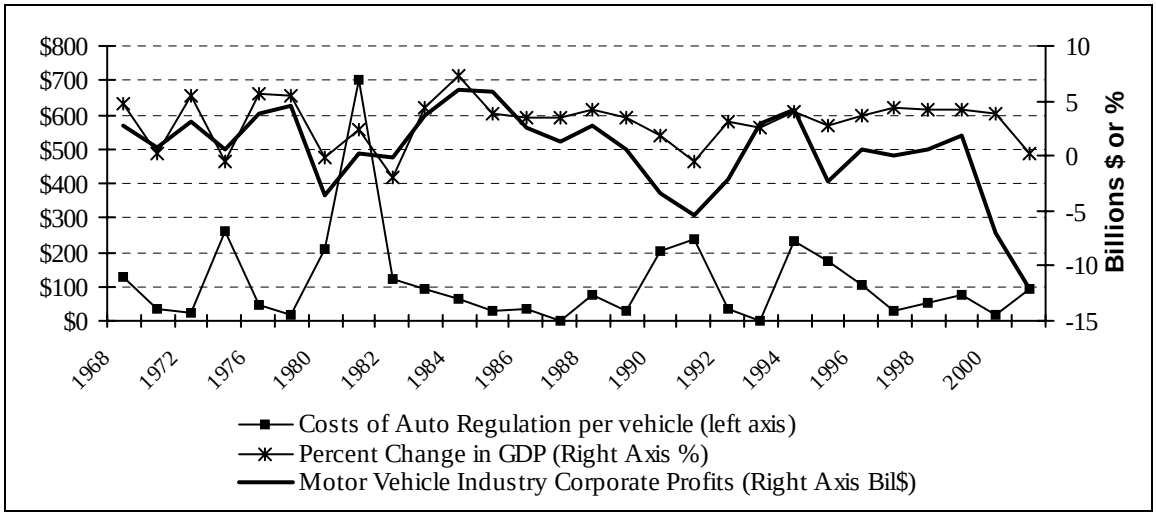
Next consider the effect of the growth rate (percent change in GDP) of the economy on vehicle production and sales. This effect is shown in Figure 14. Also indicated in the figure are the time periods 1977-1982 and 1990-1994 in which previous analysis in Section 4.3 indicated the vehicle price changes were the largest in response to changes in emissions, fuel economy, and/or safety regulations. Figure 14 indicates that increases in sales are strongly correlated with periods of economic expansion more or less independent of other factors. This correlation seems to hold even during periods in which vehicle prices had large increases. In the period 1977-1982, the economic growth rate was falling (a recession) and vehicle sales also decreased. However, for most of the period 1990-1994, the economy was expanding and vehicle production and sales increased even though the price of vehicles showed a significant increase. The effects of

Figure 14 Relationship of Domestic Motor Vehicle Sales(1) to the Overall Economy GDP(2)



Source: (1) Ward's Communications, Reference 25 (2) U.S. Department of Commerce, Reference 33.

Figure 15 Macro relationship between costs of regulation(1), industry corporate profits(2) and GDP



Source: (1) U.S. Department of Labor, Reference 32 (2) U.S. Department of Commerce, Reference 26.

economic growth and the cost of auto regulations on auto industry profits are shown in Figure 15. Industry profits decreased during the 1977-82 period and showed an increase during the later part of the 1990-94 period. This would be expected as during the first period sales decreased (especially those of US auto companies) and in the second period, sales increased. Hence Figures 14 and 15 indicate that the key factor in assessing the effect of changing regulations on vehicle sales and industry profitability is the status of the general economy when the changes are made. The changes should be made in a way that does not adversely affect economic growth.

The changes in the vehicle class sales fractions in the 1990-1994 period were very different that those that occurred in the 1977-1982 (see Table 9). The primary shifts were from subcompact to compact cars and the beginning of the purchase in large numbers of SUVs. The market share of SUVs nearly doubled between 1990 and 1995 and increased further by another 50% by 2000. Gasoline prices were low and stable in this period and buyers were clearly not concerned about fuel economy of the vehicles

Table 9 Light-Duty Vehicle Market Shares by Size Class (1976 - 2001)

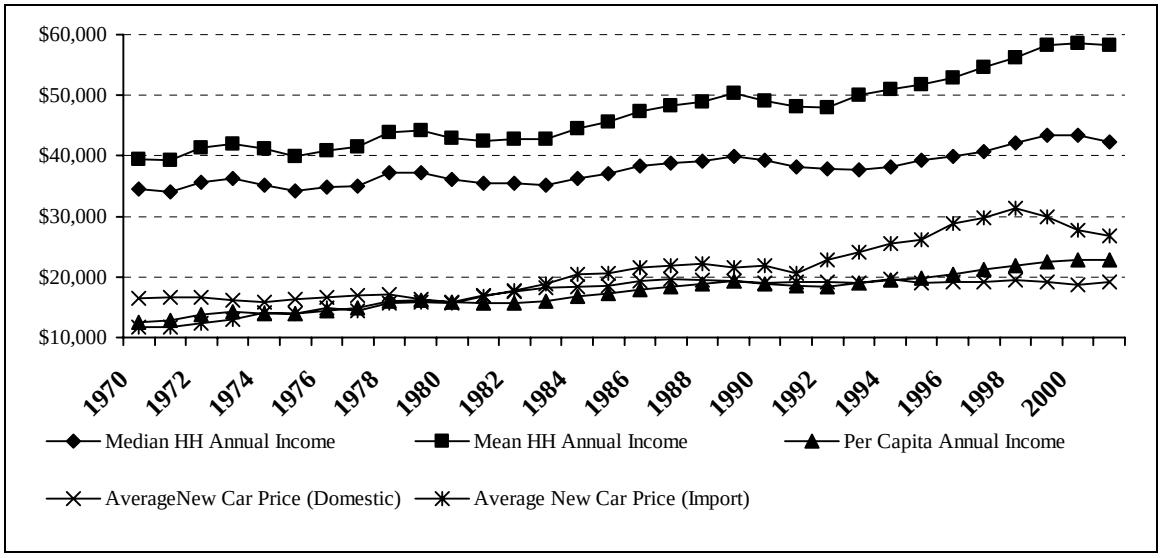
Year	Minicompact	Subcompact	Compact	Midsize	Large	Two Seater	Percent of Light Vehicles Total
1976	0.0%	21.7%	23.5%	15.0%	18.3%	1.7%	80.2%
1977	6.5%	15.5%	21.8%	15.6%	20.0%	1.7%	81.0%
1978	6.7%	15.0%	12.0%	26.1%	17.6%	1.5%	79.0%
1979	4.3%	24.4%	6.7%	26.9%	15.4%	1.7%	79.4%
1980	3.8%	30.4%	5.3%	27.2%	11.8%	1.9%	80.4%
1981	3.9%	31.2%	5.4%	27.9%	12.1%	2.0%	82.5%
1982	2.7%	26.6%	10.8%	28.3%	10.1%	2.2%	80.6%
1983	2.1%	23.2%	12.6%	24.5%	9.6%	2.0%	74.0%
1984	0.3%	18.2%	20.0%	22.1%	10.9%	2.4%	73.9%
1985	0.3%	15.7%	23.2%	20.5%	10.0%	2.5%	72.1%
1986	1.2%	15.9%	23.6%	19.1%	9.4%	1.8%	71.0%
1987	1.0%	13.6%	27.1%	16.9%	9.3%	1.6%	69.5%
1988	0.6%	13.1%	27.8%	16.9%	9.1%	1.2%	68.6%
1989	0.1%	13.1%	24.7%	19.7%	9.4%	1.1%	68.1%
1990	0.6%	14.8%	23.0%	18.3%	9.3%	1.2%	67.1%
1991	0.6%	17.5%	19.8%	18.8%	9.4%	1.1%	67.1%
1992	0.9%	16.6%	19.6%	18.0%	9.1%	0.7%	64.9%
1993	0.6%	14.5%	19.8%	18.2%	8.8%	0.5%	62.4%
1994	0.4%	13.8%	21.0%	16.1%	9.2%	0.5%	60.9%
1995	0.3%	10.4%	22.4%	17.0%	9.0%	0.4%	59.5%
1996	0.2%	8.8%	23.5%	16.7%	8.5%	0.4%	58.1%
1997	0.3%	10.2%	19.9%	17.1%	7.9%	0.5%	55.9%
1998	0.1%	9.8%	15.2%	20.4%	6.9%	0.7%	53.1%
1999	0.1%	9.7%	14.2%	20.2%	7.1%	0.6%	51.9%
2000	0.1%	10.4%	13.9%	19.4%	7.5%	0.7%	51.9%
2001	0.2%	5.6%	18.7%	16.3%	9.2%	0.7%	50.9%

Source: TEDB 22, Reference 8.

they were purchasing. In general, buyers also seemed not to be concerned with the relatively large price increases ($1000-$2000 per model year) that often occurred in 1990-1994.

Another economic factor that could be expected to influence the response of consumers to vehicle price increases is the income of families. The change in the mean and median income of families in the period 1970-2002 is shown in Figure 16. Since the early 1980s, the mean income has increased more rapidly than the median income indicating the income of more affluent families has increased faster than the lower income families. The average prices of new domestic and imported cars are also shown in Figure 16. Percentage-wise the prices of cars have increased more rapidly than family incomes over most of the period of interest. Note that after about 1990 the average price of domestic cars has leveled off, but the average prices of imported cars have continued to increase at a relatively fast rate. These trends can also be seen in the cost data given in Appendix 2 for the various vehicle models. In the case of SUVs, the prices of the vehicles in real dollars have been nearly level or even decreasing. The more rapid increase of the mean income and the relatively level price of SUVs may explain why the more expensive car models and SUVs have sold so well and are gaining a greater share of

Figure 16 Trends in Annual Income and New Car Prices ($2001)



Source: (1) U.S. Department of Commerce & U.S. Census Bureau, References 26 & 30.

the vehicle market. Further discussion of how consumers have coped with the increasing cost of new vehicles is given in the next section.

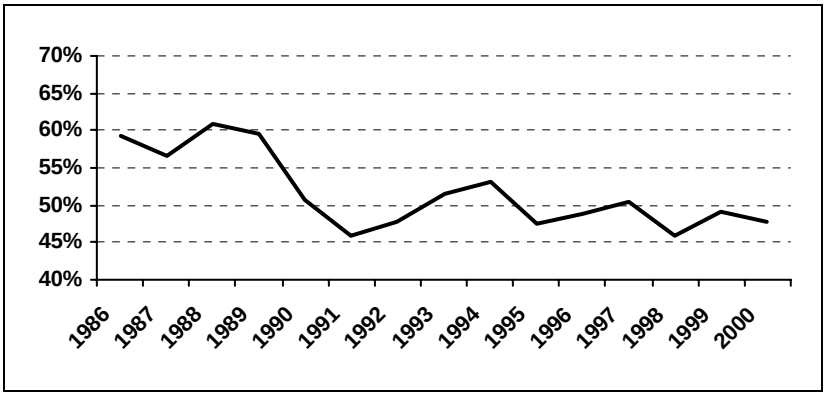
5.3 Historical review of innovative financing and marketing strategies

Automakers and dealers have increasingly used flexible financing plans and incentives to maintain high sales volumes even during economic downturns. These marketing strategies have undergone a crescendo in the aftermath of September 11th as evidenced by a proliferation of zero percent financing and rebates as high as $5000. In October 2002 it was reported that the Big 3 automakers were spending an average of $3,764 per vehicle, or 14 percent of the selling price, on all types of incentives (Reference 36).

Cut-rate financing and cash rebates are nothing new for the auto industry. These measures began in the mid-1970s as a means to move end-of-the-year inventory and particularly slow-selling models. Such marketing approaches have remained a way to reduce inventory and maintain market share, and have not been a means for generating higher total revenues. The excess capacity in the auto industry, particularly for the domestic carmakers, explains why the auto companies would continue to build more supply than normal expected demand. This excess demand is created through generous incentives. Bill Lovejoy, V.P. of GM, summed up this concept in stating that, “incentives will stay in place until demand is more aligned to capacity.” Figure 17 shows the trend in capacity utilization for the production of autos and light trucks in the U.S.

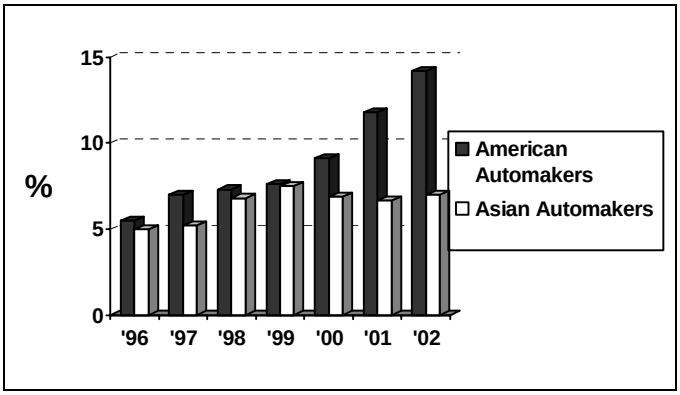
There are two types of rebates used in the auto industry: (1). manufacturer rebates (e.g. the auto manufacturer gives the customer a $1,000 rebate upon the purchase of a specific vehicle, which the customer assigns as reduction to the purchase price), and (2) dealer rebates (e.g. an auto dealer receives a $500 incentive from the auto manufacturer for every vehicle sold of a specific model in a given period). In the case (1), the rebate is part of the dealer’s gross receipts, while in the second example, it is not. American automakers in particular have increased incentives markedly over the last few years

Figure 17 Ratio of the Utilization Index to the Capacity Index for Auto Production in the US



Source: (1) U.S. Department of Commerce, Reference 26.

Figure 18 Incentives as a Percentage of Sales Price (1996-2002)

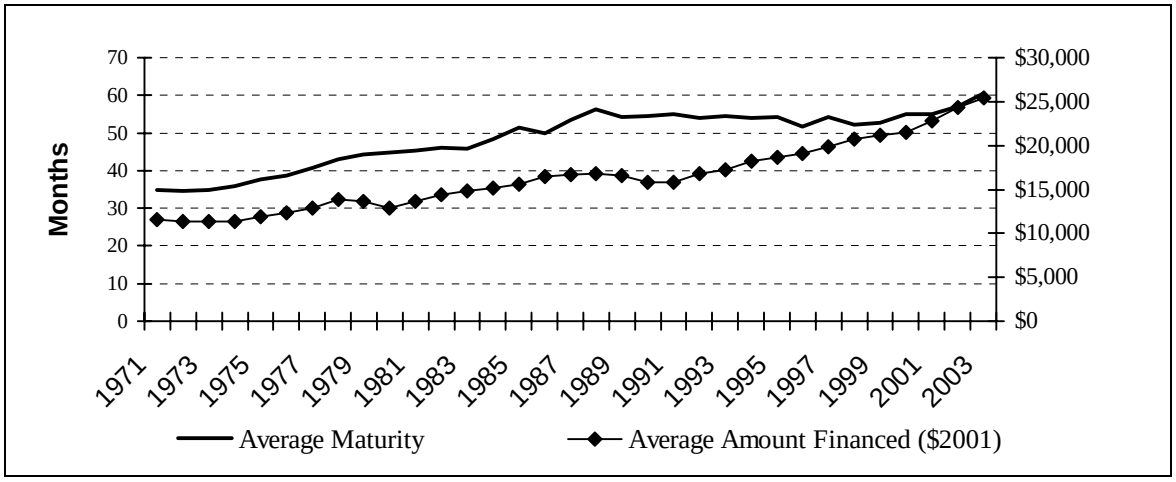


Source: CNW Marketing/Research, Reference 31.

(Figure 18). General Motors, the acknowledged bellwether with regard to incentives, has gone so far as to offer its 159,000 U.S. employees, and tens of thousands of employees at GM suppliers and dealers, a $1,000 discount on a new car or truck in an attempt to boost vehicle sales in September 2003 (Reference 37). Automakers use incentives other than cash to motivate consumers. For instance, GM offered a free Dell™ computer system with the purchase or leasing of a 2003 model year Saturn car or truck during September 2003 in addition to the incentives already in place (Reference 39).

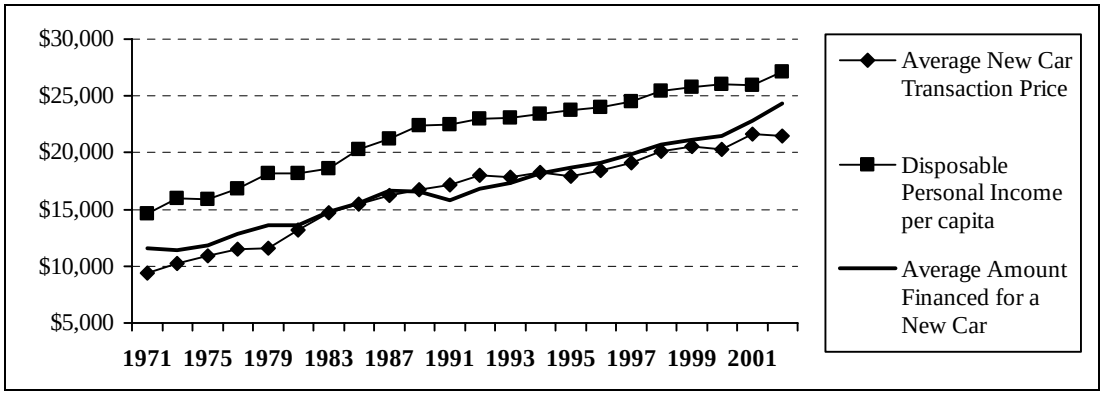
Changes in financing options have also made cars increasingly affordable to consumers whose incomes have been increasing slower than the price of new cars. Figure 19 shows that the average maturity rate for auto loans has nearly doubled over the last 32 years, while Figure 20 indicates that the car price, the amount financed, and disposable personal income all in constant dollars have tracked closely together. Monthly payments are thus smaller and more manageable for the consumer.

Figure 19 Average Amount Financed for a New Car and Average Maturity Rate of Auto Loans



Source: (1) U.S. Department of Commerce, Reference 26.

Figure 20 Trends in New Car Financing and Pricing; And in Disposable Income ($2001)



Source: U.S. Department of Commerce & U.S. Census Bureau, References 26 & 30. Table Notes: Disposable income is the amount of Personal income an individual has after taxes and government fees, which can be spent on necessities, or non-essentials, or be saved. Figure data are every other year preceding 1991 and every year thereafter.

Although most car loans are between 36 and 60 months, a number of independent finance companies in the western United States have recently offered loans as long as 96 months (Reference 38). The maturity rate for car loans has stabilized considerably since the mid to late 1980s, but recent record low interest rates provide the greater flexibility for potentially longer term car loans.

In addition to amenable loan terms and interest rates, lease financing has flourished in the last 15 years. Table 10 highlights the dramatic increase in the lease penetration rate from 3.5 percent of new vehicle transactions in 1985 to 31.5 percent in 2002. Leasing allows the consumer to have lower affordable monthly payments and the opportunity to receive a new vehicle every 3 to 5 years.

Table 10 U.S. Market Lease Penetration Rates by Vehicle Segment

Segment	1985	1990	1995	1996	1997	1998	1999	2000	2001	2002
Passenger Cars										
Budget	2.2	5.5	12.1	13.6	13.4	12.1	12.0	10.3	10.0	9.7
Small	1.8	5.3	18.9	18.5	15.4	14.8	14.4	14.2	12.1	10.4
Lower Middle	8.2	12.8	26.9	27.3	28.1	27.3	27.2	25.7	24.5	22.2
Core Middle	11.5	16.2	30.4	31.8	31.1	28.6	27.3	26.9	26.3	25.7
Upper Middle	11.5	14.7	26.2	27.3	28.1	29.1	29.4	29.2	30.0	31.9
Near Luxury	16.6	25.2	50.5	52.6	57.3	58.3	58.8	59.7	58.9	60.2
Luxury	39.6	52.6	62.0	64.2	65.9	65.2	57.8	51.3	55.5	58.8
Specialty	11.1	24.6	59.7	61.3	58.5	57.5	55.3	50.4	52.3	51.1
Sport	16.2	18.8	26.2	30.4	34.4	39.3	40.2	41.1	44.4	47.8
Light Trucks										
Compact Pickup	1.3	4.4	14.6	15.2	16.3	15.7	15.6	15.7	15.8	16.1
Compact SUV	5.2	9.6	34.3	36.7	38.4	39.7	41.2	40.7	42.2	44.7
Full Size Pickup	4.6	8.2	18.3	19.4	22.7	25.3	28.1	26.3	27.1	27.3
Full Size SUV	4.2	9.3	36.9	38.2	42.1	42.7	44.4	46.5	45.9	46.7
Full Size Van	7.1	12.1	20.0	21.3	22.7	22.4	21.9	21.1	21.0	20.7
Minivan	4.2	8.4	25.8	28.1	32.8	33.5	35.7	32.3	36.6	37.3
Total	3.5	7.3	24.2	27.2	29.3	31.5	29.1	28.7	29.2	31.5

Source: CNW Marketing/Research, Reference 31. Table Notes: Figures shown are estimates representing lease transactions as a percent of new vehicle retail transactions. The total of all segments combined is based on a weighted average.

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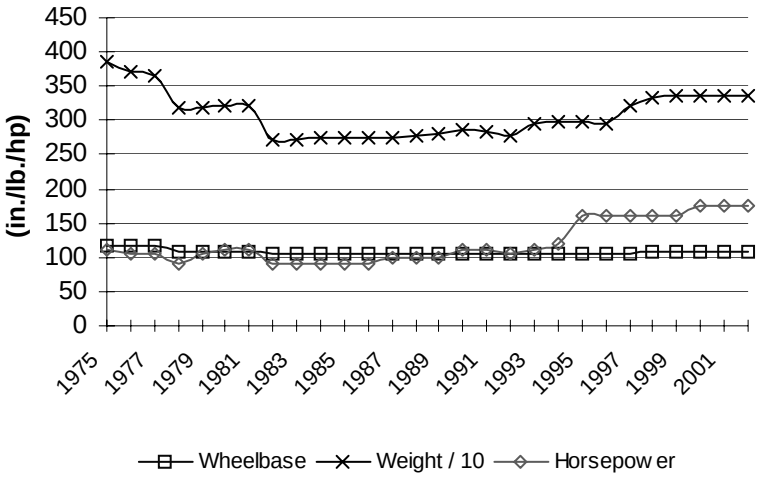
Appendices

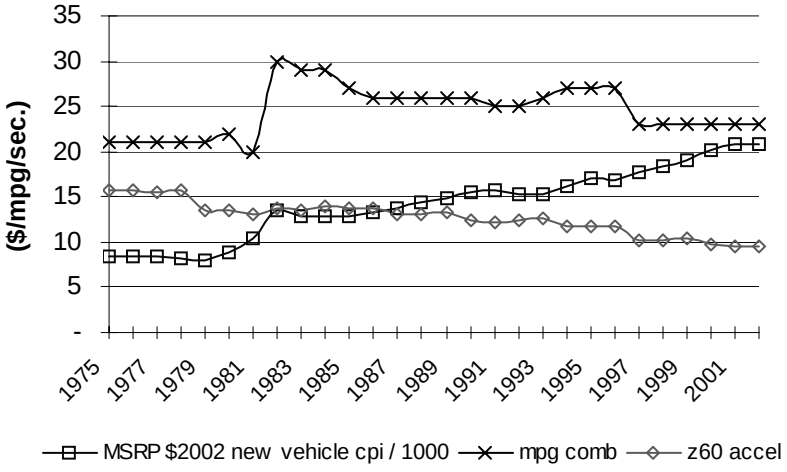
Appendix I: Timeline of new technologies to reduce emissions and improve fuel economy

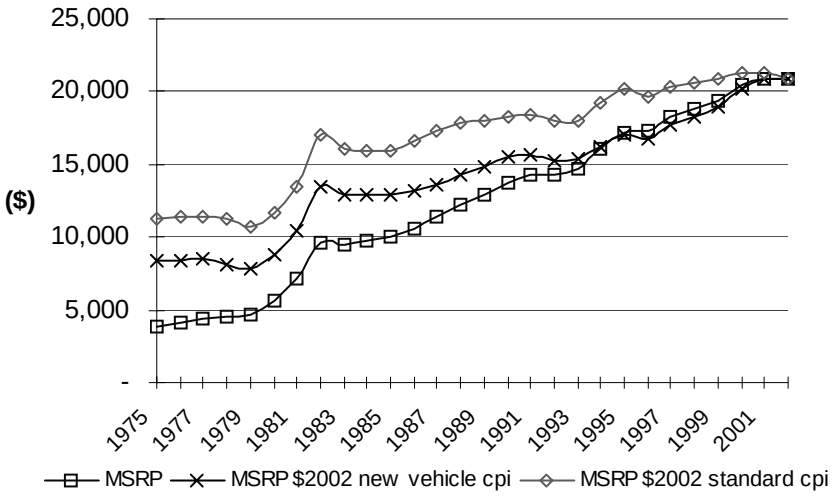
Year	Technology	Comments
1975	Two-way oxidation catalyst	Needed to meet the 1975 HC and CO standards
1975 – 1982	Weight reduction by downsizing and use of light weight materials	Needed to meet the CAFE standards (1978 – 1985?)
1976 – 1980	Improved radial tires and reduced aerodynamic drag	Lower road load
1977 – 1980	Electronic engine controls	Reduce emissions (NO_x)
1978 – 1985	Front-wheel drive in many models	Improve driveline packages and reduce weight
1978 – 1990	4-speed automatic transmission with lockup	Improve fuel economy
1980 -	V6 engines	New high power engine replacing some V8s
1980	Three-way, oxidation / reduction catalyst	Needed to meet the 1981 emissions standard (particularly NO_x)
1980	Electronic ignition and single-point fuel injection	Needed by the three-way catalyst to control A/F ratio
1982 – 1985	Computer control of the engine and transmission	Reduce emissions and fuel economy
1985	Multi-point fuel injection	Further reduce emissions
1986 – 1995	Use of 4-valves per cylinder in engines	Increase specific power (kW/Liter) of the engine and improve part-load bsfc
1995	Variable valve actuation and timing	Further improve emissions and fuel economy
2000	5- and 6-speed automatic transmissions with lockup in multiple gears	Improve fuel economy and acceleration performance
2000	Ultra-clean emission control	Meet ULEV and SULEV emissions standards
2000	Continuously Variable Transmission (CVT)	The engine speed/drive wheel speed ratio can be altered to enhance vehicle performance or fuel economy.

Appendix II: Detailed history of the performance and price of selected vehicle models

Buick Century – Midsize Car



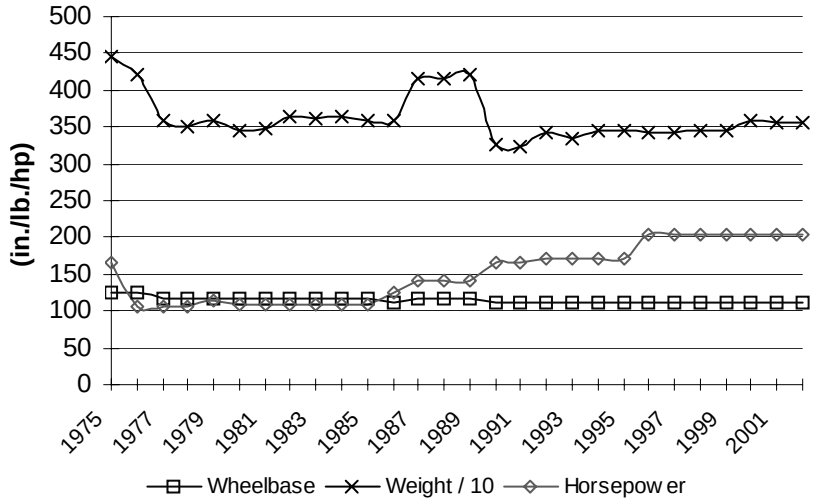


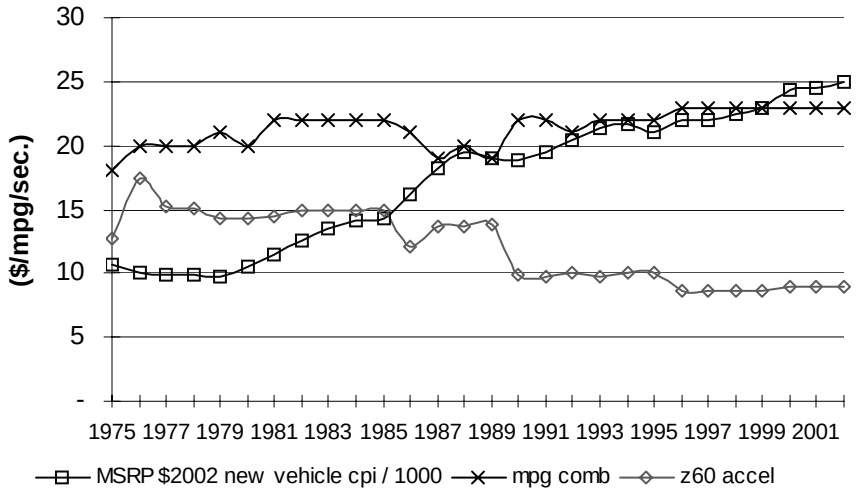


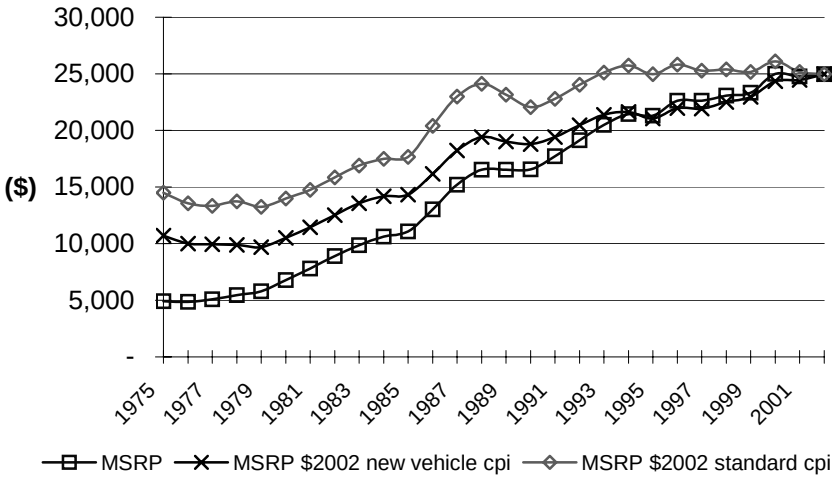
Buick Century

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1975	116	3869	110	$ 3,828	$ 8,356	$ 11,292	6	.	.	21	15.7
1976	116	3712	105	$ 4,105	$ 8,425	$ 11,435	6	.	.	21	15.7
1977	116	3645	105	$ 4,363	$ 8,509	$ 11,421	6	.	.	21	15.5
1978	108	3172	90	$ 4,486	$ 8,126	$ 11,271	6	3.2	A	21	15.7
1979	108	3172	105	$ 4,699	$ 7,887	$ 10,778	6	3.2	M3	21	13.6
1980	108	3201	110	$ 5,646	$ 8,769	$ 11,665	6	3.8	A3	22	13.5
1981	108	3201	110	$ 7,094	$ 10,395	$ 13,410	6	3.8	M3	20	13.2
1982	105	2712	90	$ 9,581	$ 13,506	$ 17,078	4	2.5	A3	30	13.8
1983	105	2712	92	$ 9,416	$ 12,941	$ 16,123	4	2.5	A3	29	13.6
1984	105	2738	90	$ 9,697	$ 12,951	$ 15,975	4	2.5	A3	29	13.9
1985	105	2738	92	$ 9,959	$ 12,888	$ 15,884	4	2.5	L3	27	13.7
1986	105	2754	92	$ 10,642	$ 13,211	$ 16,654	4	2.5	L3	26	13.8
1987	105	2753	98	$ 11,403	$ 13,662	$ 17,251	4	2.5	L3	26	13.1
1988	105	2762	98	$ 12,218	$ 14,350	$ 17,836	4	2.5	L3	26	13.1
1989	105	2792	98	$ 12,879	$ 14,835	$ 18,038	4	2.5	L3	26	13.2
1990	105	2869	110	$ 13,700	$ 15,546	$ 18,267	4	2.5	L3	26	12.3
1991	105	2832	110	$ 14,265	$ 15,631	$ 18,359	4	2.5	L3	25	12.2
1992	105	2790	110	$ 14,295	$ 15,286	$ 17,959	4	2.5	L3	25	12.5
1993	105	2949	110	$ 14,705	$ 15,354	$ 18,021	4	2.2	L3	26	12.6
1994	105	2974	120	$ 16,020	$ 16,173	$ 19,232	4	2.2	L3	27	11.8
1995	105	2993	160	$ 17,220	$ 17,009	$ 20,188	6	3.1	L4	23	10.4
1996	105	2950	160	$ 17,260	$ 16,760	$ 19,703	6	3.1	L4	23	10.4
1997	105	3215	160	$ 18,225	$ 17,765	$ 20,363	6	3.1	L4	23	10.3
1998	109	3335	160	$ 18,765	$ 18,312	$ 20,666	6	3.1	L4	23	10.3
1999	109	3353	160	$ 19,335	$ 19,016	$ 20,858	6	3.1	L4	23	10.3
2000	109	3368	175	$ 20,440	$ 20,205	$ 21,336	6	3.1	L4	23	9.6
2001	109	3353	175	$ 20,895	$ 20,895	$ 21,235	6	3.1	L4	23	9.6
2002	109	3353	175	$ 20,895	$ 20,895	$ 20,895	6	3.1	L4	23	9.6

Buick LeSabre – Large Car



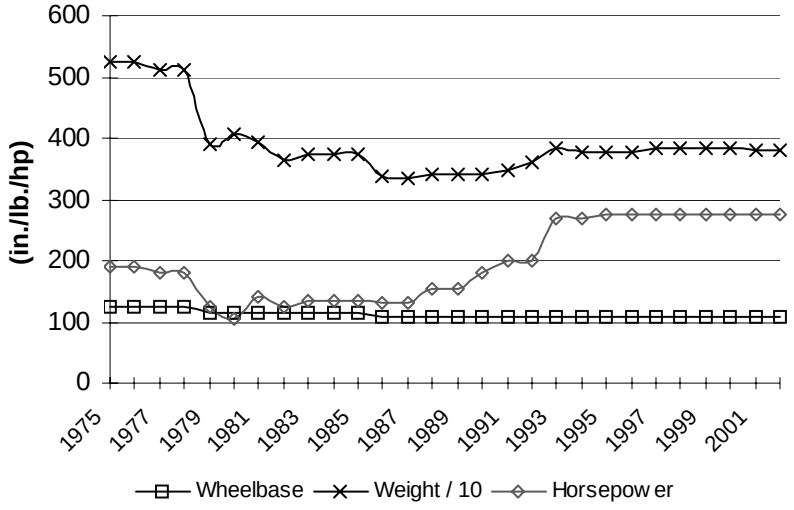


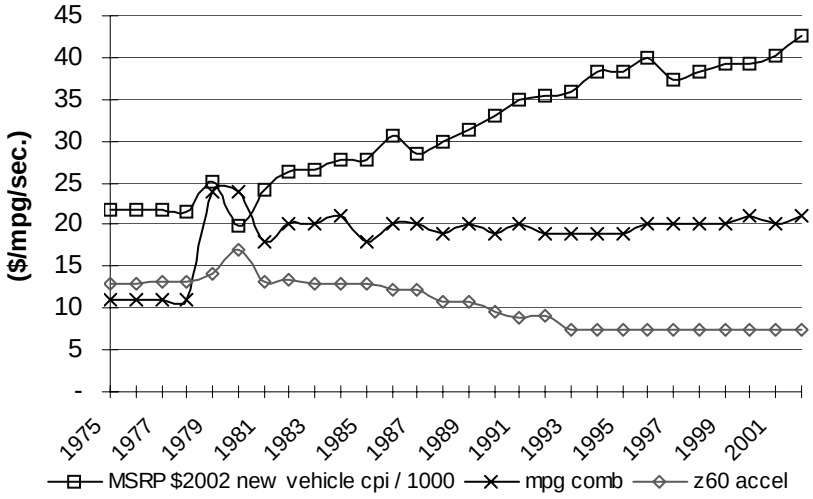


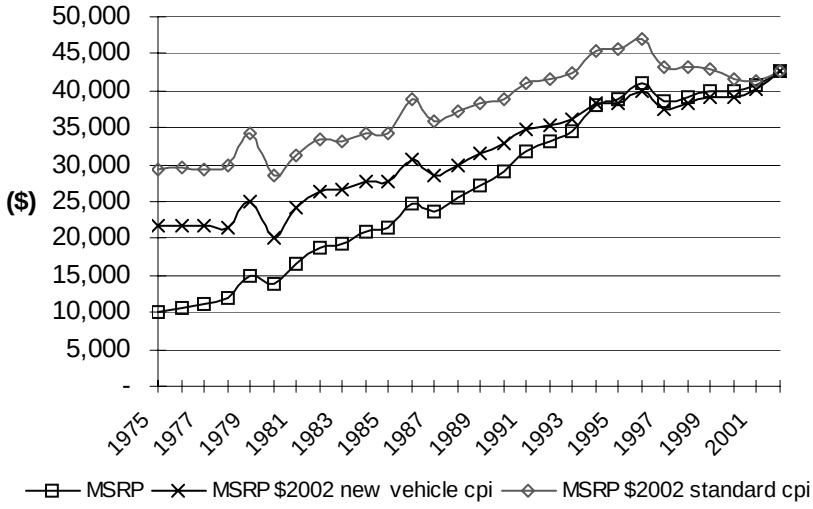
Buick LeSabre

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1975	124	4449	165	$ 4,911	$ 10,720	$ 14,487	8	.	.	18	12.7
1976	124	4210	105	$ 4,871	$ 9,997	$ 13,568	6	.	.	20	17.4
1977	116	3577	105	$ 5,092	$ 9,931	$ 13,330	6	.	.	20	15.3
1978	116	3510	105	$ 5,459	$ 9,888	$ 13,716	6	3.8	A	20	15.0
1979	116	3600	115	$ 5,780	$ 9,702	$ 13,257	6	3.8	A3	21	14.3
1980	116	3459	110	$ 6,769	$ 10,513	$ 13,986	6	3.8	A3	20	14.3
1981	116	3485	110	$ 7,805	$ 11,437	$ 14,754	6	3.8	A3	22	14.4
1982	116	3649	110	$ 8,886	$ 12,526	$ 15,840	6	3.8	A3	22	15.0
1983	116	3620	110	$ 9,869	$ 13,564	$ 16,899	6	3.8	A3	22	14.9
1984	116	3649	110	$ 10,615	$ 14,177	$ 17,488	6	3.8	A3	22	15.0
1985	116	3587	110	$ 11,078	$ 14,336	$ 17,668	6	3.8	L3	22	15.0
1986	111	3600	125	$ 13,026	$ 16,171	$ 20,385	6	3	L4	21	12.0
1987	116	4160	140	$ 15,199	$ 18,210	$ 22,994	8	5	L4	19	13.7
1988	116	4160	140	$ 16,520	$ 19,403	$ 24,117	8	5	L4	20	13.7
1989	116	4209	140	$ 16,530	$ 19,015	$ 23,151	8	5	L4	19	13.8
1990	111	3270	165	$ 16,555	$ 18,785	$ 22,073	6	3.8	L4	22	9.9
1991	111	3231	165	$ 17,715	$ 19,412	$ 22,799	6	3.8	L4	22	9.8
1992	111	3417	170	$ 19,125	$ 20,451	$ 24,026	6	3.8	L4	21	10.0
1993	111	3343	170	$ 20,490	$ 21,394	$ 25,110	6	3.8	L4	22	9.8
1994	111	3449	170	$ 21,435	$ 21,640	$ 25,732	6	3.8	L4	22	10.1
1995	111	3442	170	$ 21,309	$ 21,048	$ 24,981	6	3.8	L4	22	10.1
1996	111	3430	205	$ 22,620	$ 21,964	$ 25,822	6	3.8	L4	23	8.6
1997	111	3430	205	$ 22,620	$ 21,918	$ 25,274	6	3.8	L4	23	8.6
1998	111	3443	205	$ 23,070	$ 22,513	$ 25,407	6	3.8	L4	23	8.6
1999	111	3443	205	$ 23,340	$ 22,955	$ 25,178	6	3.8	L4	23	8.6
2000	112	3591	205	$ 25,000	$ 24,355	$ 26,096	6	3.8	L4	23	8.9
2001	112	3567	205	$ 24,762	$ 24,477	$ 25,165	6	3.8	L4	23	8.9
2002	112	3567	205	$ 24,975	$ 24,975	$ 24,975	6	3.8	L4	23	8.9

Cadillac El Dorado – Luxury Car



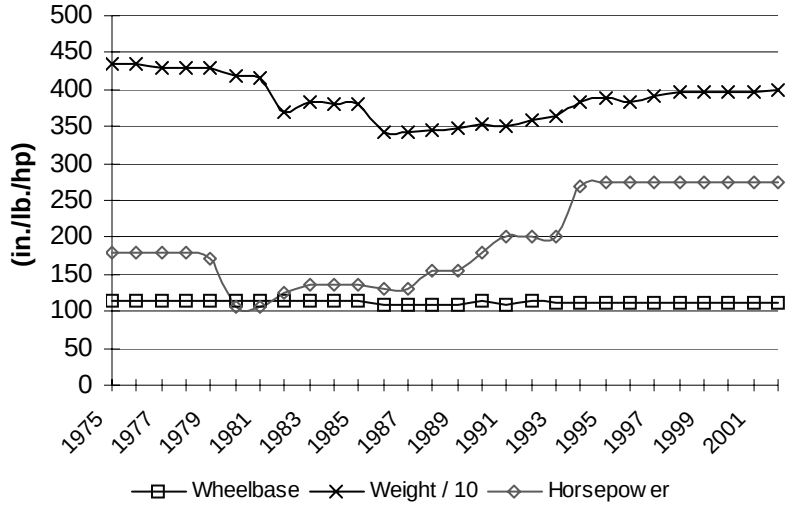


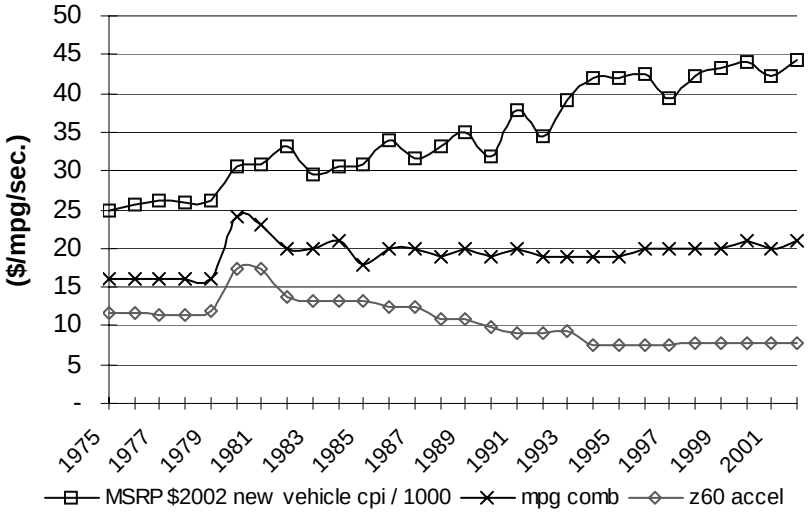


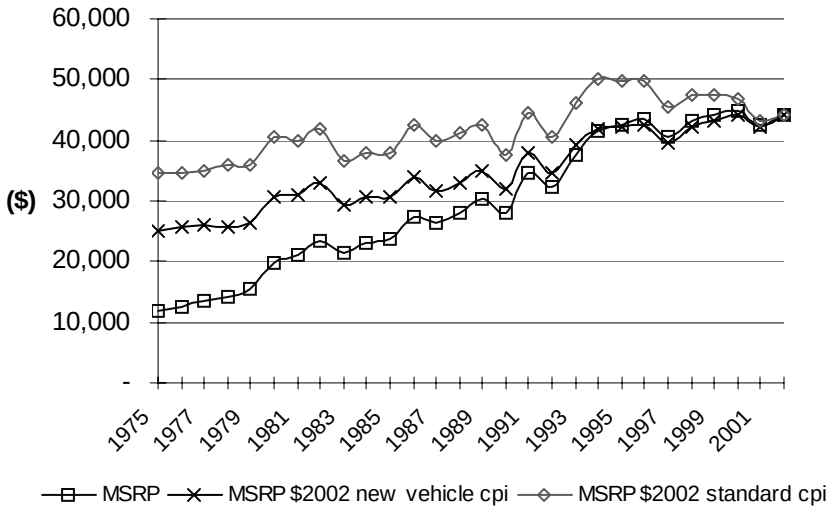
Cadillac El Dorado

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1975	126	5254	190	$ 9,948	$ 21,715	$ 29,345	8	.	.	11	12.9
1976	126	5231	190	$ 10,586	$ 21,726	$ 29,487	8	.	.	11	12.9
1977	126	5101	180	$ 11,187	$ 21,818	$ 29,285	8	.	.	11	13.2
1978	126	5100	180	$ 11,921	$ 21,593	$ 29,952	8	7	A	11	13.2
1979	114	3900	125	$ 14,955	$ 25,102	$ 34,300	8	5.7	A3	24	14.2
1980	114	4080	105	$ 13,800	$ 19,984	$ 28,512	8	5.7	A3	24	17.0
1981	114	3930	140	$ 16,492	$ 24,166	$ 31,176	8	6	A3	18	13.1
1982	114	3625	125	$ 18,716	$ 26,383	$ 33,362	8	4.1	A4	20	13.4
1983	114	3748	135	$ 19,334	$ 26,572	$ 33,106	8	4.1	A4	20	13.0
1984	114	3734	135	$ 20,842	$ 27,837	$ 34,336	8	4.1	A4	21	12.9
1985	114	3734	135	$ 21,431	$ 27,733	$ 34,180	8	4.1	L4	18	12.9
1986	108	3365	130	$ 24,751	$ 30,726	$ 38,734	8	4.1	L4	20	12.2
1987	108	3360	130	$ 23,740	$ 28,442	$ 35,915	8	4.1	L4	20	12.2
1988	108	3398	155	$ 25,416	$ 29,851	$ 37,104	8	4.5	L4	19	10.7
1989	108	3421	155	$ 27,288	$ 31,432	$ 38,218	8	4.5	L4	20	10.8
1990	108	3426	180	$ 29,045	$ 32,958	$ 38,727	8	4.5	L4	19	9.6
1991	108	3469	200	$ 31,825	$ 34,873	$ 40,959	8	4.9	L4	20	8.9
1992	108	3604	200	$ 33,070	$ 35,362	$ 41,545	8	4.9	L4	19	9.2
1993	108	3840	270	$ 34,490	$ 36,011	$ 42,267	8	4.6	L4	19	7.5
1994	108	3774	270	$ 37,915	$ 38,277	$ 45,516	8	4.6	L4	19	7.5
1995	108	3774	275	$ 38,855	$ 38,380	$ 45,551	8	4.6	L4	19	7.4
1996	108	3765	275	$ 41,135	$ 39,942	$ 46,958	8	4.6	L4	20	7.3
1997	108	3821	275	$ 38,660	$ 37,460	$ 43,196	8	4.6	L4	20	7.4
1998	108	3843	275	$ 39,160	$ 38,214	$ 43,128	8	4.6	L4	20	7.5
1999	108	3843	275	$ 39,905	$ 39,248	$ 43,047	8	4.6	L4	20	7.5
2000	108	3843	275	$ 39,815	$ 39,159	$ 41,561	8	4.6	L4	21	7.5
2001	108	3814	275	$ 40,756	$ 40,287	$ 41,419	8	4.6	L4	20	7.4
2002	108	3814	275	$ 42,610	$ 42,610	$ 42,610	8	4.6	L4	21	7.4

Cadillac Seville – Luxury Car



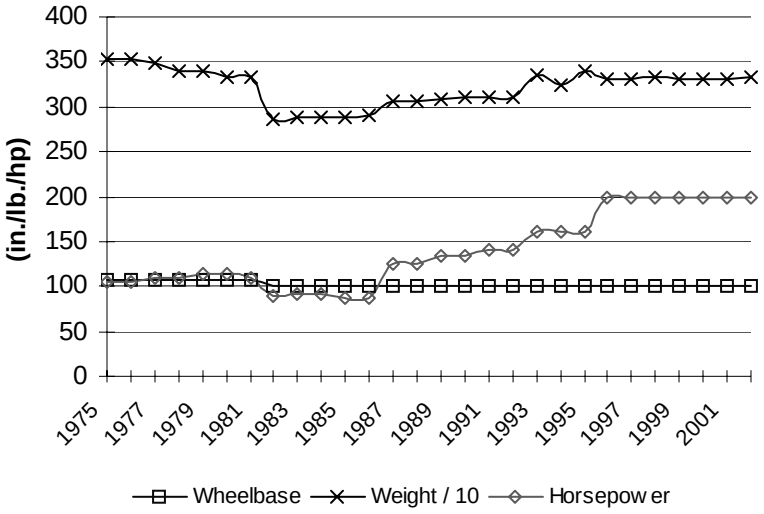


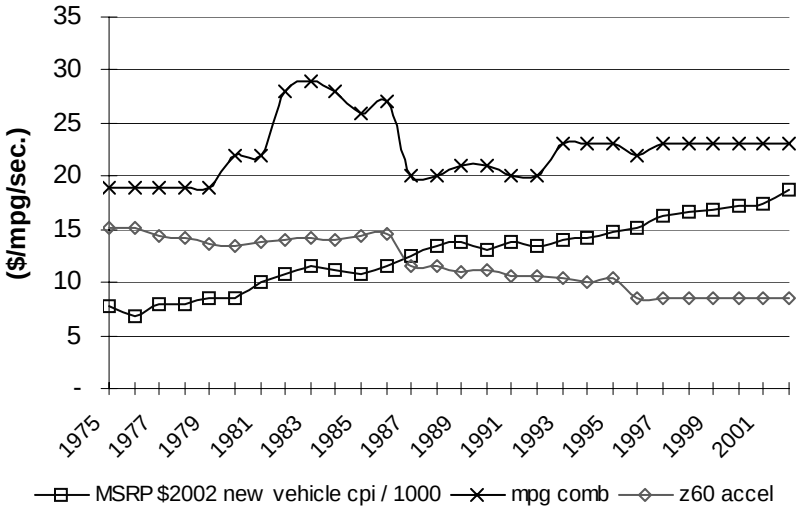


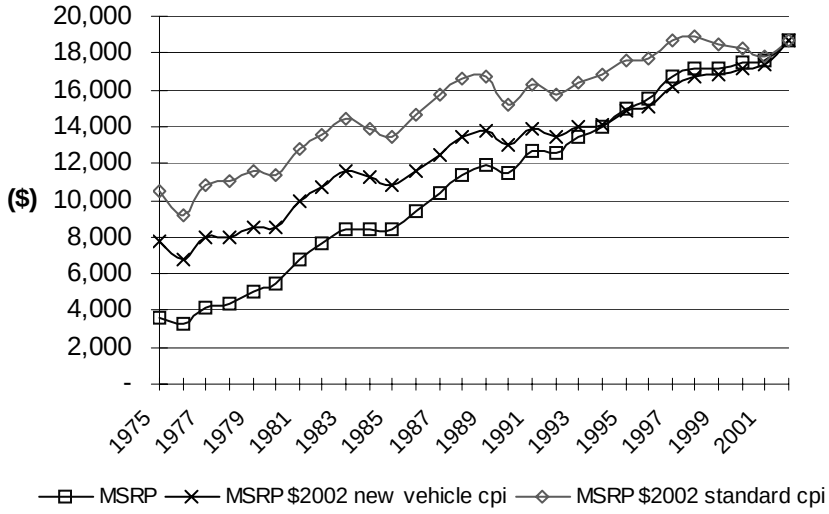
Cadillac Seville

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1975	114	4341	180	$ 11,788	$ 24,898	$ 34,773	8	.	.	16	11.6
1976	114	4340	180	$ 12,479	$ 25,611	$ 34,760	8	.	.	16	11.6
1977	114	4300	180	$ 13,359	$ 26,054	$ 34,971	8	.	.	16	11.5
1978	114	4300	180	$ 14,267	$ 25,842	$ 35,847	8	5.7	A	16	11.5
1979	114	4290	170	$ 15,646	$ 26,262	$ 35,885	8	5.7	A3	16	12.0
1980	114	4185	105	$ 19,662	$ 30,538	$ 40,624	8	5.7	A3	24	17.3
1981	114	4167	105	$ 21,088	$ 30,901	$ 39,864	8	5.7	A3	23	17.3
1982	114	3706	125	$ 23,433	$ 33,032	$ 41,770	8	4.1	A4	20	13.7
1983	114	3844	135	$ 21,440	$ 29,467	$ 36,712	8	4.1	A4	20	13.2
1984	114	3804	135	$ 22,962	$ 30,668	$ 37,829	8	4.1	A4	21	13.1
1985	114	3803	135	$ 23,759	$ 30,746	$ 37,893	8	4.1	L4	18	13.1
1986	108	3428	130	$ 27,256	$ 33,836	$ 42,654	8	4.1	L4	20	12.4
1987	108	3419	130	$ 26,326	$ 31,541	$ 39,828	8	4.1	L4	20	12.4
1988	108	3449	155	$ 28,152	$ 33,065	$ 41,098	8	4.5	L4	19	10.8
1989	108	3469	155	$ 30,300	$ 34,901	$ 42,437	8	4.5	L4	20	10.9
1990	114	3543	180	$ 28,090	$ 31,874	$ 37,453	8	4.5	L4	19	9.8
1991	114	3512	200	$ 34,545	$ 37,853	$ 44,459	8	4.9	L4	20	9.0
1992	114	3591	200	$ 32,340	$ 34,582	$ 40,628	8	4.9	L4	19	9.1
1993	111	3648	200	$ 37,590	$ 39,248	$ 46,066	8	4.6	L4	19	9.2
1994	111	3830	270	$ 41,615	$ 42,013	$ 49,958	8	4.6	L4	19	7.5
1995	111	3892	275	$ 42,570	$ 42,049	$ 49,906	8	4.6	L4	19	7.5
1996	111	3832	275	$ 43,635	$ 42,370	$ 49,812	8	4.6	L4	20	7.4
1997	111	3900	275	$ 40,660	$ 39,397	$ 45,430	8	4.6	L4	20	7.5
1998	112	3972	275	$ 43,160	$ 42,117	$ 47,533	8	4.6	L4	20	7.7
1999	112	3970	275	$ 44,025	$ 43,300	$ 47,492	8	4.6	L4	20	7.7
2000	112	3970	275	$ 44,775	$ 44,037	$ 46,738	8	4.6	L4	21	7.7
2001	112	3970	275	$ 42,655	$ 42,164	$ 43,349	8	4.6	L4	20	7.7
2002	112	3992	275	$ 44,269	$ 44,269	$ 44,269	8	4.6	L4	21	7.7

Chevrolet Camaro – Sports Car



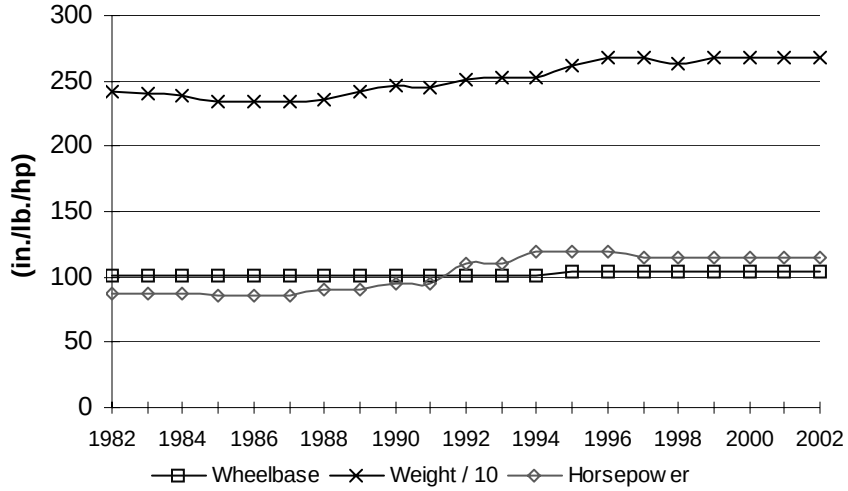


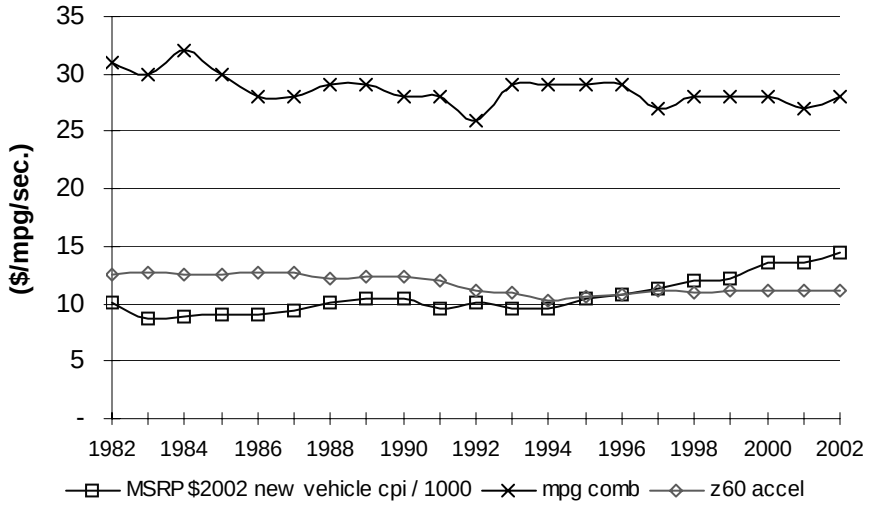


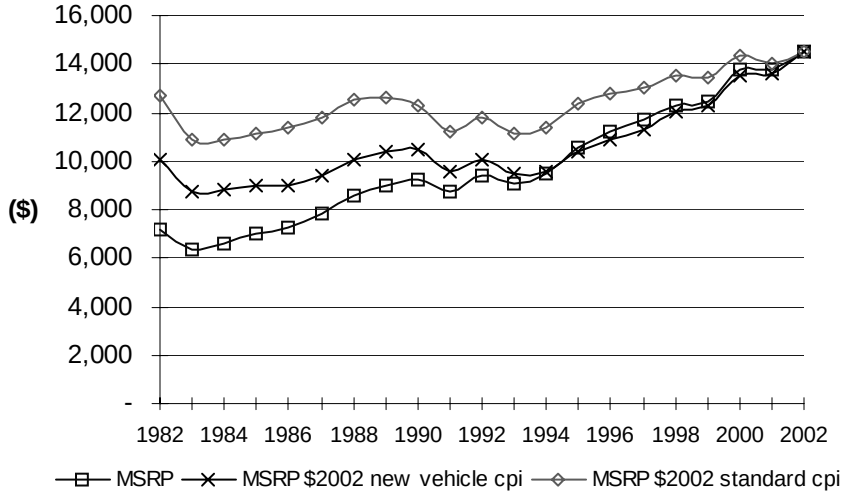
Chevrolet Camaro

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1975	108	3531	105	$ 3,553	$ 7,756	$ 10,481	6	.	.	19	15.1
1976	108	3531	105	$ 3,283	$ 6,738	$ 9,145	6	.	.	19	15.1
1977	108	3479	110	$ 4,113	$ 8,022	$ 10,767	6	.	.	19	14.4
1978	108	3403	110	$ 4,414	$ 7,995	$ 11,090	6	4.1	A	19	14.1
1979	108	3392	115	$ 5,073	$ 8,515	$ 11,635	6	4.1	A3	19	13.6
1980	108	3328	115	$ 5,499	$ 8,541	$ 11,362	6	3.8	A3	22	13.4
1981	108	3330	110	$ 6,780	$ 9,935	$ 12,817	6	3.8	A3	22	13.9
1982	101	2850	90	$ 7,630	$ 10,756	$ 13,601	4	2.5	M4	28	14.1
1983	101	2883	92	$ 8,450	$ 11,613	$ 14,469	4	2.5	A4	29	14.3
1984	101	2892	92	$ 8,409	$ 11,231	$ 13,853	4	2.5	M4	28	14.0
1985	101	2881	88	$ 8,399	$ 10,869	$ 13,396	4	2.5	M5	26	14.4
1986	101	2900	88	$ 9,349	$ 11,606	$ 14,631	4	2.5	M5	27	14.5
1987	101	3062	125	$ 10,409	$ 12,471	$ 15,747	6	2.8	M5	20	11.5
1988	101	3055	125	$ 11,409	$ 13,400	$ 16,655	6	2.8	M5	20	11.5
1989	101	3082	135	$ 11,934	$ 13,746	$ 16,714	6	2.8	M5	21	10.9
1990	101	3107	135	$ 11,434	$ 12,974	$ 15,245	6	3.1	L4	21	11.1
1991	101	3103	140	$ 12,649	$ 13,860	$ 16,279	6	3.1	M5	20	10.7
1992	101	3103	140	$ 12,565	$ 13,436	$ 15,785	6	3.1	M5	20	10.7
1993	101	3355	160	$ 13,399	$ 13,990	$ 16,420	6	3.3	L4	23	10.3
1994	101	3247	160	$ 13,989	$ 14,123	$ 16,794	6	3.3	L4	23	10.1
1995	101	3390	160	$ 14,995	$ 14,812	$ 17,579	6	3.3	L4	23	10.4
1996	101	3306	200	$ 15,495	$ 15,046	$ 17,688	6	3.8	L4	22	8.5
1997	101	3307	200	$ 16,740	$ 16,220	$ 18,704	6	3.8	M5	23	8.5
1998	101	3331	200	$ 17,150	$ 16,736	$ 18,888	6	3.8	M5	23	8.6
1999	101	3306	200	$ 17,160	$ 16,877	$ 18,511	6	3.8	M5	23	8.5
2000	101	3306	200	$ 17,490	$ 17,202	$ 18,257	6	3.8	M5	23	8.5
2001	101	3306	200	$ 17,560	$ 17,358	$ 17,846	6	3.8	L4	23	8.5
2002	101	3323	200	$ 18,655	$ 18,655	$ 18,655	6	3.8	M5	23	8.5

Chevrolet Cavalier – Compact Car



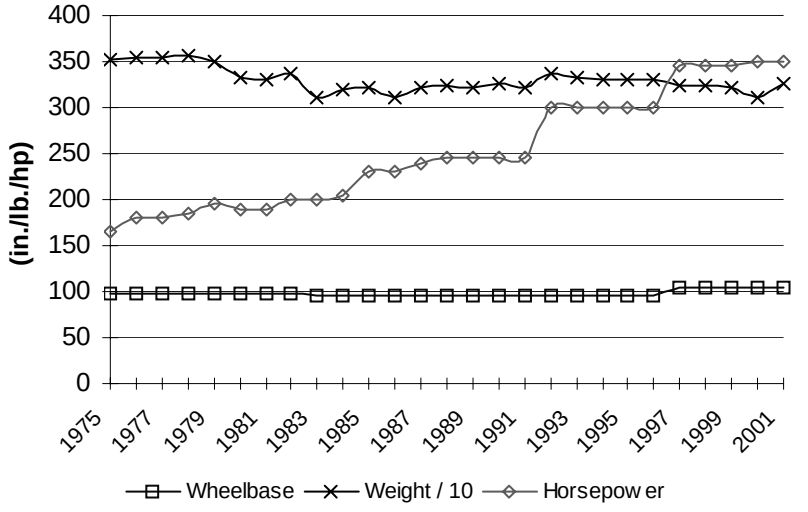


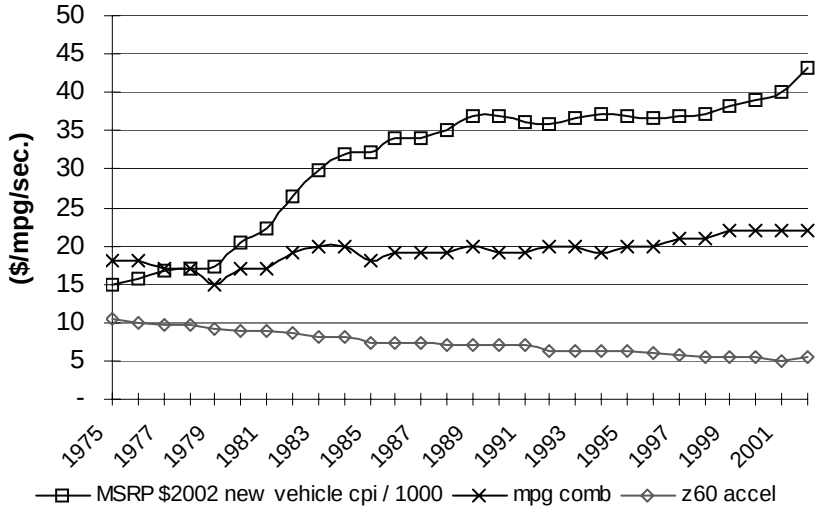


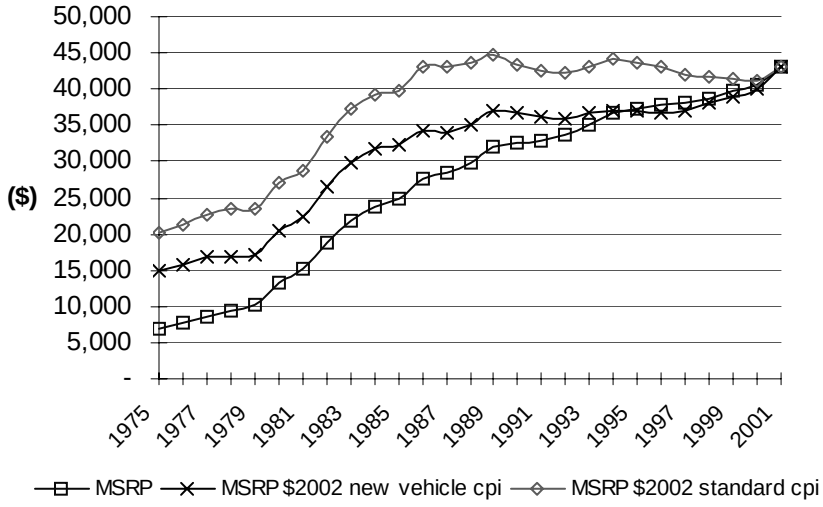
Chevrolet Cavalier

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1982	101	2413	88	$ 7,137	$ 10,061	$ 12,722	4	1.8	M4	31	12.6
1983	101	2403	88	$ 6,369	$ 8,753	$ 10,906	4	2	A3	30	12.8
1984	101	2389	88	$ 6,592	$ 8,804	$ 10,860	4	2	M4	32	12.5
1985	101	2339	85	$ 6,976	$ 9,027	$ 11,126	4	2	M4	30	12.6
1986	101	2342	85	$ 7,258	$ 9,010	$ 11,358	4	2	M4	28	12.6
1987	101	2345	85	$ 7,819	$ 9,368	$ 11,829	4	2	M4	28	12.7
1988	101	2363	90	$ 8,595	$ 10,095	$ 12,547	4	2	M5	29	12.2
1989	101	2423	90	$ 9,020	$ 10,390	$ 12,633	4	2	M5	29	12.4
1990	101	2471	95	$ 9,245	$ 10,490	$ 12,327	4	2.2	L3	28	12.3
1991	101	2444	95	$ 8,725	$ 9,561	$ 11,229	4	2.2	M5	28	12.0
1992	101	2509	110	$ 9,374	$ 10,024	$ 11,776	4	2.2	L3	26	11.1
1993	101	2520	110	$ 9,095	$ 9,496	$ 11,146	4	2.2	M5	29	11.0
1994	101	2520	120	$ 9,470	$ 9,561	$ 11,369	4	2.2	M5	29	10.2
1995	104	2617	120	$ 10,545	$ 10,416	$ 12,362	4	2.2	M5	29	10.5
1996	104	2676	120	$ 11,195	$ 10,870	$ 12,780	4	2.2	M5	29	10.7
1997	104	2676	115	$ 11,680	$ 11,317	$ 13,050	4	2.2	M5	27	11.1
1998	104	2630	115	$ 12,310	$ 12,013	$ 13,557	4	2.2	M5	28	10.9
1999	104	2676	115	$ 12,481	$ 12,275	$ 13,464	4	2.2	M5	28	11.1
2000	104	2676	115	$ 13,770	$ 13,543	$ 14,374	4	2.2	M5	28	11.1
2001	104	2676	115	$ 13,780	$ 13,621	$ 14,004	4	2.2	M5	27	11.1
2002	104	2676	115	$ 14,500	$ 14,500	$ 14,500	4	2.2	M5	28	11.1

Chevrolet Corvette – Sports/Luxury Car



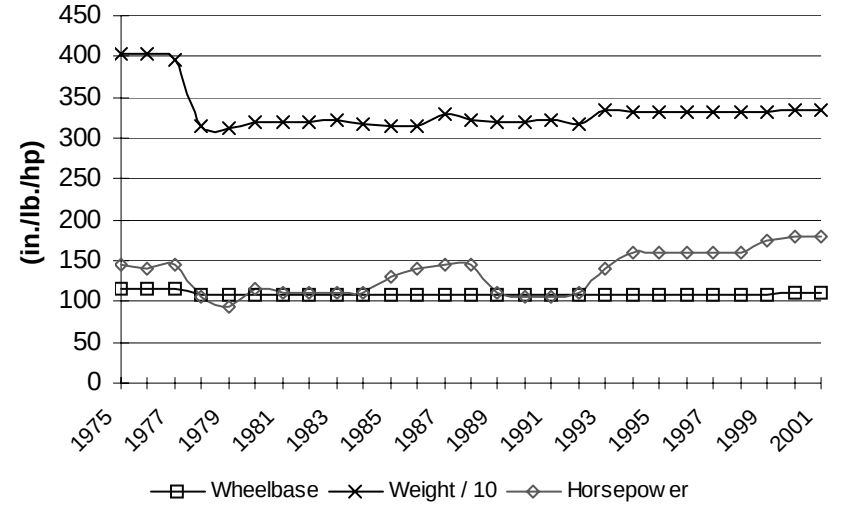


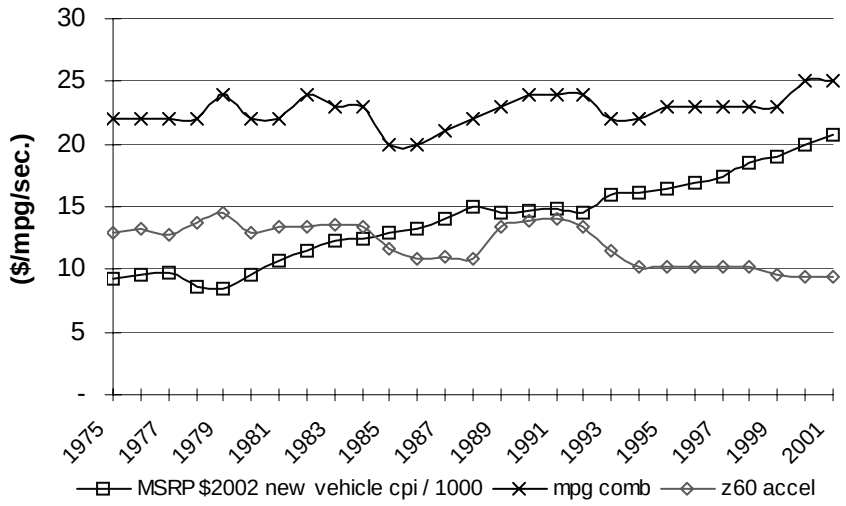


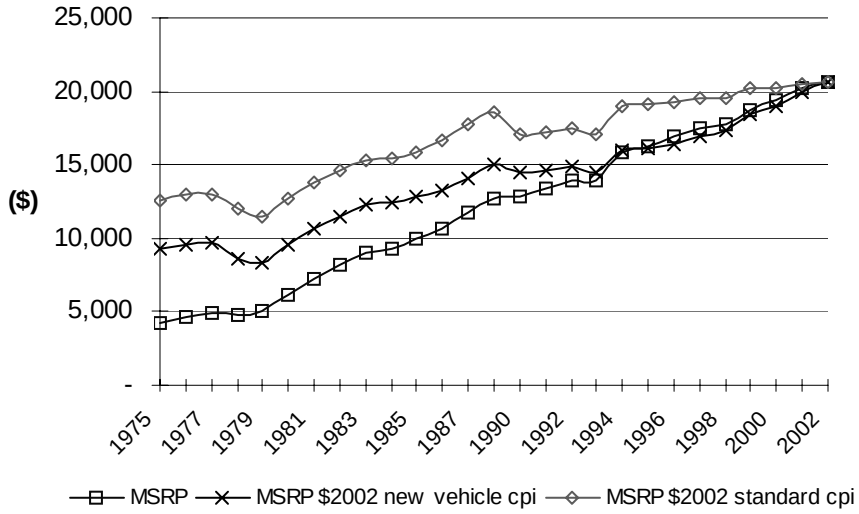
Chevrolet Corvette

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1975	98	3529	165	$ 6,810	$ 14,865	$ 20,088	8	.	.	18	10.5
1976	98	3541	180	$ 7,605	$ 15,608	$ 21,184	8	.	.	18	9.8
1977	98	3534	180	$ 8,647	$ 16,864	$ 22,636	8	.	.	17	9.8
1978	98	3572	185	$ 9,352	$ 16,940	$ 23,497	8	5.7	A	17	9.7
1979	98	3503	195	$ 10,220	$ 17,154	$ 23,440	8	5.7	M4	15	9.1
1980	98	3334	190	$ 13,140	$ 20,409	$ 27,149	8	5.7	A3	17	9.0
1981	98	3307	190	$ 15,248	$ 22,343	$ 28,824	8	5.7	A3	17	8.9
1982	98	3367	200	$ 18,750	$ 26,431	$ 33,422	8	5.7	A4	19	8.7
1983	96	3117	200	$ 21,800	$ 29,961	$ 37,329	8	5.7	A4	20	8.1
1984	96	3192	205	$ 23,835	$ 31,834	$ 39,267	8	5.7	M4	20	8.1
1985	96	3216	230	$ 24,878	$ 32,194	$ 39,678	8	5.7	L4	18	7.5
1986	96	3101	230	$ 27,502	$ 34,141	$ 43,039	8	5.7	M4	19	7.3
1987	96	3216	240	$ 28,474	$ 34,114	$ 43,077	8	5.7	L4	19	7.2
1988	96	3229	245	$ 29,955	$ 35,182	$ 43,730	8	5.7	M4	19	7.1
1989	96	3223	245	$ 32,045	$ 36,911	$ 44,881	8	5.7	L4	20	7.1
1990	96	3255	245	$ 32,479	$ 36,854	$ 43,305	8	5.7	M6	19	7.2
1991	96	3223	245	$ 32,985	$ 36,144	$ 42,452	8	5.7	L4	19	7.1
1992	96	3380	300	$ 33,635	$ 35,966	$ 42,255	8	5.7	M6	20	6.3
1993	96	3333	300	$ 35,145	$ 36,695	$ 43,070	8	5.7	M6	20	6.3
1994	96	3309	300	$ 36,735	$ 37,086	$ 44,100	8	5.7	L4	19	6.2
1995	96	3309	300	$ 37,345	$ 36,888	$ 43,781	8	5.7	M6	20	6.2
1996	96	3298	300	$ 37,790	$ 36,694	$ 43,139	8	5.7	M6	20	6.1
1998	105	3245	345	$ 38,060	$ 37,140	$ 41,916	8	5.7	M6	21	5.5
1999	105	3245	345	$ 38,777	$ 38,138	$ 41,831	8	5.7	M6	22	5.5
2000	105	3221	345	$ 39,730	$ 39,075	$ 41,472	8	5.7	M6	22	5.5
2001	105	3115	350	$ 40,475	$ 40,009	$ 41,133	8	5.7	M6	22	5.5
2002	105	3255	350	$ 43,225	$ 43,225	$ 43,225	8	5.7	M6	22	5.5

Chevrolet Monte Carlo/Lumina – Midsize Car



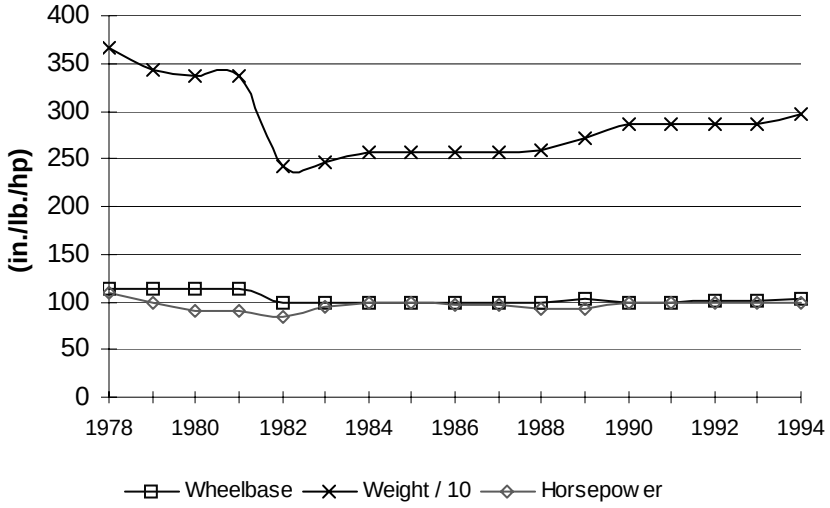


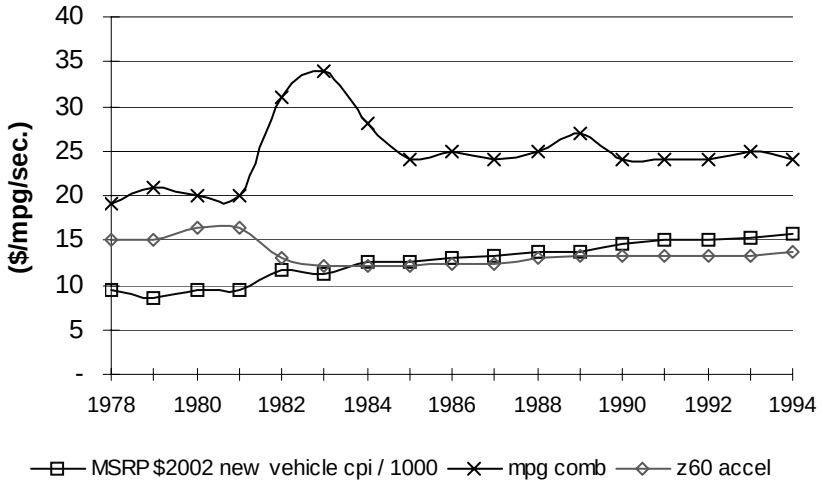


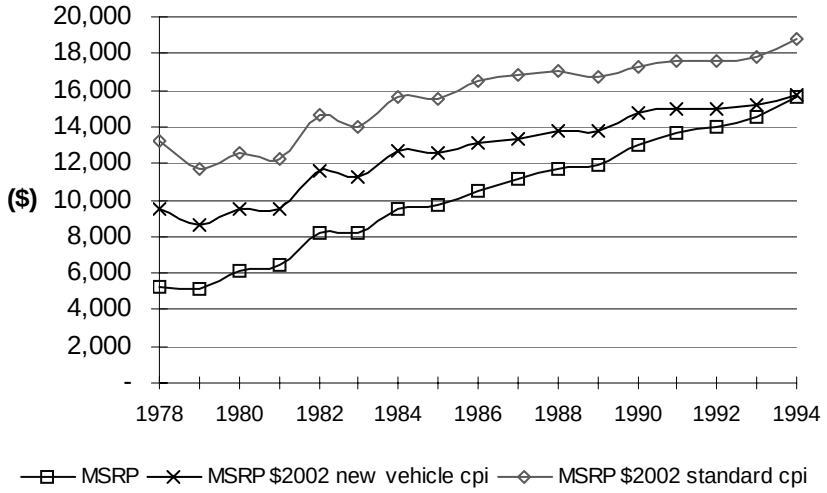
Chevrolet Monte Carlo/Lumina

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1975	108	3531	105	$ 3,553	$ 7,756	$ 10,481	6	.	.	19	15.1
1976	108	3531	105	$ 3,283	$ 6,738	$ 9,145	6	.	.	19	15.1
1977	108	3479	110	$ 4,113	$ 8,022	$ 10,767	6	.	.	19	14.4
1978	108	3403	110	$ 4,414	$ 7,995	$ 11,090	6	4.1	A	19	14.1
1979	108	3392	115	$ 5,073	$ 8,515	$ 11,635	6	4.1	A3	19	13.6
1980	108	3328	115	$ 5,499	$ 8,541	$ 11,362	6	3.8	A3	22	13.4
1981	108	3330	110	$ 6,780	$ 9,935	$ 12,817	6	3.8	A3	22	13.9
1982	101	2850	90	$ 7,630	$ 10,756	$ 13,601	4	2.5	M4	28	14.1
1983	101	2883	92	$ 8,450	$ 11,613	$ 14,469	4	2.5	A4	29	14.3
1984	101	2892	92	$ 8,409	$ 11,231	$ 13,853	4	2.5	M4	28	14.0
1985	101	2881	88	$ 8,399	$ 10,869	$ 13,396	4	2.5	M5	26	14.4
1986	101	2900	88	$ 9,349	$ 11,606	$ 14,631	4	2.5	M5	27	14.5
1987	101	3062	125	$ 10,409	$ 12,471	$ 15,747	6	2.8	M5	20	11.5
1988	101	3055	125	$ 11,409	$ 13,400	$ 16,655	6	2.8	M5	20	11.5
1989	101	3082	135	$ 11,934	$ 13,746	$ 16,714	6	2.8	M5	21	10.9
1990	101	3107	135	$ 11,434	$ 12,974	$ 15,245	6	3.1	L4	21	11.1
1991	101	3103	140	$ 12,649	$ 13,860	$ 16,279	6	3.1	M5	20	10.7
1992	101	3103	140	$ 12,565	$ 13,436	$ 15,785	6	3.1	M5	20	10.7
1993	101	3355	160	$ 13,399	$ 13,990	$ 16,420	6	3.3	L4	23	10.3
1994	101	3247	160	$ 13,989	$ 14,123	$ 16,794	6	3.3	L4	23	10.1
1995	101	3390	160	$ 14,995	$ 14,812	$ 17,579	6	3.3	L4	23	10.4
1996	101	3306	200	$ 15,495	$ 15,046	$ 17,688	6	3.8	L4	22	8.5
1997	101	3307	200	$ 16,740	$ 16,220	$ 18,704	6	3.8	M5	23	8.5
1998	101	3331	200	$ 17,150	$ 16,736	$ 18,888	6	3.8	M5	23	8.6
1999	101	3306	200	$ 17,160	$ 16,877	$ 18,511	6	3.8	M5	23	8.5
2000	101	3306	200	$ 17,490	$ 17,202	$ 18,257	6	3.8	M5	23	8.5
2001	101	3306	200	$ 17,560	$ 17,358	$ 17,846	6	3.8	L4	23	8.5
2002	101	3323	200	$ 18,655	$ 18,655	$ 18,655	6	3.8	M5	23	8.5

Chrysler LeBaron – Midsize Car



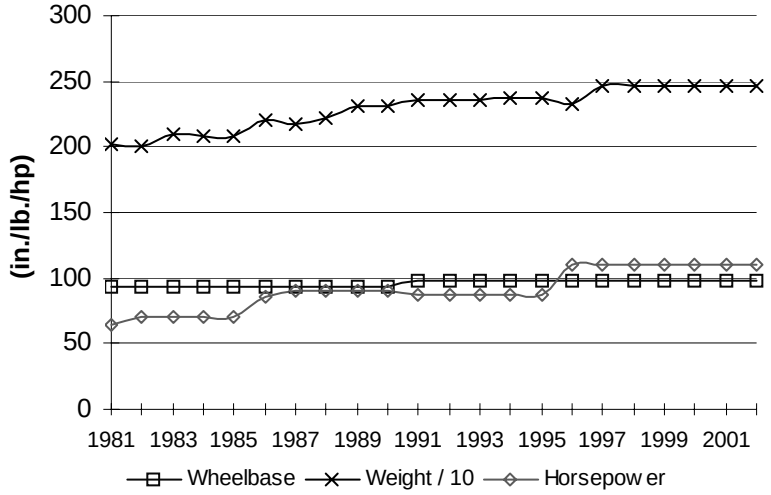


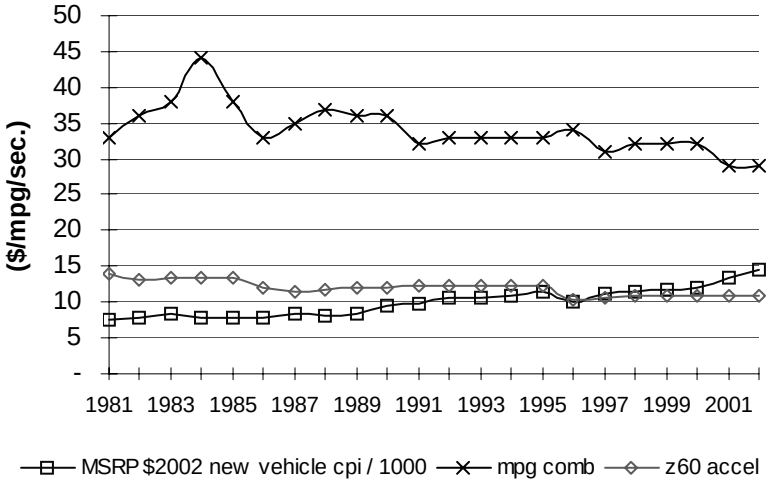


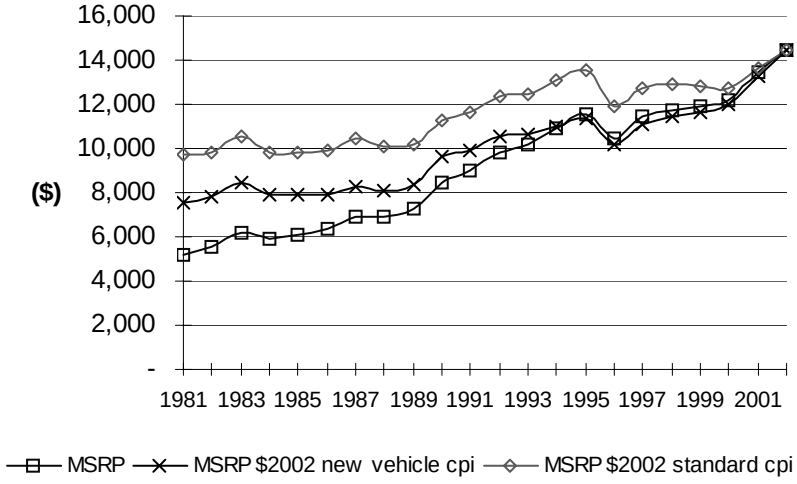
Chrysler LeBaron

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1978	113	3654	110	$ 5,270	$ 9,546	$ 13,241	6	3.7	A	19	15.0
1979	113	3429	100	$ 5,122	$ 8,597	$ 11,748	6	3.7	M4	21	15.0
1980	113	3375	90	$ 6,103	$ 9,479	$ 12,610	6	3.7	A3	20	16.5
1981	113	3375	90	$ 6,495	$ 9,517	$ 12,278	6	3.7	A3	20	16.5
1982	100	2416	84	$ 8,237	$ 11,611	$ 14,683	4	2.2	M4	31	13.1
1983	100	2464	94	$ 8,154	$ 11,207	$ 13,962	4	2.2	M5	34	12.2
1984	100	2560	99	$ 9,465	$ 12,641	$ 15,593	4	2.2	A3	28	12.2
1985	100	2559	99	$ 9,707	$ 12,561	$ 15,482	4	2.2	A3	24	12.2
1986	100	2566	97	$ 10,525	$ 13,066	$ 16,471	4	2.2	A3	25	12.5
1987	100	2566	97	$ 11,105	$ 13,305	$ 16,800	4	2.2	A3	24	12.5
1988	100	2592	93	$ 11,715	$ 13,759	$ 17,102	4	2.2	L3	25	13.0
1989	103	2714	93	$ 11,945	$ 13,759	$ 16,730	4	2.5	M5	27	13.2
1990	100	2863	100	$ 12,960	$ 14,706	$ 17,280	4	2.5	L3	24	13.3
1991	100	2853	100	$ 13,650	$ 14,957	$ 17,568	4	2.5	L3	24	13.2
1992	101	2863	100	$ 13,998	$ 14,968	$ 17,585	4	2.5	L3	24	13.3
1993	101	2863	100	$ 14,554	$ 15,196	$ 17,836	4	2.5	L3	25	13.3
1994	104	2971	100	$ 15,626	$ 15,775	$ 18,759	4	2.5	L3	24	13.7

Ford Escort – Compact Car



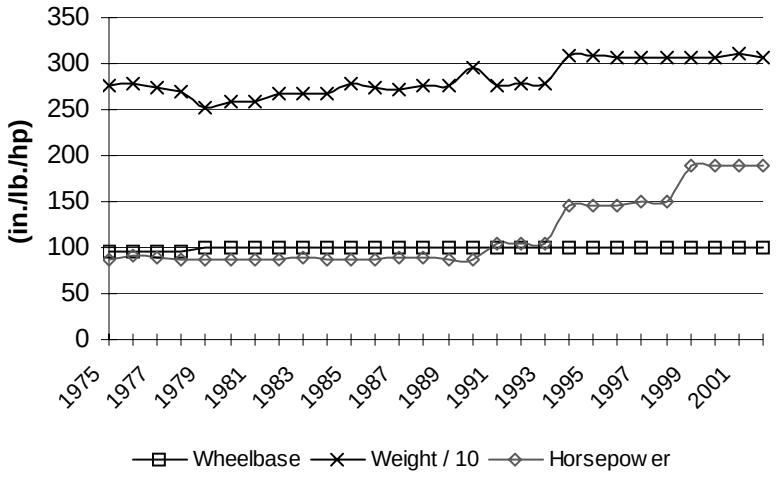


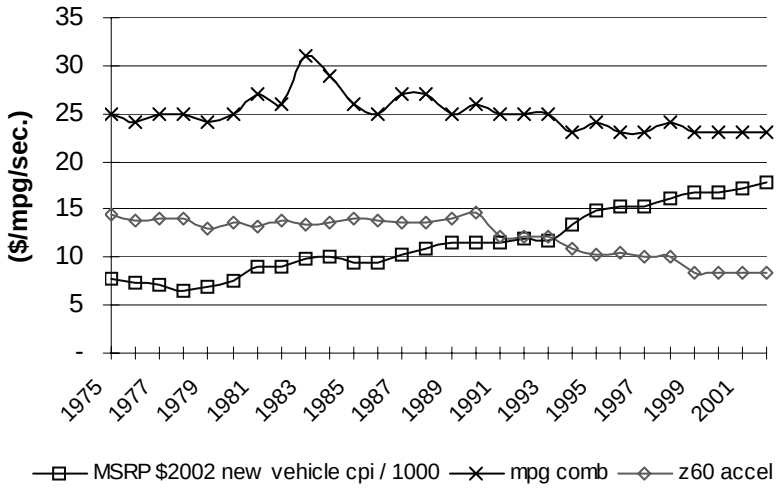


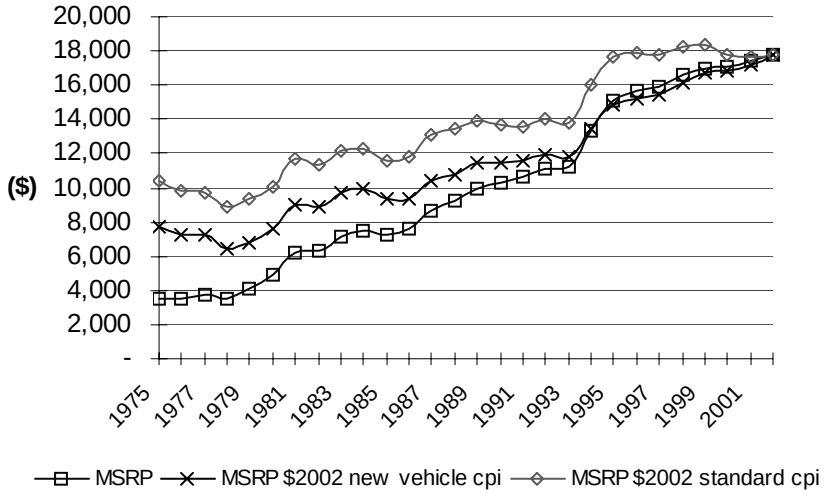
Ford Escort

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1981	94	2021	65	$ 5,158	$ 7,558	$ 9,750	4	1.6	M4	33	13.9
1982	94	2007	70	$ 5,518	$ 7,778	$ 9,836	4	1.6	M4	36	13.0
1983	94	2094	70	$ 6,154	$ 8,458	$ 10,538	4	1.6	M4	38	13.5
1984	94	2080	70	$ 5,937	$ 7,929	$ 9,781	4	1.6	M4	44	13.4
1985	94	2074	70	$ 6,135	$ 7,939	$ 9,785	4	1.6	M4	38	13.4
1986	94	2201	86	$ 6,360	$ 7,895	$ 9,953	4	1.9	M4	33	11.9
1987	94	2180	90	$ 6,895	$ 8,261	$ 10,431	4	1.9	M4	35	11.4
1988	94	2222	90	$ 6,895	$ 8,098	$ 10,066	4	1.9	M4	37	11.6
1989	94	2313	90	$ 7,299	$ 8,407	$ 10,223	4	1.9	M4	36	12.0
1990	94	2310	90	$ 8,476	$ 9,618	$ 11,301	4	1.9	M4	36	12.0
1991	98	2355	88	$ 9,029	$ 9,894	$ 11,620	4	1.9	M5	32	12.4
1992	98	2355	88	$ 9,858	$ 10,541	$ 12,384	4	1.9	M5	33	12.4
1993	98	2360	88	$ 10,172	$ 10,621	$ 12,466	4	1.9	M5	33	12.4
1994	98	2371	88	$ 10,925	$ 11,029	$ 13,115	4	1.9	M5	33	12.4
1995	98	2371	88	$ 11,530	$ 11,389	$ 13,517	4	1.9	M5	33	12.4
1996	98	2323	110	$ 10,455	$ 10,152	$ 11,935	4	1.9	M5	34	10.3
1997	98	2457	110	$ 11,430	$ 11,075	$ 12,771	4	2	M5	31	10.7
1998	98	2468	110	$ 11,745	$ 11,461	$ 12,935	4	2	M5	32	10.8
1999	98	2468	110	$ 11,870	$ 11,674	$ 12,805	4	2	M5	32	10.8
2000	98	2468	110	$ 12,200	$ 11,999	$ 12,735	4	2	L4	32	10.8
2001	98	2468	110	$ 13,435	$ 13,280	$ 13,653	4	2	L4	29	10.9
2002	98	2468	110	$ 14,450	$ 14,450	$ 14,450	4	2	L4	29	10.9

Ford Mustang – Sports Car



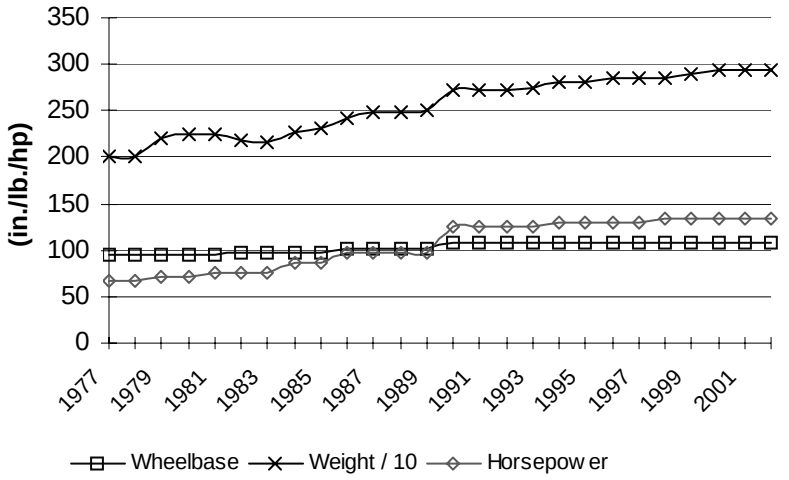


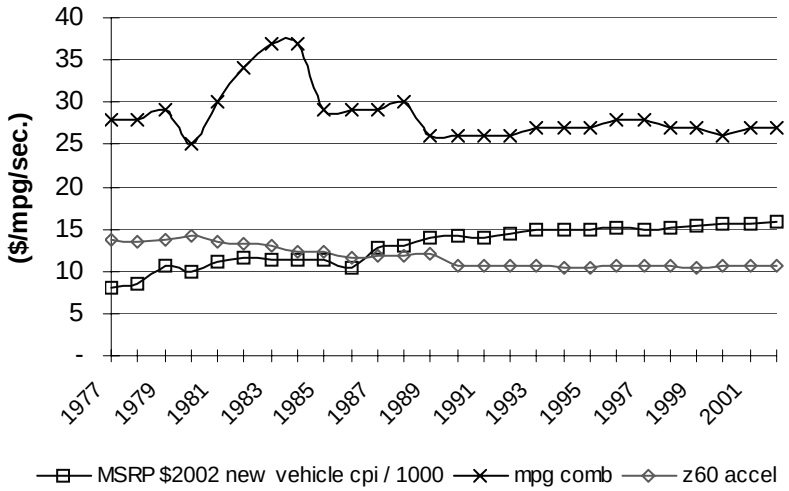


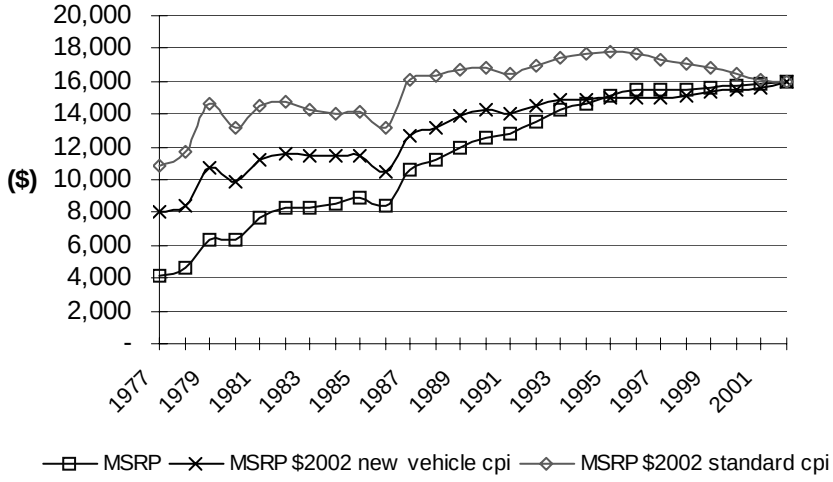
Ford Mustang

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1975	96	2759	87	$ 3,529	$ 7,703	$ 10,410	4	.	.	25	14.4
1976	96	2779	92	$ 3,525	$ 7,234	$ 9,819	4	.	.	24	13.9
1977	96	2735	89	$ 3,702	$ 7,220	$ 9,691	4	.	.	25	14.1
1978	96	2698	88	$ 3,555	$ 6,439	$ 8,932	4	2.3	A	25	14.0
1979	100	2532	88	$ 4,071	$ 6,833	$ 9,337	4	2.3	M4	24	13.1
1980	100	2588	88	$ 4,884	$ 7,586	$ 10,091	4	2.3	A3	25	13.6
1981	100	2588	88	$ 6,171	$ 9,042	$ 11,665	4	2.3	M4	27	13.3
1982	100	2683	86	$ 6,345	$ 8,944	$ 11,310	4	2.3	M4	26	13.9
1983	100	2679	90	$ 7,101	$ 9,759	$ 12,159	4	2.3	M4	31	13.4
1984	101	2664	88	$ 7,472	$ 9,980	$ 12,310	4	2.3	M4	29	13.6
1985	101	2782	88	$ 7,259	$ 9,394	$ 11,577	4	2.3	M4	26	14.1
1986	101	2733	88	$ 7,563	$ 9,389	$ 11,836	4	2.3	M4	25	13.9
1987	101	2724	90	$ 8,645	$ 10,357	$ 13,079	4	2.3	M5	27	13.6
1988	101	2751	90	$ 9,209	$ 10,816	$ 13,444	4	2.3	M5	27	13.7
1989	101	2754	88	$ 9,956	$ 11,468	$ 13,944	4	2.3	M5	25	14.0
1990	101	2960	88	$ 10,300	$ 11,520	$ 13,733	4	2.3	M5	26	14.8
1991	101	2759	105	$ 10,587	$ 11,601	$ 13,625	4	2.3	M5	25	12.2
1992	101	2775	105	$ 11,163	$ 11,937	$ 14,024	4	2.3	M5	25	12.2
1993	101	2775	105	$ 11,285	$ 11,783	$ 13,830	4	2.3	M5	25	12.2
1994	101	3077	145	$ 13,365	$ 13,493	$ 16,044	6	3.8	L4	23	11.0
1995	101	3077	145	$ 15,030	$ 14,846	$ 17,620	6	3.8	M5	24	10.3
1996	101	3065	145	$ 15,680	$ 15,225	$ 17,900	6	3.8	L4	23	10.4
1997	101	3065	150	$ 15,880	$ 15,387	$ 17,743	6	3.8	L4	23	10.1
1998	101	3065	150	$ 16,595	$ 16,194	$ 18,276	6	3.8	M5	24	10.0
1999	101	3069	190	$ 16,995	$ 16,715	$ 18,333	6	3.8	M5	23	8.4
2000	101	3069	190	$ 17,070	$ 16,789	$ 17,818	6	3.8	M5	23	8.4
2001	101	3114	190	$ 17,380	$ 17,180	$ 17,663	6	3.8	M5	23	8.5
2002	101	3066	190	$ 17,820	$ 17,820	$ 17,820	6	3.8	M5	23	8.4

Honda Accord – Compact/Midsize Car



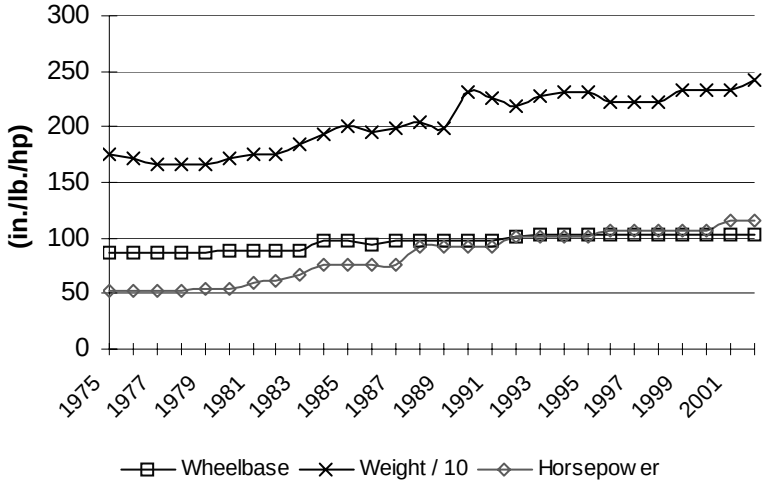


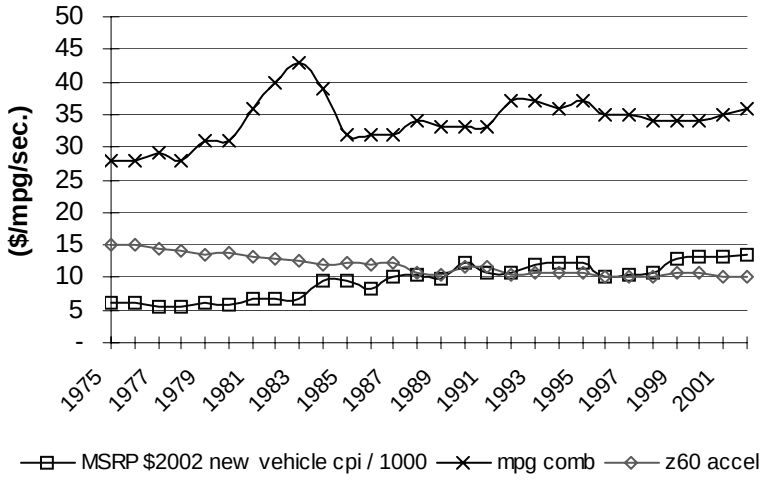


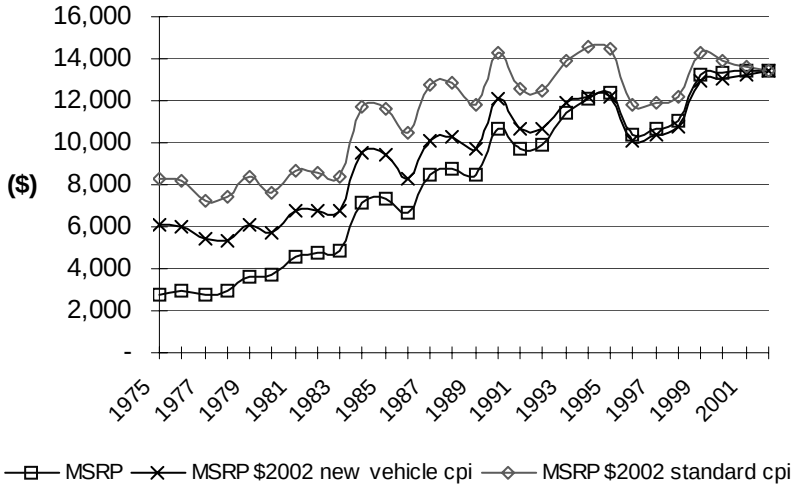
Honda Accord

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1977	94	2018	68	$ 4,145	$ 8,084	$ 10,851	4	1.6	M5	28	13.7
1978	94	2018	68	$ 4,645	$ 8,414	$ 11,671	4	1.6	M5	28	13.4
1979	94	2203	72	$ 6,365	$ 10,684	$ 14,599	4	1.8	M5	29	13.7
1980	94	2239	72	$ 6,365	$ 9,886	$ 13,151	4	1.8	A3	25	14.2
1981	94	2249	75	$ 7,645	$ 11,202	$ 14,452	4	1.8	M5	30	13.5
1982	97	2185	75	$ 8,245	$ 11,623	$ 14,697	4	1.8	M5	34	13.2
1983	97	2169	75	$ 8,345	$ 11,469	$ 14,289	4	1.8	M5	37	13.1
1984	97	2271	86	$ 8,549	$ 11,418	$ 14,084	4	1.8	M5	37	12.2
1985	97	2304	86	$ 8,845	$ 11,446	$ 14,107	4	1.8	M5	29	12.4
1986	102	2416	98	$ 8,429	$ 10,464	$ 13,191	4	2	M5	29	11.6
1987	102	2491	98	$ 10,625	$ 12,730	$ 16,074	4	2	M5	29	11.9
1988	102	2482	98	$ 11,175	$ 13,125	$ 16,314	4	2	M5	30	11.8
1989	102	2500	98	$ 11,910	$ 13,862	$ 16,681	4	2	L4	26	12.1
1990	107	2733	125	$ 12,590	$ 14,286	$ 16,787	4	2.2	M5	26	10.6
1991	107	2733	125	$ 12,805	$ 14,031	$ 16,480	4	2.2	M5	26	10.6
1992	107	2733	125	$ 13,515	$ 14,452	$ 16,979	4	2.2	M5	26	10.6
1993	107	2734	125	$ 14,280	$ 14,910	$ 17,500	4	2.2	M5	27	10.6
1994	107	2800	130	$ 14,680	$ 14,820	$ 17,623	4	2.2	M5	27	10.4
1995	107	2800	130	$ 15,180	$ 14,994	$ 17,796	4	2.2	M5	27	10.4
1996	107	2855	130	$ 15,480	$ 15,031	$ 17,671	4	2.2	M5	28	10.6
1997	107	2855	130	$ 15,495	$ 15,014	$ 17,313	4	2.2	M5	28	10.6
1998	107	2855	135	$ 15,495	$ 15,121	$ 17,065	4	2.3	M5	27	10.6
1999	107	2888	135	$ 15,615	$ 15,358	$ 16,845	4	2.3	M5	27	10.4
2000	107	2932	135	$ 15,785	$ 15,525	$ 16,477	4	2.3	M5	26	10.6
2001	107	2943	135	$ 15,840	$ 15,658	$ 16,098	4	2.3	M5	27	10.5
2002	107	2943	135	$ 15,940	$ 15,940	$ 15,940	4	2.3	M5	27	10.5

Honda Civic – Mini/Sub-Compact



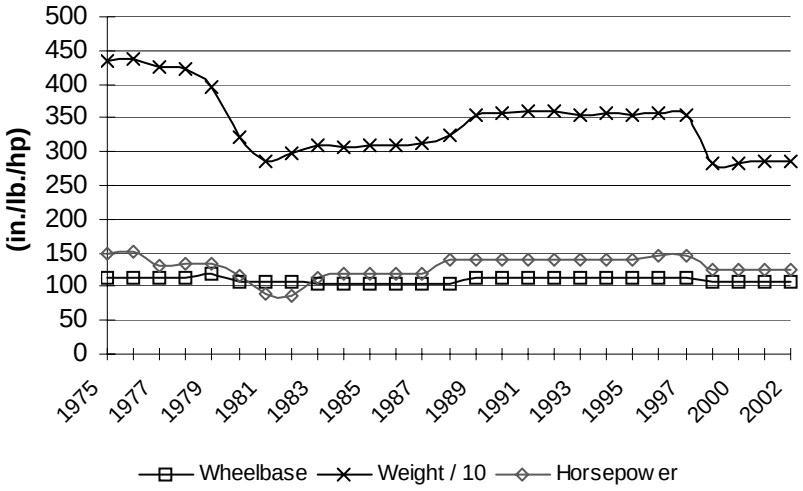


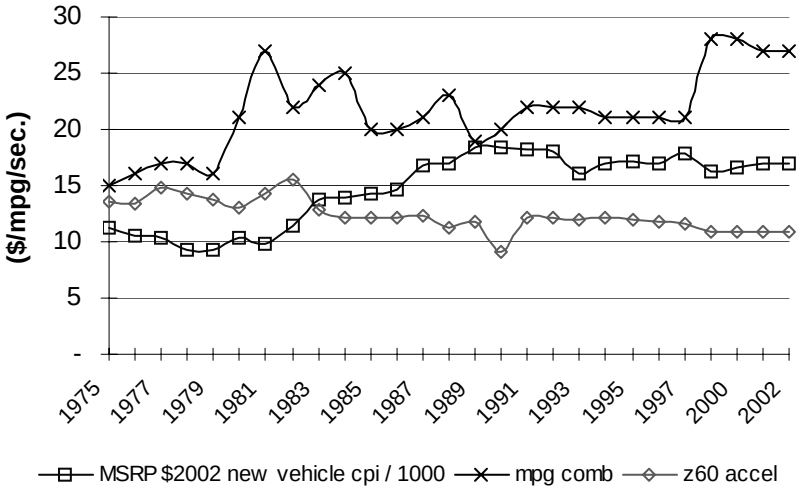


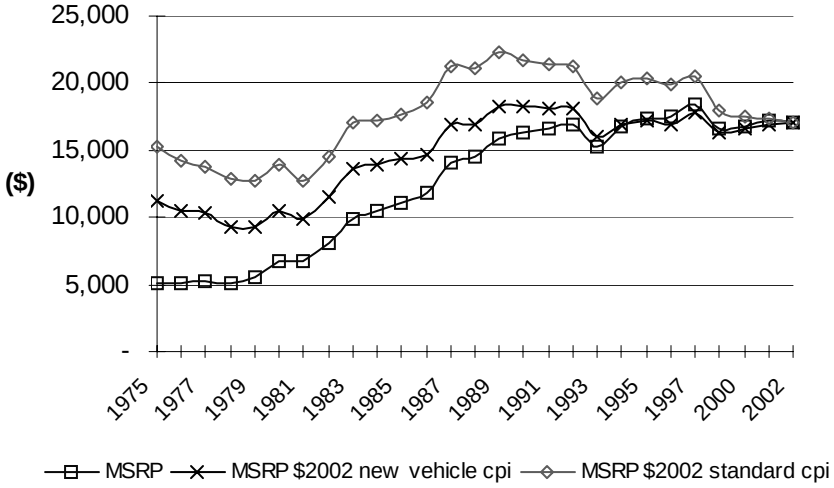
Honda Civic

Year	Wheel Base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1975	87	1748	53	$ 2,798	$ 6,108	$ 8,254	4	.	.	28	14.9
1976	87	1720	52	$ 2,939	$ 6,032	$ 8,187	4	.	.	28	14.9
1977	87	1665	52	$ 2,779	$ 5,420	$ 7,275	4	.	.	29	14.5
1978	87	1665	52	$ 2,969	$ 5,378	$ 7,460	4	1.2	M4	28	14.2
1979	87	1663	55	$ 3,649	$ 6,125	$ 8,369	4	1.2	M4	31	13.6
1980	89	1722	55	$ 3,699	$ 5,745	$ 7,643	4	1.3	M4	31	14.0
1981	89	1750	60	$ 4,599	$ 6,739	$ 8,694	4	1.3	M4	36	13.2
1982	89	1761	62	$ 4,799	$ 6,765	$ 8,554	4	1.3	M4	40	12.9
1983	89	1835	67	$ 4,899	$ 6,733	$ 8,389	4	1.3	M4	43	12.6
1984	97	1940	76	$ 7,099	$ 9,481	$ 11,695	4	1.5	M5	39	11.9
1985	97	2010	76	$ 7,295	$ 9,440	$ 11,635	4	1.5	M5	32	12.2
1986	94	1958	76	$ 6,699	$ 8,316	$ 10,484	4	1.5	M5	32	12.0
1987	97	1992	76	$ 8,455	$ 10,130	$ 12,791	4	1.5	M5	32	12.2
1988	98	2039	92	$ 8,795	$ 10,330	$ 12,839	4	1.5	M5	34	10.7
1989	98	1993	92	$ 8,445	$ 9,727	$ 11,828	4	1.5	M5	33	10.5
1990	98	2322	92	$ 10,695	$ 12,136	$ 14,260	4	1.5	M5	33	11.8
1991	98	2255	92	$ 9,750	$ 10,684	$ 12,548	4	1.5	M5	33	11.5
1992	101	2178	102	$ 9,940	$ 10,629	$ 12,487	4	1.5	M5	37	10.4
1993	103	2275	102	$ 11,385	$ 11,887	$ 13,952	4	1.5	M5	37	10.7
1994	103	2313	102	$ 12,100	$ 12,216	$ 14,526	4	1.5	M5	36	10.9
1995	103	2313	102	$ 12,360	$ 12,209	$ 14,490	4	1.5	M5	37	10.9
1996	103	2222	106	$ 10,360	$ 10,060	$ 11,826	4	1.6	M5	35	10.2
1997	103	2222	106	$ 10,650	$ 10,380	$ 11,899	4	1.6	M5	35	10.2
1998	103	2222	106	$ 11,045	$ 10,778	$ 12,164	4	1.6	M5	34	10.2
1999	103	2339	106	$ 13,200	$ 12,983	$ 14,239	4	1.6	M5	34	10.6
2000	103	2339	106	$ 13,300	$ 13,081	$ 13,883	4	1.6	M5	34	10.6
2001	103	2339	115	$ 13,400	$ 13,246	$ 13,618	4	1.7	M5	35	10.0
2002	103	2421	115	$ 13,450	$ 13,450	$ 13,450	4	1.7	M5	36	10.3

Mercury Cougar – Midsize/Compact Car



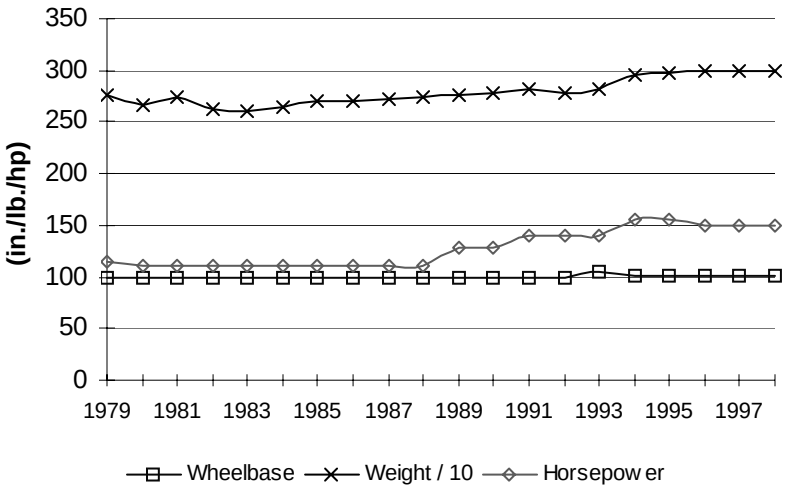


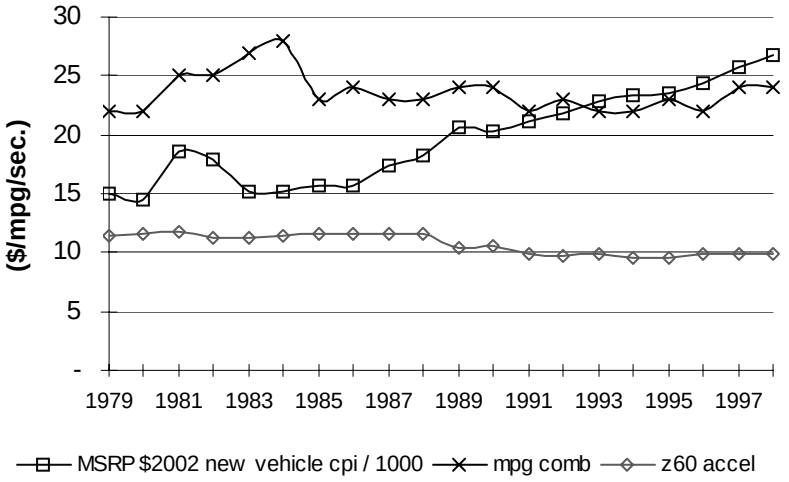


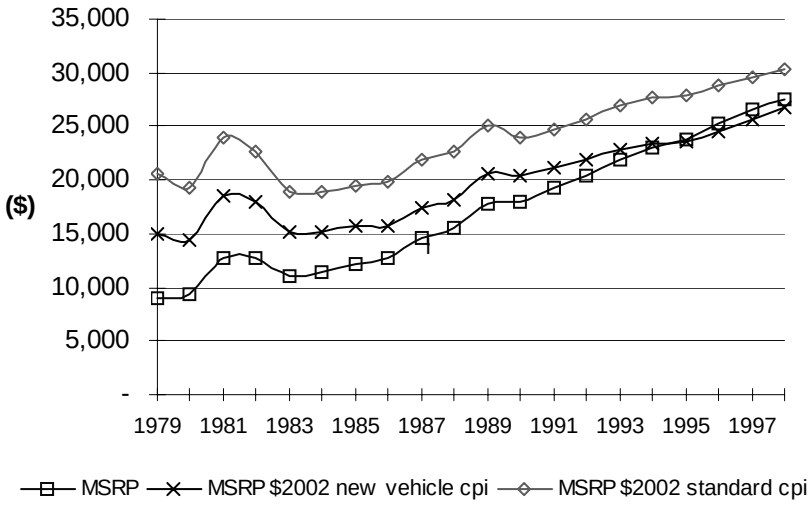
Mercury Cougar

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1975	114	4351	148	$ 5,153	$ 11,248	$ 15,201	8	.	.	15	13.6
1976	114	4376	152	$ 5,125	$ 10,518	$ 14,276	8	.	.	16	13.3
1977	114	4252	130	$ 5,274	$ 10,286	$ 13,806	8	.	.	17	14.8
1978	114	4231	134	$ 5,126	$ 9,285	$ 12,879	8	5	A	17	14.4
1979	118	3968	133	$ 5,524	$ 9,272	$ 12,670	8	5	A3	16	13.7
1980	108	3228	115	$ 6,719	$ 10,436	$ 13,882	8	4.2	A3	21	13.1
1981	106	2849	88	$ 6,694	$ 9,809	$ 12,654	4	2.3	M4	27	14.3
1982	106	2981	86	$ 8,158	$ 11,500	$ 14,542	6	3.8	A3	22	15.5
1983	104	3099	112	$ 9,953	$ 13,679	$ 17,043	6	3.8	A3	24	12.9
1984	104	3065	120	$ 10,410	$ 13,904	$ 17,150	6	3.8	A4	25	12.1
1985	104	3084	120	$ 11,082	$ 14,341	$ 17,675	6	3.8	L3	20	12.2
1986	104	3085	120	$ 11,853	$ 14,714	$ 18,549	6	3.8	L3	20	12.2
1987	104	3133	120	$ 14,062	$ 16,847	$ 21,274	6	3.8	L4	21	12.3
1988	104	3237	140	$ 14,458	$ 16,981	$ 21,107	6	3.8	L4	23	11.2
1989	113	3553	140	$ 15,905	$ 18,320	$ 22,276	6	3.8	M5	19	11.9
1990	113	3565	140	$ 16,255	$ 18,316	$ 21,673	6	3.8	M5	20	9.1
1991	113	3587	140	$ 16,579	$ 18,167	$ 21,337	6	3.8	L4	22	12.1
1992	113	3587	140	$ 16,880	$ 18,050	$ 21,206	6	3.8	L4	22	12.1
1993	113	3548	140	$ 15,340	$ 16,017	$ 18,799	6	3.8	L4	22	12.0
1994	113	3564	140	$ 16,755	$ 16,915	$ 20,114	6	3.8	L4	21	12.1
1995	113	3533	140	$ 17,370	$ 17,158	$ 20,363	6	3.8	L4	21	12.0
1996	113	3559	145	$ 17,490	$ 16,983	$ 19,966	6	3.8	L4	21	11.7
1997	113	3536	145	$ 18,340	$ 17,771	$ 20,492	6	3.8	L4	21	11.7
1999	107	2829	125	$ 16,595	$ 16,322	$ 17,902	4	2	M5	28	10.9
2000	107	2829	125	$ 16,820	$ 16,543	$ 17,557	4	2	M5	28	10.9
2001	106	2861	125	$ 17,150	$ 16,952	$ 17,429	4	2	M5	27	10.9
2002	106	2861	125	$ 16,995	$ 16,995	$ 16,995	4	2	M5	27	10.9

Saab 900 – Compact/Midsize Car



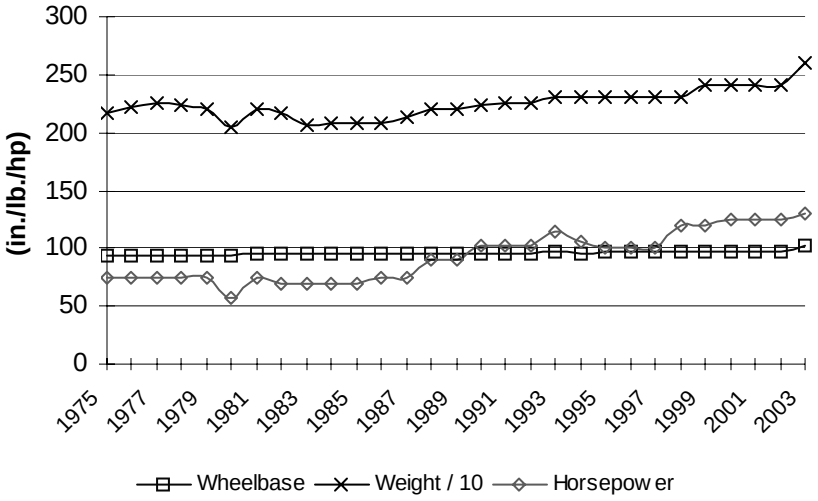


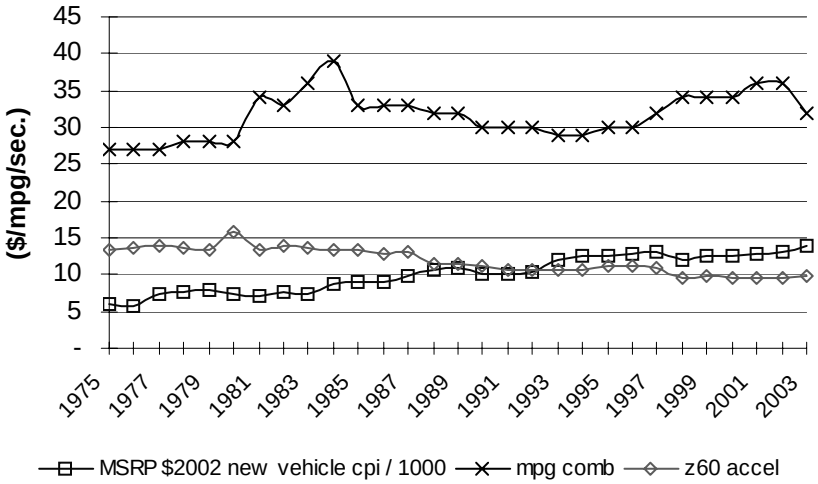


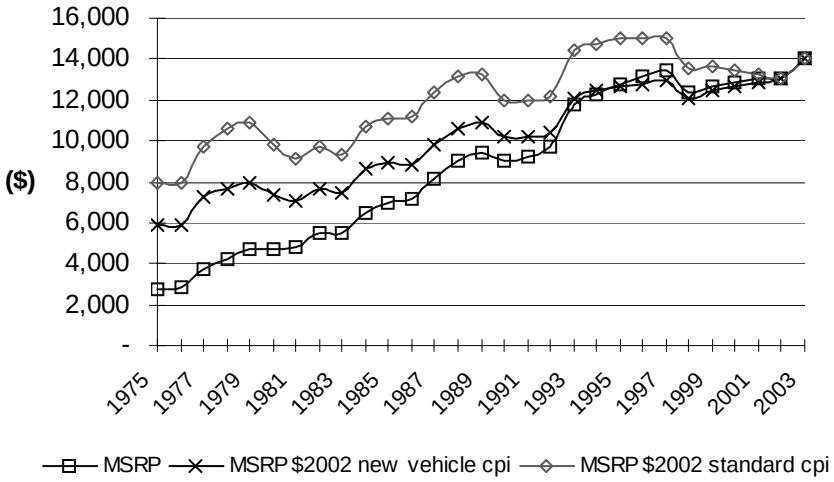
Saab 900

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1979	99	2760	115	$ 8,948	$ 15,019	$ 20,523	4	2	M4	22	11.4
1980	99	2660	110	$ 9,295	$ 14,437	$ 19,205	4	2	A3	22	11.6
1981	99	2740	110	$ 12,700	$ 18,609	$ 24,008	4	2	M5	25	11.7
1982	99	2630	110	$ 12,700	$ 17,903	$ 22,638	4	2	M5	25	11.3
1983	99	2600	110	$ 11,050	$ 15,187	$ 18,921	4	2	M5	27	11.2
1984	99	2640	110	$ 11,420	$ 15,253	$ 18,814	4	2	M5	28	11.4
1985	99	2695	110	$ 12,170	$ 15,749	$ 19,410	4	2	M5	23	11.5
1986	99	2706	110	$ 12,685	$ 15,747	$ 19,851	4	2	M5	24	11.6
1987	99	2724	110	$ 14,515	$ 17,390	$ 21,959	4	2	M5	23	11.6
1988	99	2735	110	$ 15,471	$ 18,171	$ 22,585	4	2	M5	23	11.7
1989	99	2763	128	$ 17,874	$ 20,588	$ 25,034	4	2	M5	24	10.5
1990	99	2787	128	$ 17,898	$ 20,309	$ 23,864	4	2	M5	24	10.5
1991	99	2818	140	$ 19,232	$ 21,074	$ 24,752	4	2.1	M5	22	9.9
1992	99	2776	140	$ 20,435	$ 21,851	$ 25,672	4	2.1	M5	23	9.8
1993	105	2810	140	$ 21,945	$ 22,913	$ 26,893	4	2.1	M5	22	9.9
1994	102	2950	155	$ 23,110	$ 23,331	$ 27,743	4	2.3	M5	22	9.5
1995	102	2980	155	$ 23,845	$ 23,553	$ 27,954	4	2.3	M5	23	9.6
1996	102	2990	150	$ 25,190	$ 24,460	$ 28,756	4	2.3	L4	22	9.9
1997	102	2990	150	$ 26,520	$ 25,697	$ 29,631	4	2.3	M5	24	9.8
1998	102	2990	150	$ 27,505	$ 26,840	$ 30,292	4	2	M5	24	9.8

Toyota Corolla – (Sub)Compact Car



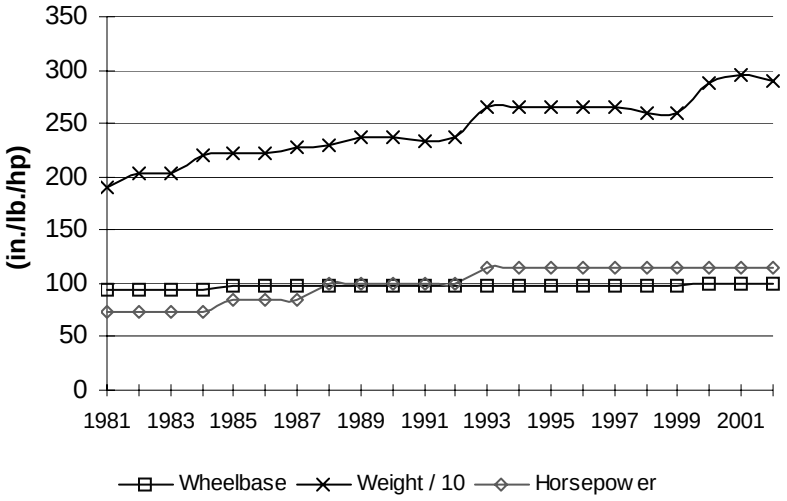


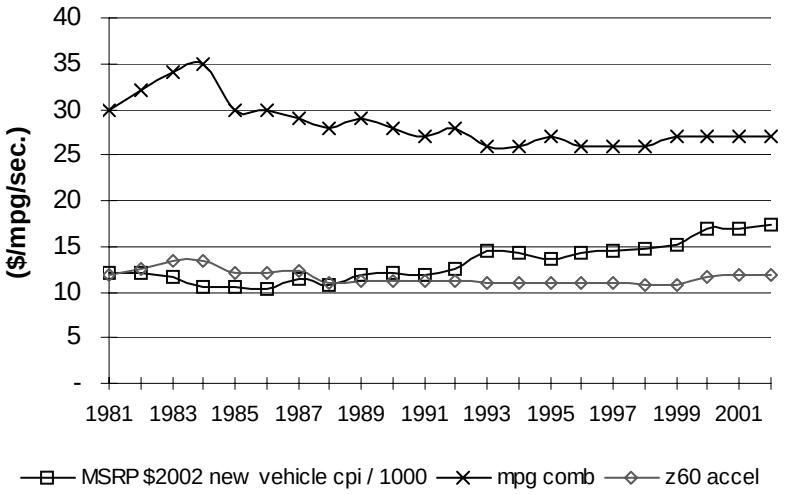


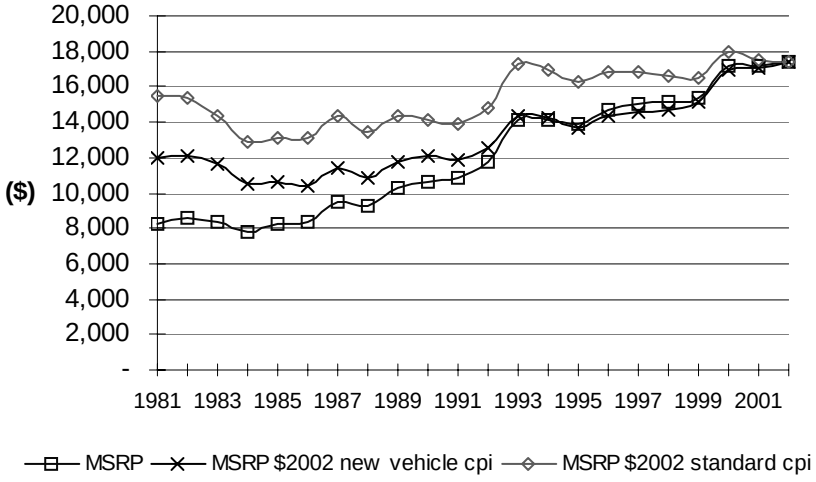
Toyota Corolla

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1975	93	2174	75	$ 2,711	$ 5,918	$ 7,997	4	.	.	27	13.4
1976	93	2227	75	$ 2,849	$ 5,847	$ 7,936	4	.	.	27	13.7
1977	93	2250	75	$ 3,708	$ 7,232	$ 9,707	4	1.6	A	27	13.8
1978	93	2240	75	$ 4,213	$ 7,631	$ 10,585	4	1.6	A	28	13.7
1979	93	2200	75	$ 4,758	$ 7,986	$ 10,913	4	1.6	M4	28	13.3
1980	93	2046	58	$ 4,758	$ 7,390	$ 9,831	4	1.8	A3	28	15.7
1981	95	2210	75	$ 4,828	$ 7,075	$ 9,127	4	1.8	M4	34	13.3
1982	95	2176	70	$ 5,448	$ 7,680	$ 9,711	4	1.8	M4	33	13.9
1983	95	2066	70	$ 5,448	$ 7,488	$ 9,329	4	1.6	A4	36	13.6
1984	96	2081	70	$ 6,498	$ 8,679	$ 10,705	4	1.6	M5	39	13.4
1985	96	2081	70	$ 6,938	$ 8,978	$ 11,065	4	1.6	M5	33	13.4
1986	96	2081	74	$ 7,148	$ 8,874	$ 11,186	4	1.6	M5	33	12.8
1987	96	2134	74	$ 8,178	$ 9,798	$ 12,372	4	1.6	M5	33	13.1
1988	96	2207	90	$ 8,998	$ 10,568	$ 13,136	4	1.6	M5	32	11.5
1989	96	2207	90	$ 9,453	$ 10,888	$ 13,239	4	1.6	M5	32	11.5
1990	96	2240	102	$ 9,013	$ 10,227	$ 12,017	4	1.6	M5	30	11.1
1991	96	2253	102	$ 9,273	$ 10,161	$ 11,934	4	1.6	M5	30	10.7
1992	96	2253	102	$ 9,713	$ 10,386	$ 12,202	4	1.6	M5	30	10.7
1993	97	2300	115	$ 11,803	$ 12,115	$ 14,464	4	1.8	L4	29	10.8
1994	96	2315	105	$ 12,303	$ 12,421	$ 14,770	4	1.6	M5	29	10.6
1995	97	2315	100	$ 12,775	$ 12,619	$ 14,977	4	1.8	L4	30	11.2
1996	97	2315	100	$ 13,148	$ 12,767	$ 15,009	4	1.8	L4	30	11.2
1997	97	2315	100	$ 13,418	$ 13,001	$ 14,992	4	1.6	M5	32	11.0
1998	97	2315	120	$ 12,328	$ 12,030	$ 13,577	4	1.8	M5	34	9.6
1999	97	2414	120	$ 12,638	$ 12,430	$ 13,633	4	1.8	M5	34	9.9
2000	97	2414	125	$ 12,873	$ 12,661	$ 13,437	4	1.8	M5	34	9.6
2001	97	2410	125	$ 13,048	$ 12,898	$ 13,260	4	1.8	M5	36	9.6
2002	97	2410	125	$ 13,053	$ 13,053	$ 13,053	4	1.8	M5	36	9.6

Volkswagen Jetta – (Sub)Compact Car



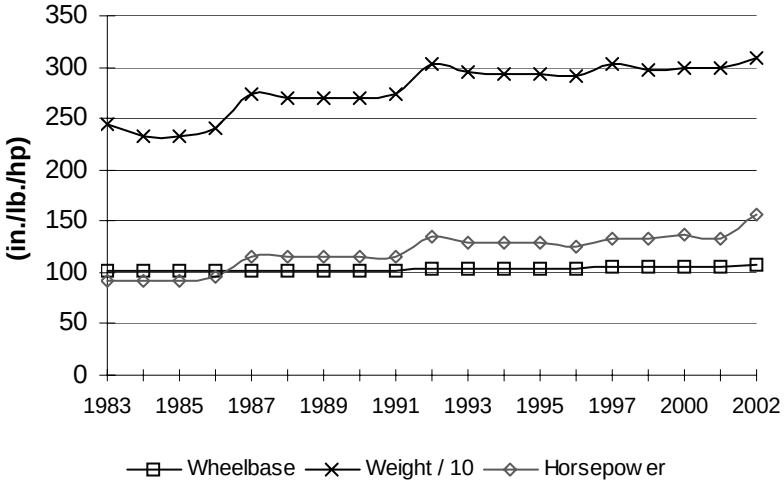


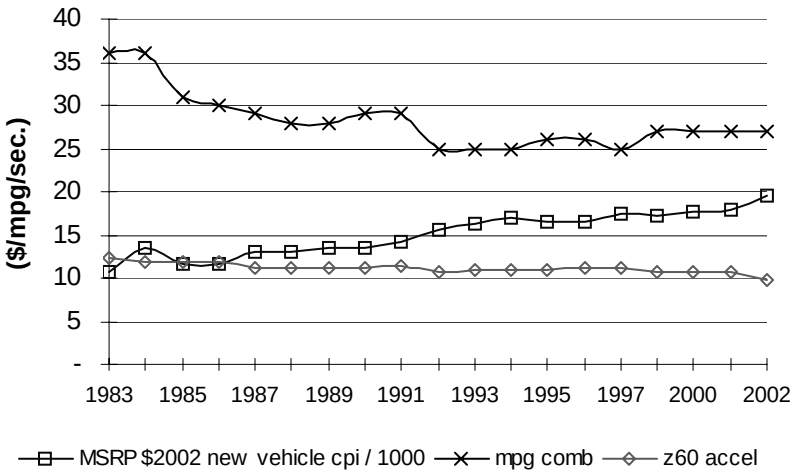


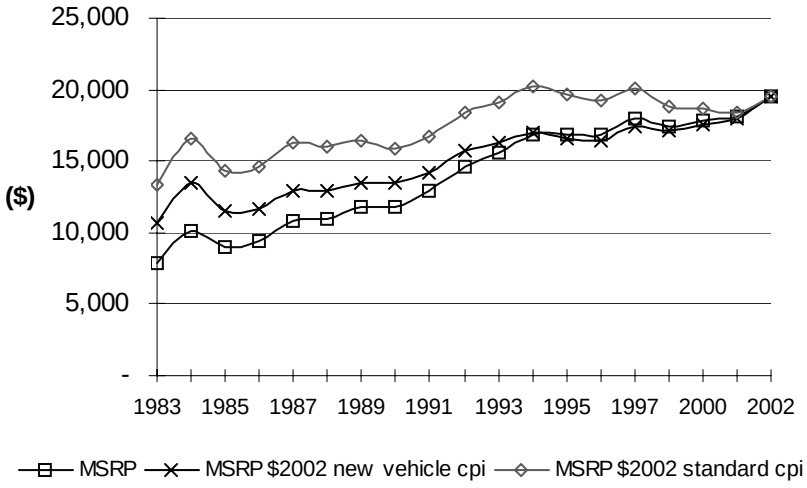
Volkswagen Jetta

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1981	95	1892	74	$ 8,195	$ 12,008	$ 15,491	4	1.7	M5	30	11.9
1982	95	2026	74	$ 8,595	$ 12,116	$ 15,321	4	1.7	M5	32	12.6
1983	95	2026	74	$ 8,350	$ 11,645	$ 14,298	4	1.6	M5	34	13.4
1984	95	2204	74	$ 7,850	$ 10,484	$ 12,932	4	1.7	M5	35	13.4
1985	97	2212	85	$ 8,195	$ 10,605	$ 13,070	4	1.8	M5	30	12.1
1986	97	2212	85	$ 8,370	$ 10,391	$ 13,099	4	1.8	M5	30	12.1
1987	97	2275	85	$ 9,510	$ 11,394	$ 14,387	4	1.8	M5	29	12.4
1988	97	2305	100	$ 9,210	$ 10,817	$ 13,445	4	1.8	M5	28	11.0
1989	97	2367	100	$ 10,230	$ 11,783	$ 14,328	4	1.8	M5	29	11.2
1990	97	2367	100	$ 10,615	$ 12,045	$ 14,153	4	1.8	M5	28	11.2
1991	97	2330	100	$ 10,815	$ 11,851	$ 13,919	4	1.8	M5	27	11.1
1992	97	2369	100	$ 11,740	$ 12,554	$ 14,749	4	1.8	M5	28	11.2
1993	97	2647	115	$ 14,140	$ 14,400	$ 17,328	4	2	M5	26	11.0
1994	97	2647	115	$ 14,140	$ 14,275	$ 16,975	4	2	M5	26	11.0
1995	97	2647	115	$ 13,865	$ 13,695	$ 16,254	4	2	M5	27	11.0
1996	97	2657	115	$ 14,725	$ 14,298	$ 16,809	4	2	M5	26	11.0
1997	97	2657	115	$ 15,070	$ 14,602	$ 16,838	4	2	M5	26	11.0
1998	97	2590	115	$ 15,095	$ 14,730	$ 16,624	4	2	M5	26	10.8
1999	97	2590	115	$ 15,345	$ 15,092	$ 16,553	4	2	M5	27	10.8
2000	99	2884	115	$ 17,225	$ 16,941	$ 17,980	4	2	M5	27	11.8
2001	99	2946	115	$ 17,225	$ 17,027	$ 17,505	4	2	M5	27	11.9
2002	99	2893	115	$ 17,400	$ 17,400	$ 17,400	4	1.8	M5	27	11.8

Toyota Camry – Compact/Midsize Car



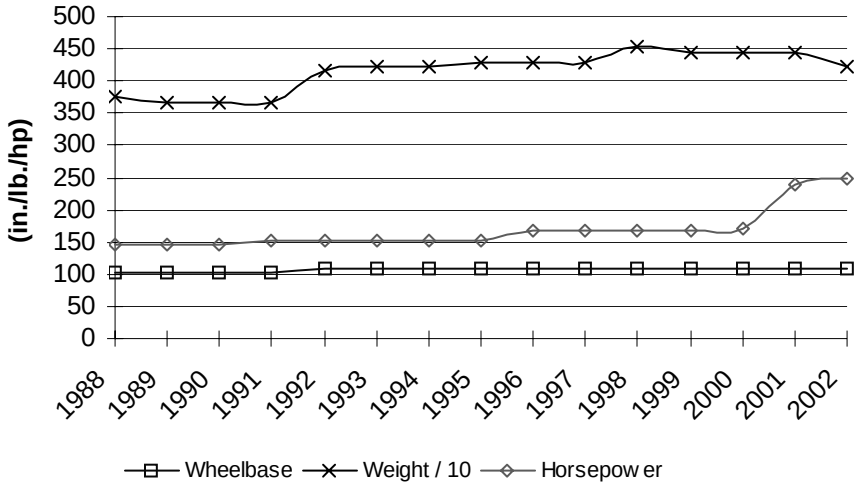


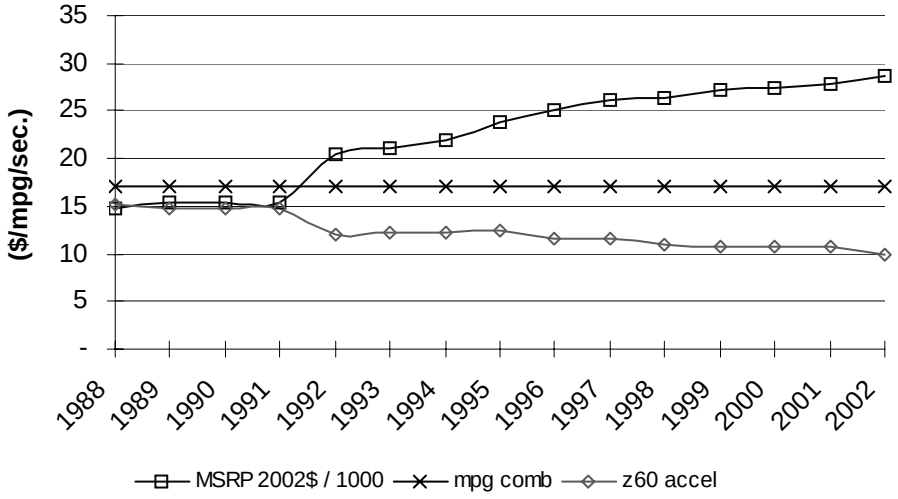


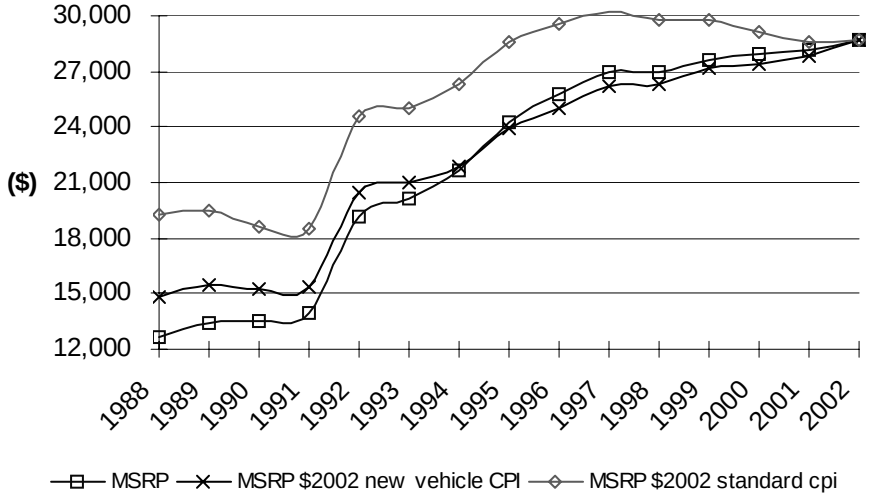
Toyota Camry

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1983	102	2445	92	$ 7,798	$ 10,717	$ 13,353	4	2	M5	36	12.3
1984	102	2326	92	$ 10,098	$ 13,487	$ 16,636	4	2	M5	36	11.8
1985	102	2326	92	$ 8,948	$ 11,579	$ 14,271	4	2	M5	31	11.8
1986	102	2403	95	$ 9,378	$ 11,642	$ 14,676	4	2	M5	30	11.8
1987	102	2734	115	$ 10,798	$ 12,937	$ 16,336	4	2	M5	29	11.3
1988	102	2690	115	$ 10,998	$ 12,917	$ 16,055	4	2	M5	28	11.1
1989	102	2690	115	$ 11,743	$ 13,526	$ 16,447	4	2	M5	28	11.1
1990	102	2690	115	$ 11,853	$ 13,450	$ 15,804	4	2	M5	29	11.1
1991	102	2743	115	$ 12,963	$ 14,204	$ 16,683	4	2	M5	29	11.3
1992	103	3030	135	$ 14,663	$ 15,679	$ 18,421	4	2.2	M5	25	10.8
1993	103	2943	130	$ 15,633	$ 16,323	$ 19,158	4	2.2	M5	25	10.9
1994	103	2932	130	$ 16,823	$ 16,984	$ 20,196	4	2.2	M5	25	10.8
1995	103	2932	130	$ 16,815	$ 16,609	$ 19,713	4	2.2	M5	26	10.8
1996	103	2910	125	$ 16,888	$ 16,398	$ 19,279	4	2.2	M5	26	11.1
1997	105	3035	133	$ 18,028	$ 17,468	$ 20,143	4	2.2	L4	25	11.1
1999	105	2976	133	$ 17,458	$ 17,170	$ 18,833	4	2.2	M5	27	10.8
2000	105	2998	136	$ 17,873	$ 17,579	$ 18,657	4	2.2	M5	27	10.6
2001	105	2998	133	$ 18,155	$ 17,946	$ 18,450	4	2.2	M5	27	10.8
2002	107	3086	157	$ 19,455	$ 19,455	$ 19,455	4	2.4	M5	27	9.7

Isuzu Trooper – Midsize SUV







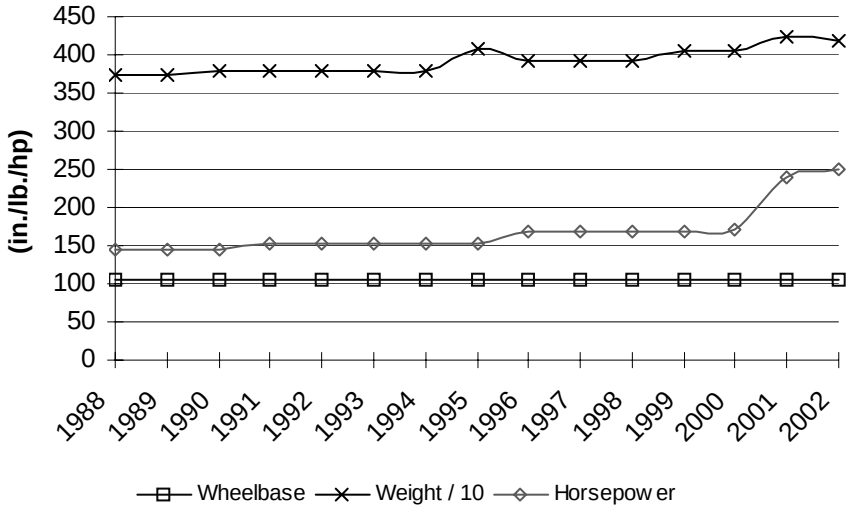
Isuzu Trooper

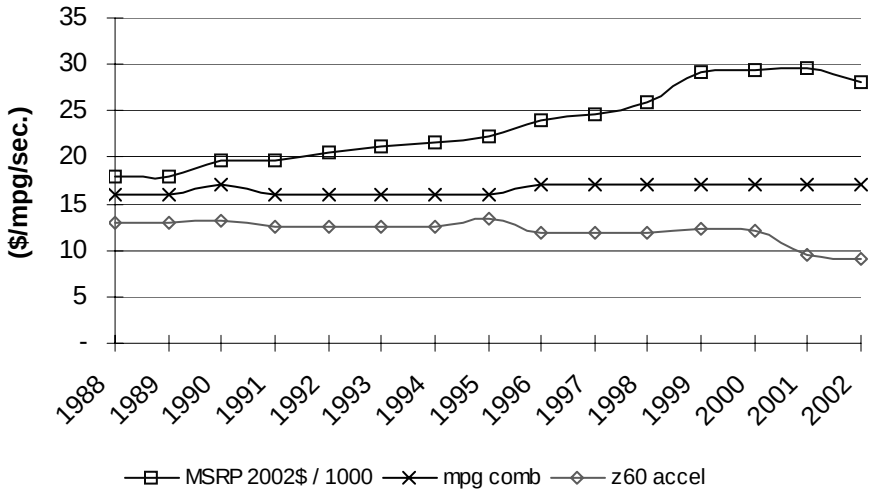
Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1988	104	3745	120	$12,639	$14,845	$19,220	4	2.6	L4	17	15.1
1989	104	3650	120	$13,408	$15,444	$19,452	4	2.6	M5	17	14.9
1990	104	3650	120	$13,489	$15,306	$18,567	4	2.6	M5	17	14.9
1991	104	3650	120	$13,998	$15,339	$18,489	4	2.6	M5	17	14.9
1992	109	4155	175	$19,169	$20,498	$24,579	6	3.2	M5	17	12.1
1993	109	4210	175	$20,119	$21,006	$25,048	6	3.2	M5	17	12.2
1994	109	4210	175	$21,650	$21,857	$26,281	6	3.2	M5	17	12.2
1995	109	4275	175	$24,220	$23,924	$28,590	6	3.2	M5	17	12.3
1996	109	4275	190	$25,805	$25,057	$29,588	6	3.2	M5	17	11.6
1997	109	4275	190	$26,995	$26,157	$30,258	6	3.2	M5	17	11.6
1998	109	4530	215	$26,995	$26,343	$29,794	6	3.5	M5	17	10.9
1999	109	4455	215	$27,595	$27,140	$29,798	6	3.5	M5	17	10.8
2000	109	4455	215	$27,895	$27,435	$29,142	6	3.5	M5	17	10.8
2001	109	4455	215	$28,140	$27,816	$28,585	6	3.5	M5	17	10.8
2002	109	4238	230	$28,715	$28,715	$28,715	6		M5	17	9.8

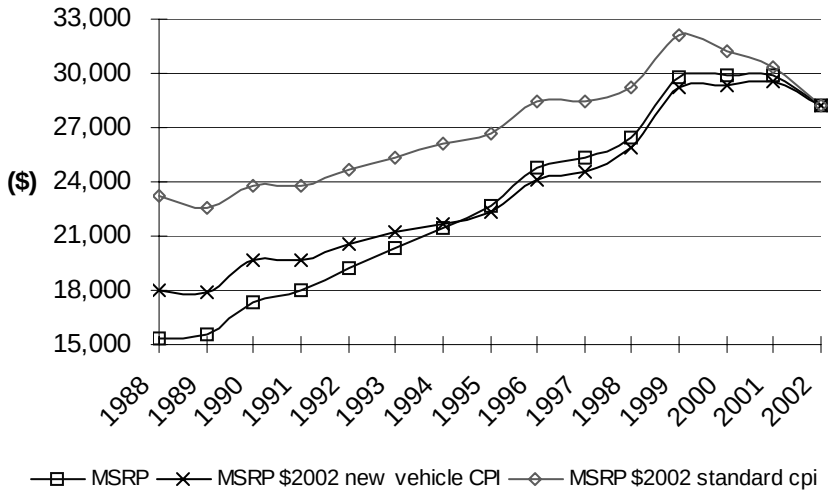
Nissan Pathfinder

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1988	104	3735	145	$15,299	$17,969	$23,265	6	3	M5	16	13.0
1989	104	3735	145	$15,569	$17,933	$22,588	6	3	M5	16	13.0
1990	104	3798	145	$17,295	$19,625	$23,805	6	3	L4	17	13.1
1991	104	3795	153	$17,970	$19,691	$23,736	6	3	L4	16	12.6
1992	104	3795	153	$19,210	$20,542	$24,632	6	3	L4	16	12.6
1993	104	3795	153	$20,370	$21,268	$25,360	6	3	L4	16	12.6
1994	104	3795	153	$21,479	$21,684	$26,073	6	3	L4	16	12.6
1995	104	4090	153	$22,619	$22,342	$26,701	6	3	L4	16	13.3
1996	106	3920	168	$24,804	$24,085	$28,440	6	3.3	M5	17	11.9
1997	106	3920	168	$25,369	$24,581	$28,435	6	3.3	M5	17	11.9
1998	106	3920	168	$26,489	$25,849	$29,235	6	3.3	M5	17	11.9
1999	106	4050	168	$29,739	$29,249	$32,113	6	3.3	M5	17	12.2
2000	106	4050	170	$29,869	$29,377	$31,205	6	3.3	M5	17	12.1
2001	106	4250	240	$29,869	$29,525	$30,341	6	3.5	M5	17	9.5
2002	106	4190	250	$28,189	$28,189	$28,189	6	3.5	M5	17	9.1

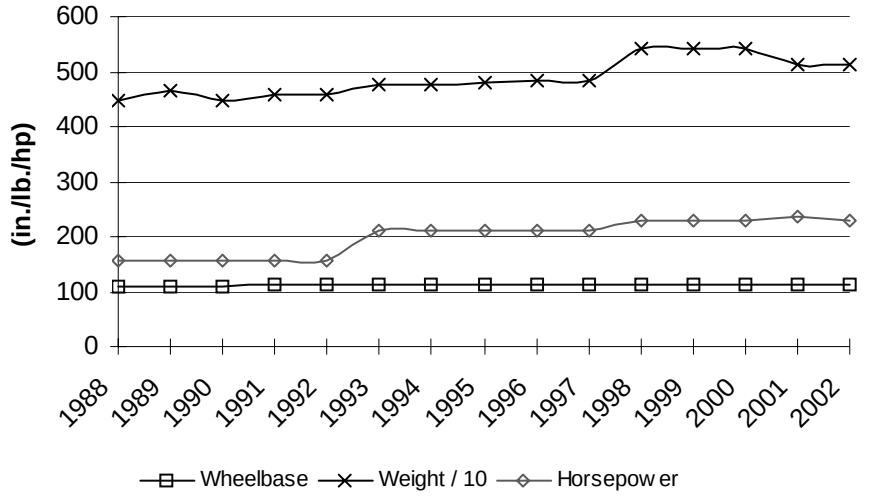
Nissan Pathfinder – Midsize SUV

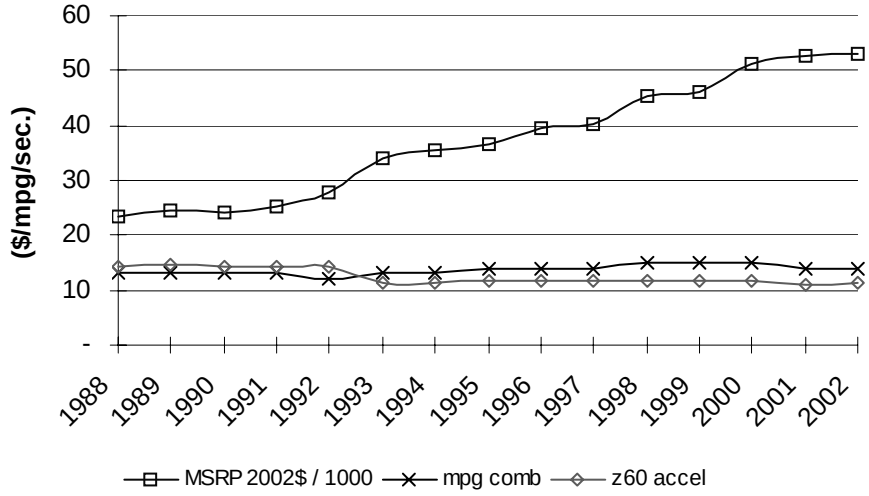


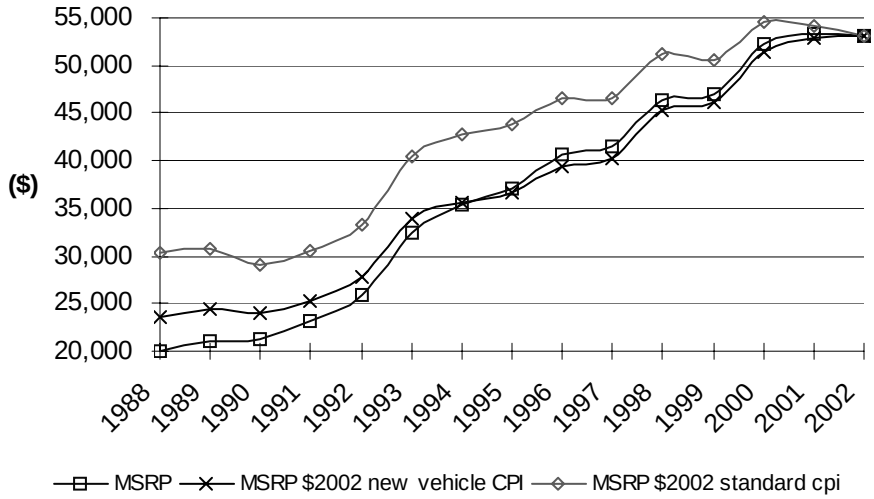




Toyota Land Cruiser – Large SUV







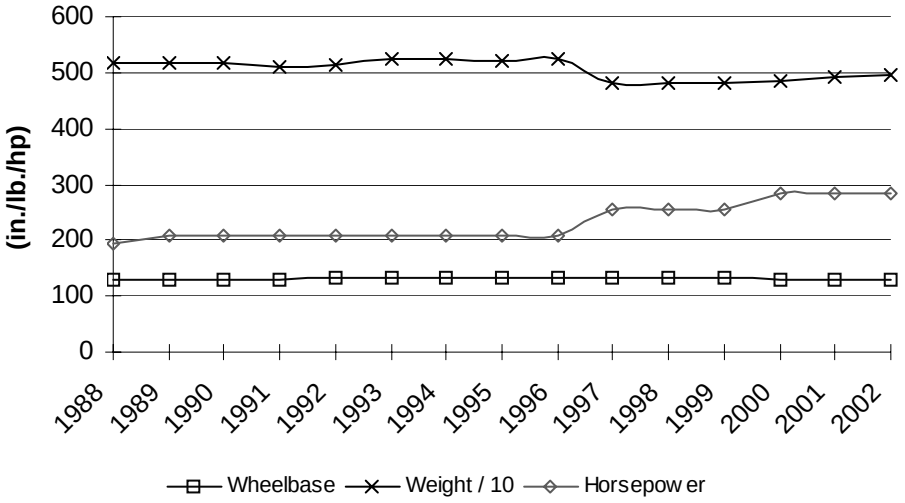
Toyota Land Cruiser

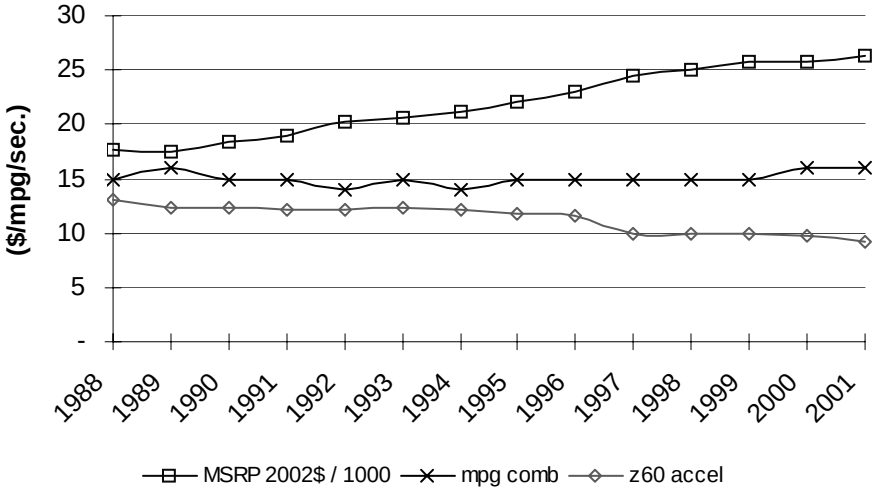
Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1988	108	4480	155	$19,998	$23,488	$30,411	6	4	L4	13	14.1
1989	108	4650	155	$21,153	$24,365	$30,689	6	4	L4	13	14.5
1990	108	4480	155	$21,163	$24,014	$29,129	6	4	L4	13	14.1
1991	112	4597	155	$23,063	$25,272	$30,463	6	4	L4	13	14.4
1992	112	4597	155	$25,923	$27,720	$33,240	6	4	L4	12	14.4
1993	112	4760	212	$32,453	$33,884	$40,403	6	4.5	L4	13	11.5
1994	112	4780	212	$35,298	$35,635	$42,848	6	4.5	L4	13	11.5
1995	112	4800	212	$37,105	$36,651	$43,800	6	4.5	L4	14	11.5
1996	112	4834	212	$40,678	$39,499	$46,641	6	4.5	L4	14	11.6
1997	112	4834	212	$41,488	$40,200	$46,503	6	4.5	L4	14	11.6
1998	112	5401	230	$46,370	$45,249	$51,178	8	4.7	L4	15	11.8
1999	112	5401	230	$46,898	$46,125	$50,642	8	4.7	L4	15	11.8
2000	112	5401	230	$52,208	$51,348	$54,543	6	4.7	L4	15	11.8
2001	112	5115	235	$53,405	$52,790	$54,249	8	4.7	L4	14	11.1
2002	112	5115	230	$53,105	$53,105	$53,105	8	4.7	L4	14	11.3

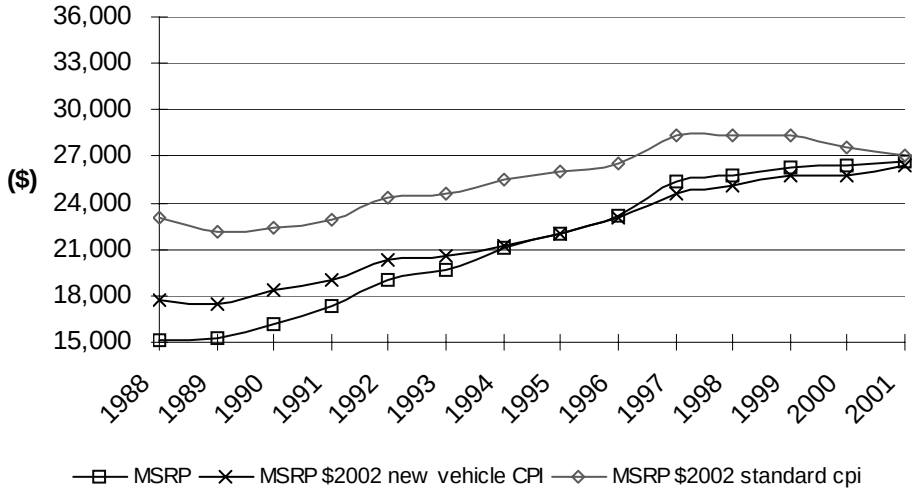
Chevrolet Suburban

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1988	130	5178	195	$15,107	$17,743	$22,973	8	5.7	L4	15	13.1
1989	130	5178	210	$15,215	$17,525	$22,074	8	5.7	L4	16	12.3
1990	130	5178	210	$16,225	$18,411	$22,333	8	5.7	L4	15	12.3
1991	130	5100	210	$17,340	$19,001	$22,904	8	5.7	L4	15	12.2
1992	132	5125	210	$19,003	$20,320	$24,367	8	5.7	L4	14	12.2
1993	132	5230	210	$19,720	$20,590	$24,551	8	5.7	L4	15	12.4
1994	132	5230	210	$21,046	$21,247	$25,548	8	5.7	L4	14	12.2
1995	132	5199	210	$22,000	$22,050	$25,970	8	5.7	L4	15	11.8
1996	132	5230	210	$23,200	$23,000	$26,601	8	5.7	L4	15	11.6
1997	132	4802	255	$25,323	$24,537	$28,384	8	5.7	L4	15	10.0
1998	132	4820	255	$25,740	$25,118	$28,409	8	5.7	L4	15	10.0
1999	132	4820	255	$26,230	$25,798	$28,324	8	5.7	L4	15	10.0
2000	130	4866	285	$26,400	$25,798	$27,613	8	5.3	L4	16	9.7
2001	130	4914	285	$26,656	$26,349	$27,077	8	5.3	L4	16	9.3

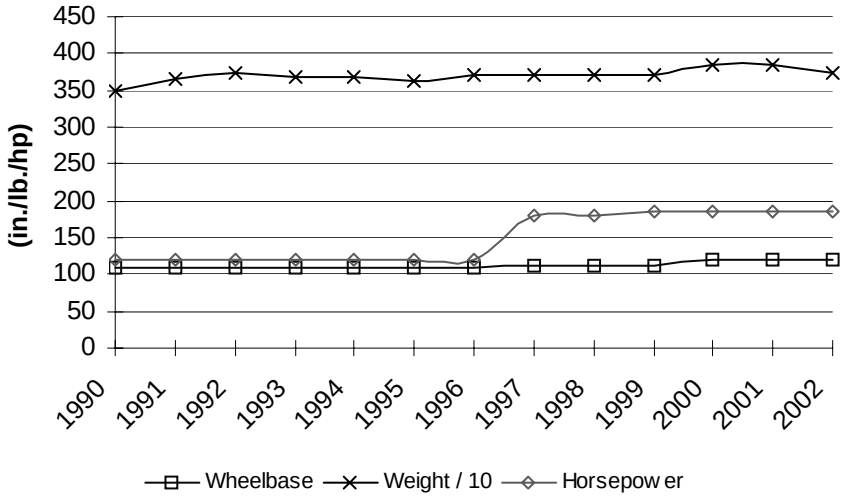
Chevrolet Suburban – Large SUV

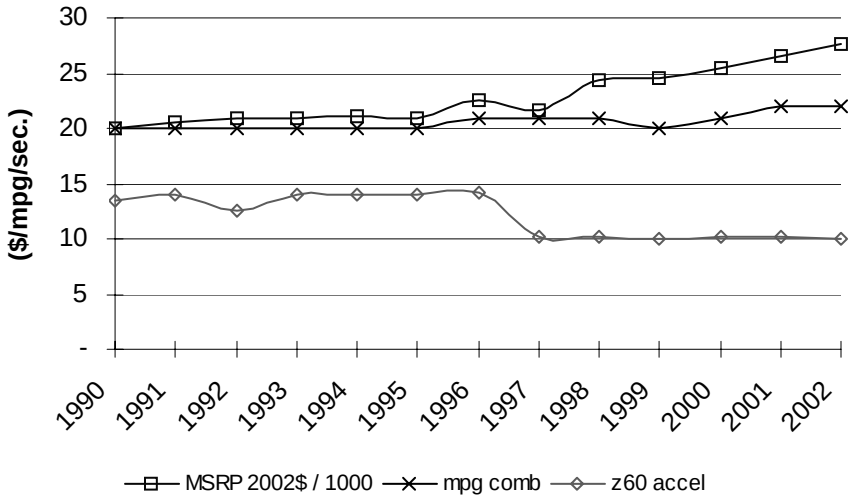


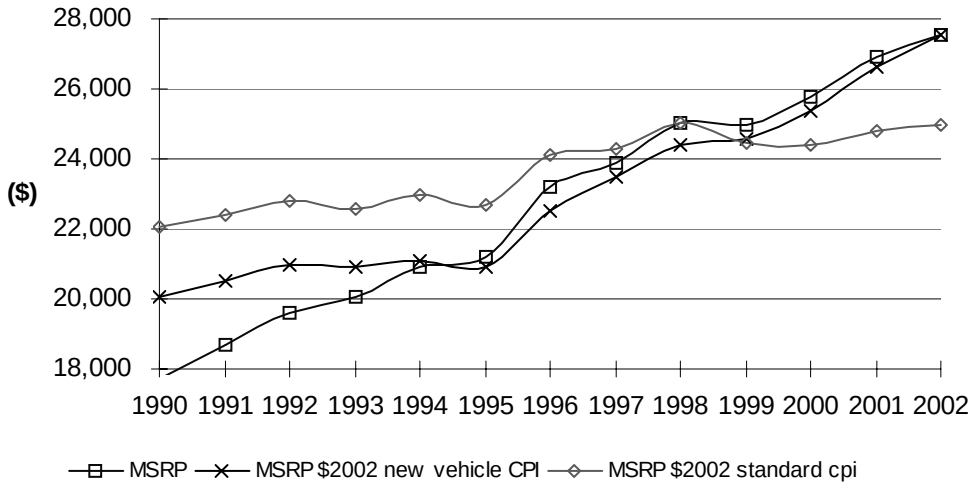




Oldsmobile Silhouette – Minivan







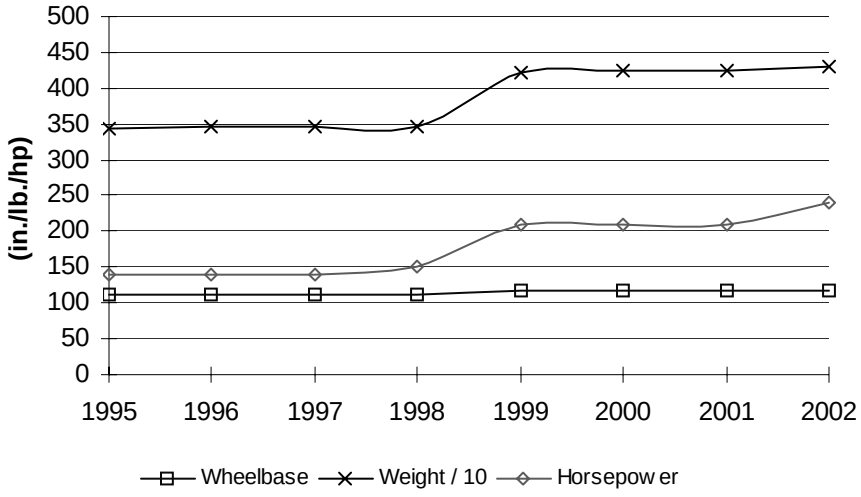
Oldsmobile Silhouette

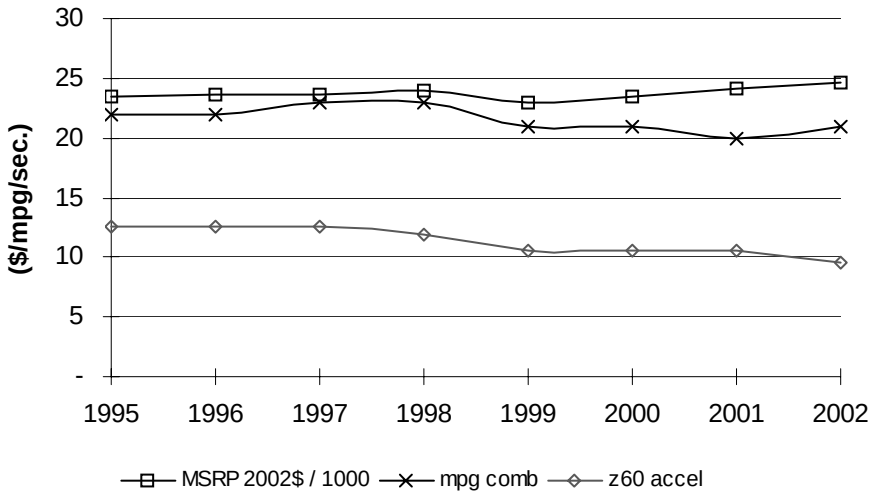
Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1990	110	3495	120	$17,695	$20,079	$22,068	6	3.1	L3	20	13.5
1991	110	3648	120	$18,705	$20,496	$22,386	6	3.1	L3	20	13.9
1992	110	3735	120	$19,625	$20,985	$22,800	6	3.1	L3	20	12.5
1993	110	3676	120	$20,029	$20,912	$22,593	6	3.1	L3	20	14.0
1994	110	3676	120	$20,895	$21,095	$22,982	6	3.1	L3	20	14.0
1995	110	3633	120	$21,200	$20,941	$22,675	6	3.8	L4	20	14.0
1996	110	3704	120	$23,200	$22,527	$24,102	6	2.8	L4	21	14.1
1997	112	3702	180	$23,900	$23,466	$24,272	6	3.3	L4	21	10.2
1998	112	3710	180	$25,000	$24,396	$25,000	6	3.4	L4	21	10.2
1999	112	3710	185	$24,990	$24,578	$24,450	6	3.4	L4	20	10.0
2000	120	3832	185	$25,800	$25,375	$24,422	6	3.4	L4	21	10.2
2001	120	3832	185	$26,920	$26,610	$24,777	6	3.4	L4	22	10.2
2002	120	3730	185	$27,560	$27,560	$24,971	6	3.4	L4	22	10.0

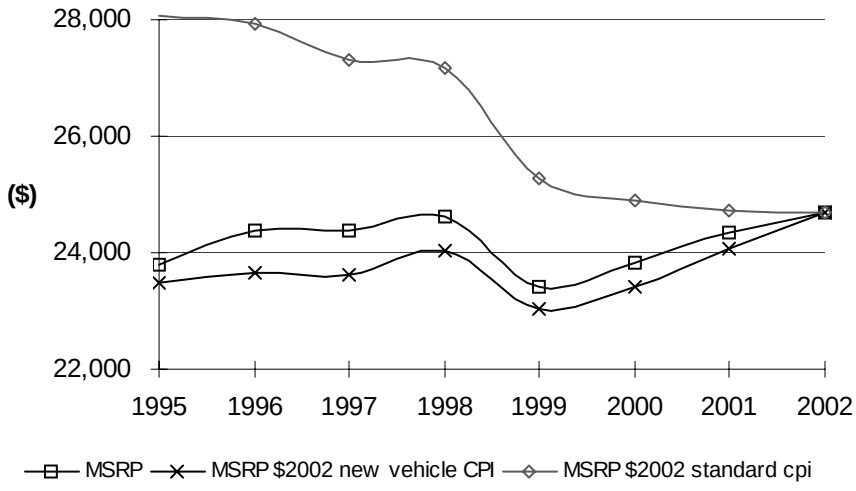
Honda Odyssey

Year	Wheel base	Curb Wgt	Horse power	MSRP Current $	MSRP $2002 new vehicle cpi	MSRP $2002 standard cpi	Cyl	Dis (L)	Tran	mpg cmb	Zero to 60 accl (sec)
1995	111	3435	140	$23,790	$23,499	$28,083	4	2.2	L4	22	13.0
1996	111	3473	140	$24,365	$23,659	$27,937	4	2.2	L4	22	13.1
1997	111	3473	140	$24,365	$23,608	$27,310	4	2.2	L4	23	13.1
1998	111	3450	150	$24,615	$24,020	$27,167	4	2.3	L4	23	12.3
1999	118	4211	210	$23,415	$23,029	$25,284	6	3.5	L4	21	10.6
2000	118	4233	210	$23,815	$23,423	$24,880	6	3.5	L4	21	10.7
2001	118	4248	210	$24,340	$24,060	$24,725	6	3.5	L4	20	10.8
2002	118	4299	240	$24,690	$24,690	$24,690	6	3.5	L5	21	9.1

Honda Odyssey – Minivan

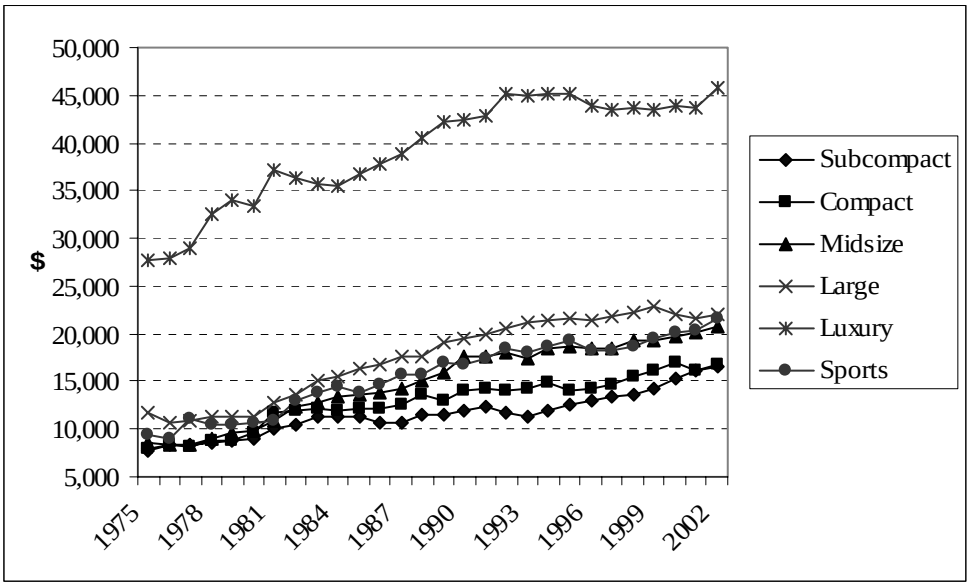


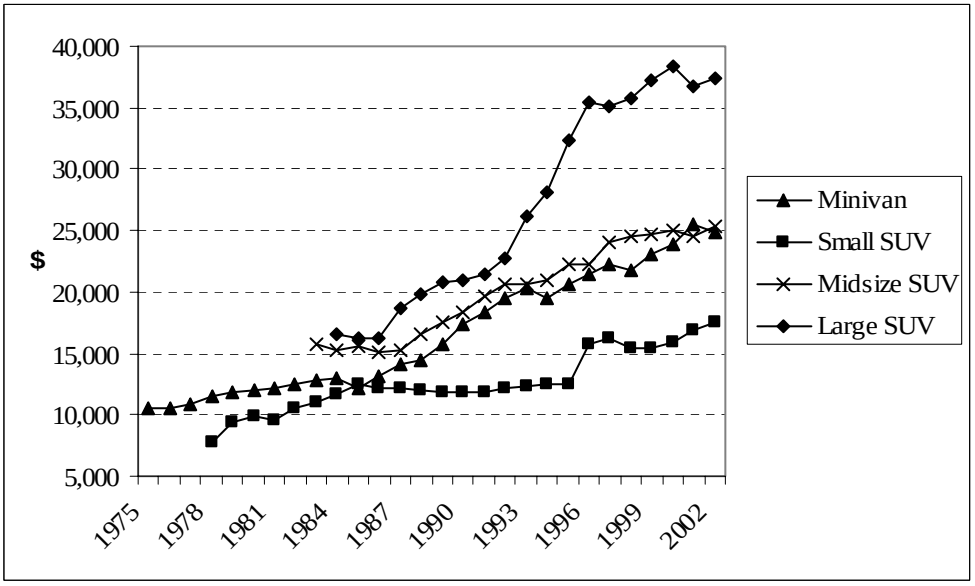




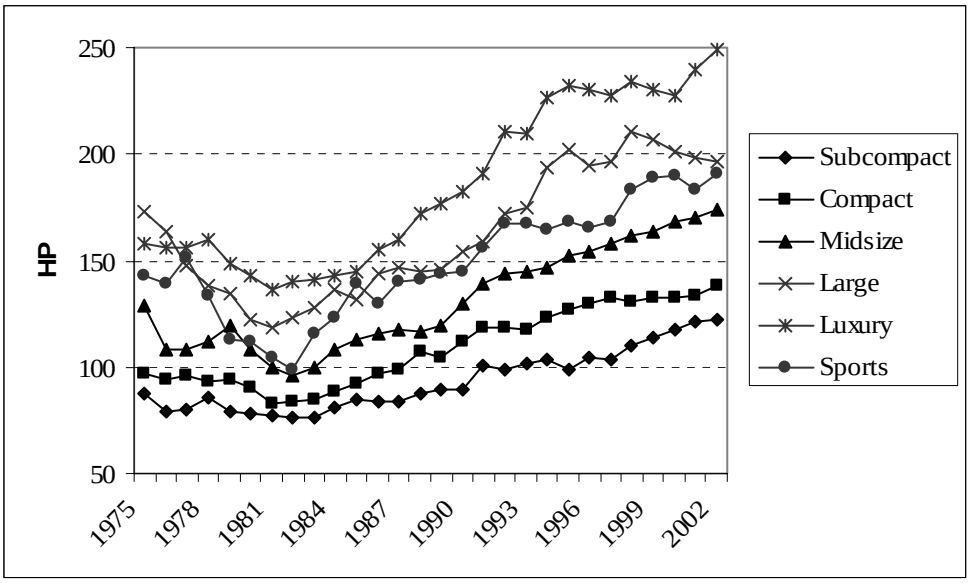
Appendix III: Average Attribute Trends Generated from the ITS Davis Database – MSRP, Acceleration, Fuel Economy, Curb Weight, Horsepower

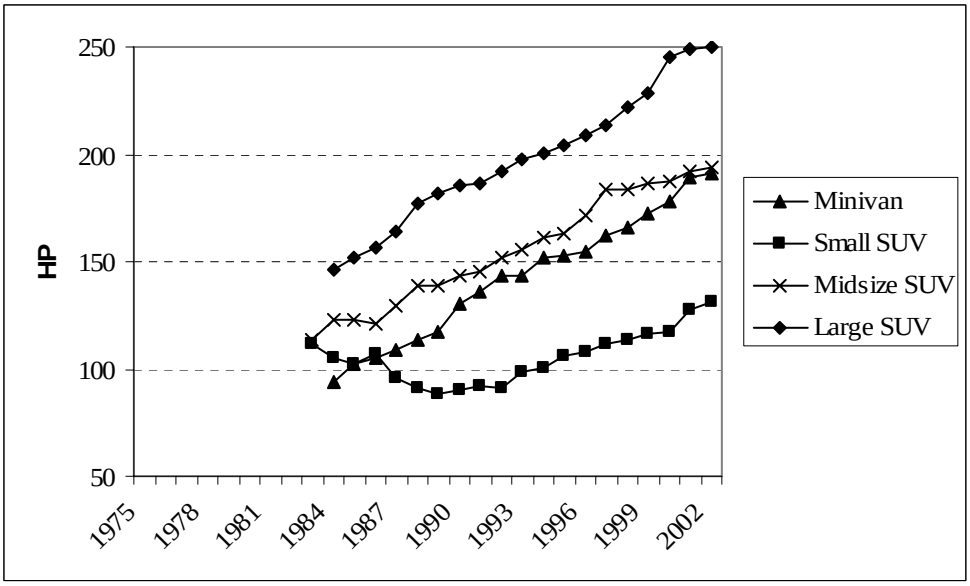
Manufacturer's Suggested Retail Price ($2002)



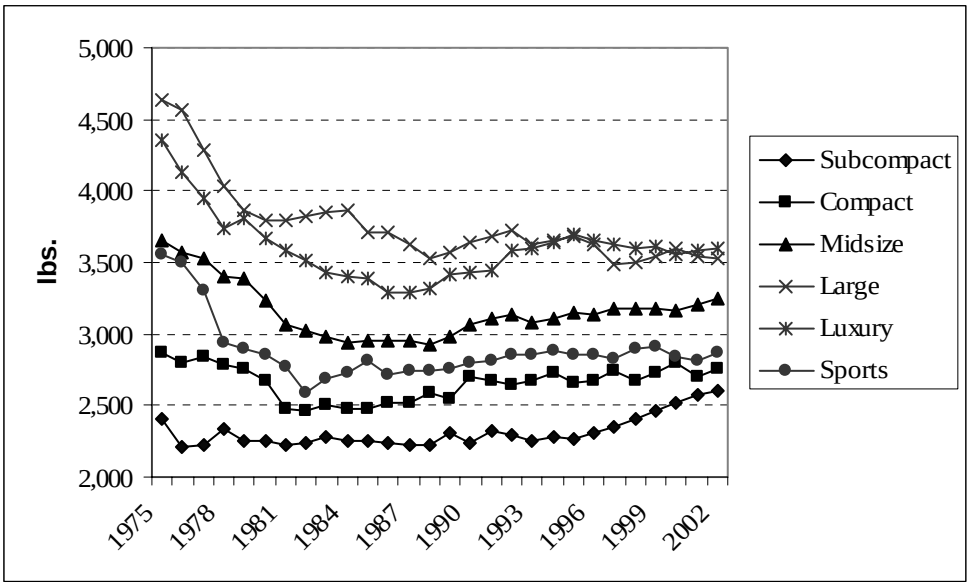


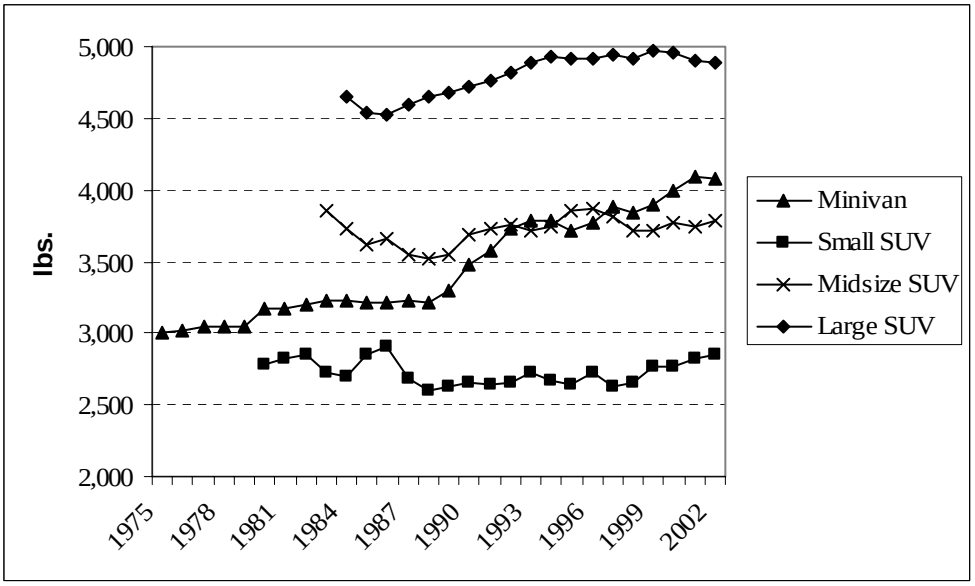
Horsepower


250
200
150
100
50
HP
1975
1978
1981
1984
1987
1990
1993
1996
1999
2002
Subcompact
Compact
Midsize
Large
Luxury
Sports

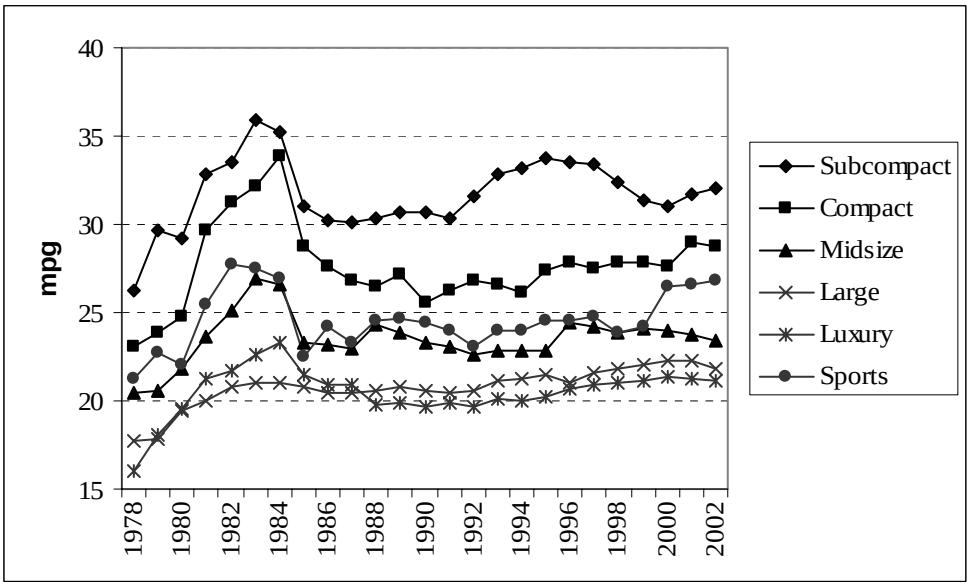

250
200
150
100
50
HP
1975
1978
1981
1984
1987
1990
1993
1996
1999
2002
Minivan
Small SUV
Midsize SUV
Large SUV

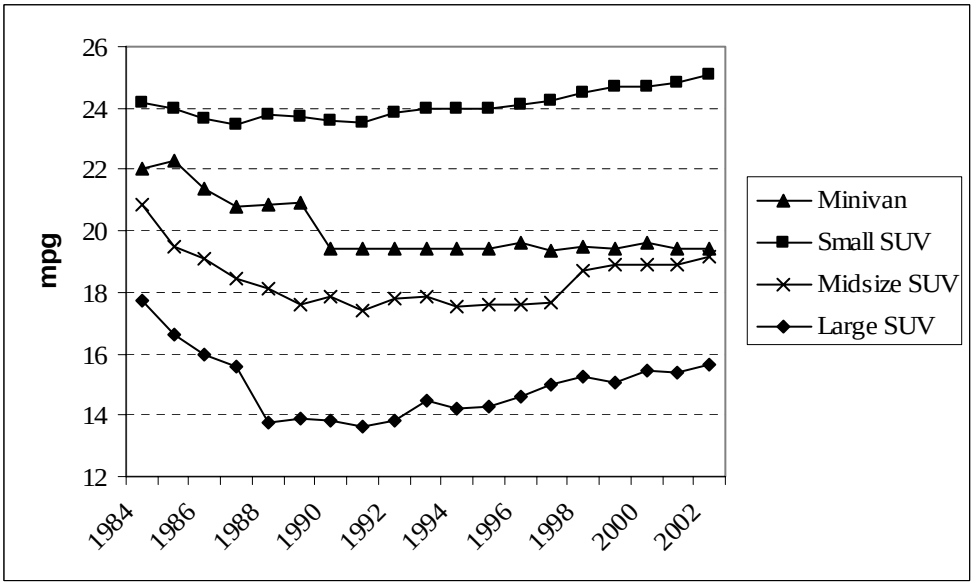
Curb Weight


5,000
4,500
4,000
3,500
3,000
2,500
2,000
lbs.
1975
1978
1981
1984
1987
1990
1993
1996
1999
2002
Subcompact
Compact
Midsize
Large
Luxury
Sports

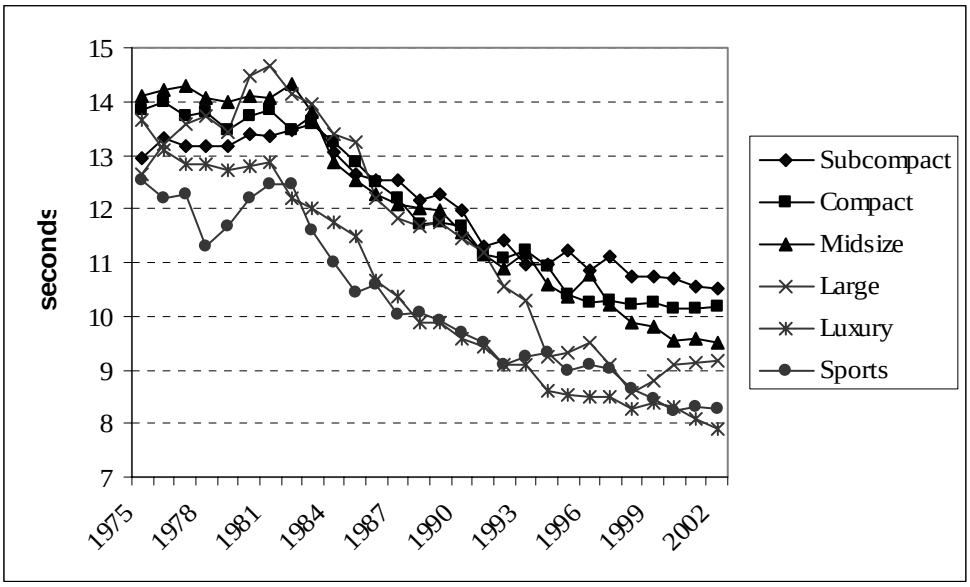

5,000
4,500
4,000
3,500
3,000
2,500
2,000
lbs.
1975
1978
1981
1984
1987
1990
1993
1996
1999
2002
Minivan
Small SUV
Midsize SUV
Large SUV

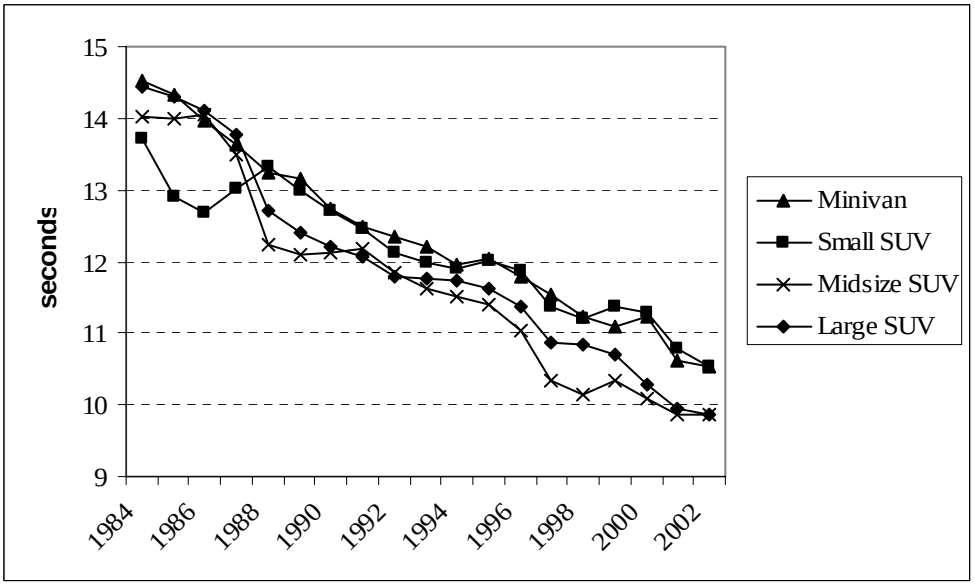
Combined Adjusted Fuel Economy from EPA





Zero to Sixty mph Acceleration Time





Appendix IV: Vehicle Technology Trends with respect to Fuel Economy and Performance for Passenger Cars and Light Trucks (1975 to 2003)

Source: Reference 5, p. 6-9, Table 2 and p. 12-13, Table 3.

Passenger Cars

< - - - - - - - Measured Characteristics - - - - - - - >										< - -Percent By: - - >		
Model Year	Sales (000)	Frac	Adj 55/45 mpg	Vol Cu-Ft	Inertia Weight (lb)	Eng HP	HP/WT	0-60 Time	Top Spd	Vehicle Size		
										Small	Mid	Large
1975	8237	80.6%	13.5		4057	136	0.0331	14.2	111	55.4	23.3	21.3
1976	9722	78.8%	14.9		4058	134	0.0324	14.4	110	55.4	25.2	19.4
1977	11300	80.0%	15.6	110	3943	133	0.0335	14	111	51.9	24.5	23.5
1978	11175	77.3%	16.9	109	3587	124	0.0342	13.7	111	44.7	34.4	21
1979	10794	77.8%	17.2	108	3484	119	0.0338	13.8	110	43.7	34.2	22.1
1980	9443	83.5%	20	104	3101	100	0.0322	14.3	107	54.4	34.4	11.3
1981	8733	82.7%	21.4	106	3075	99	0.032	14.4	106	51.5	36.4	12.2
1982	7819	80.3%	22.2	106	3054	99	0.032	14.4	106	56.5	31	12.5
1983	8002	77.7%	22.1	108	3111	104	0.033	14	108	53.1	31.8	15.1
1984	10675	76.1%	22.4	107	3098	106	0.0339	13.8	109	57.4	29.4	13.2
1985	10791	74.6%	23	108	3092	111	0.0355	13.3	111	55.7	28.9	15.4
1986	11015	71.7%	23.8	107	3040	111	0.036	13.2	111	59.5	27.9	12.6
1987	10731	72.2%	24	106	3030	112	0.0365	13	112	63.5	24.3	12.2
1988	10736	70.2%	24.4	107	3046	116	0.0375	12.8	113	64.8	22.3	12.8
1989	10018	69.3%	24	107	3099	121	0.0387	12.5	115	58.3	28.2	13.5
1990	8810	69.8%	23.7	107	3175	129	0.0401	12.1	117	58.6	28.7	12.8
1991	8524	67.8%	23.9	106	3153	132	0.0413	11.8	118	61.5	26.2	12.3
1992	8108	66.6%	23.6	108	3239	141	0.0428	11.5	120	56.5	27.8	15.6
1993	8457	64.0%	24.1	108	3207	138	0.0425	11.6	120	57.2	29.5	13.3
1994	8414	60.2%	24	108	3249	143	0.0432	11.4	121	58.5	26.1	15.4
1995	9396	62.0%	24.2	108	3262	152	0.046	10.9	125	57.3	28.6	14
1996	7890	60.0%	24.2	108	3281	154	0.0464	10.8	125	54.3	32	13.6
1997	8335	57.7%	24.3	108	3274	156	0.0469	10.7	126	55.1	30.6	14.3
1998	7972	55.2%	24.4	108	3306	159	0.0475	10.6	127	49.4	39.1	11.4
1999	8446	55.3%	24.1	109	3365	164	0.0481	10.5	128	47.4	40	12.5
2000	9124	55.1%	24.1	109	3369	168	0.0492	10.4	129	47.5	34.3	18.2
2001	8405	53.9%	24.3	109	3379	168	0.0492	10.3	129	50.9	32.3	16.8
2002	8190	52.2%	24.3	109	3405	175	0.0507	10.1	131	48.7	34.8	16.4
2003	8388	52.4%	24.8	109	3410	175	0.0508	10.1	131	52	32.7	15.4

Model Year	Engine		HP/ CID	Drivetrain		Transmission		FI	Fuel Metering			DSL	Four Valve
	CID	HP		FWD	4WD	Manual	Lock		Port	TBI	Carb		
1975	288	136	0.515	6.5	0	19.9	0	5.1	5.1	0	94.6	0.2	0
1976	287	134	0.502	5.8	0	17.1	0	3.2	3.2	0	96.6	0.3	0
1977	279	133	0.516	6.8	0	16.8	0	4.2	4.2	0	95.3	0.5	0
1978	251	124	0.538	9.6	0	20.2	6.7	5.1	5.1	0	94	0.9	0
1979	238	119	0.545	11.9	0.3	22.3	8	4.7	4.7	0	93.2	2.1	0
1980	188	100	0.583	29.7	0.9	31.9	16.5	6.9	6.2	0.7	88.7	4.4	0
1981	182	99	0.594	37	0.7	30.4	33.3	8.8	6.1	2.6	85.3	5.9	0
1982	175	99	0.609	45.6	0.8	29.7	51.4	17	7.2	9.8	78.4	4.7	0
1983	182	104	0.615	47.3	3.1	26.5	56.7	28.3	9.5	18.9	69.6	2.1	0
1984	179	106	0.637	53.7	1	24.1	58.3	39.4	15	24.4	58.9	1.7	0
1985	177	111	0.671	61.6	2.1	22.8	58.7	53.5	21.4	32	45.6	0.9	0
1986	167	111	0.701	71.1	1.1	24.8	58	65.1	36.7	28.4	34.5	0.3	1.6
1987	162	112	0.732	77	1.1	24.9	59.5	73	42.5	30.5	26.8	0.3	5.6
1988	160	116	0.759	81.7	0.8	24.3	66.1	83.7	53.7	30	16.3	0	10.4
1989	163	121	0.783	82.5	1	21	69.3	90.2	62.4	27.8	9.7	0	12.8
1990	163	129	0.829	84.6	1	19.6	72.9	98.6	77.5	21.1	1.4	0	25.7
1991	163	132	0.851	83.2	1.4	20.5	73.5	99.8	78	21.8	0	0.1	28.2
1992	170	141	0.868	80.8	1.1	17.4	76.4	99.9	89.5	10.4	0	0.1	29.7
1993	166	138	0.865	85.1	1.2	17.8	76.9	100	91.6	8.4	0	0	32.8
1994	168	143	0.884	84.4	0.4	16.7	79.3	100	94.9	5.1	0	0	38.9
1995	167	152	0.945	82	1.2	16.3	81.9	99.9	98.8	1.2	0	0.1	52.1
1996	165	154	0.958	86.5	1.5	14.9	83.6	99.9	98.8	1.1	0	0.1	56.2
1997	164	156	0.974	86.5	1.7	13.5	85.8	99.9	99.1	0.8	0	0.1	57.4
1998	164	159	0.993	87	2.3	12.3	87.3	99.8	99.7	0.1	0	0.2	60.5
1999	166	164	1.009	86.5	3	11	88.4	99.8	99.7	0.1	0	0.2	59.7
2000	165	168	1.032	84.9	2.1	11.2	87.7	99.8	99.7	0.1	0	0.2	63.2
2001	165	168	1.042	84.1	3.2	11.4	87.5	99.7	99.7	0	0	0.3	61.8
2002	168	175	1.063	83.1	3.8	14	85.1	99.8	99.8	0	0	0.2	64.5
2003	165	175	1.083	82.4	3.6	14.7	84.7	99.6	99.6	0	0	0.4	70.4

Light Trucks

< - - - - - - - Measured Characteristics - - - - - - - >									< - - - - - Percent By: - - - - - >					
Model Year	Sales (000)	Frac	Adj 55/45 mpg	Inertia Weight (lb)	Eng HP	HP/WT	0-60 Time	Top Spd	Vehicle Size			Vehicle Type		
									Small	Mid	Large	Van	SUV	Pickup
1975	1987	19.4%	11.6	4072	142	0.035	13.6	114	10.9	24.2	64.9	23	9.4	67.6
1976	2612	21.2%	12.2	4154	141	0.034	13.8	113	9	20.3	70.7	19.2	9.3	71.4
1977	2823	20.0%	13.3	4135	147	0.036	13.3	115	11.1	20.3	68.5	18.2	10	71.8
1978	3273	22.7%	12.9	4151	146	0.035	13.4	114	10.9	22.7	66.3	19.1	11.6	69.3
1979	3088	22.2%	12.5	4251	138	0.033	14.3	111	15.2	19.5	65.3	15.6	13	71.5
1980	1863	16.5%	15.8	3868	121	0.031	14.5	108	28.4	17.6	54	13	9.9	77.1
1981	1821	17.3%	17.1	3805	119	0.031	14.6	108	23.2	19.1	57.7	13.5	7.5	79.1
1982	1914	19.7%	17.4	3805	120	0.032	14.5	109	21.1	31	47.9	16.2	8.5	75.3
1983	2300	22.3%	17.8	3763	118	0.031	14.5	108	16.6	45.9	37.6	16.6	12.6	70.8
1984	3345	23.9%	17.4	3782	118	0.031	14.7	108	19.5	46.4	34.1	20.2	18.7	61.1
1985	3669	25.4%	17.5	3795	124	0.033	14.1	110	19.2	48.5	32.3	23.3	20	56.6
1986	4350	28.3%	18.3	3737	123	0.033	14	110	23.5	48.5	28	24	17.8	58.2
1987	4134	27.8%	18.4	3712	131	0.035	13.3	113	19.9	59.6	20.6	26.9	21.1	51.9
1988	4559	29.8%	18.1	3841	141	0.037	12.9	115	15	57.2	27.8	24.8	21.2	53.9
1989	4435	30.7%	17.8	3921	146	0.037	12.8	116	13.9	58.9	27.2	28.8	20.9	50.3
1990	3805	30.2%	17.7	4005	151	0.038	12.6	117	13.4	57.1	29.6	33.2	18.6	48.2
1991	4049	32.2%	18.1	3948	150	0.038	12.6	117	11.4	67.2	21.4	25.5	27	47.4
1992	4064	33.4%	17.8	4055	155	0.038	12.5	118	10.4	64	25.6	30	24.7	45.3
1993	4754	36.0%	17.9	4073	162	0.04	12.1	120	8.8	65.3	25.9	30.3	27.6	42.1
1994	5572	39.8%	17.7	4129	166	0.04	12	121	9.8	62.5	27.7	25	28.5	46.5
1995	5749	38.0%	17.5	4184	168	0.04	12	121	8.6	63.5	27.9	28.9	31.6	39.5
1996	5254	40.0%	17.8	4224	179	0.042	11.5	124	6.5	67.1	26.4	26.8	36	37.2
1997	6117	42.3%	17.6	4344	187	0.043	11.4	126	10.1	52.5	37.3	20.7	40	39.3
1998	6477	44.8%	17.8	4282	187	0.044	11.2	126	8.9	58.7	32.4	23	39.8	37.3
1999	6839	44.7%	17.5	4412	197	0.045	11	128	7.7	55.8	36.5	21.4	41.4	37.2
2000	7434	44.9%	17.7	4375	197	0.045	11	128	6.7	55.7	37.5	22.7	42.2	35.1
2001	7189	46.1%	17.6	4462	209	0.047	10.6	131	6.6	47.4	46	17.2	46.3	36.5
2002	7511	47.8%	17.3	4556	219	0.048	10.4	133	6.2	45.1	48.6	17.4	50.5	32.1
2003	7612	47.6%	17.7	4595	220	0.048	10.4	133	6.4	48.1	45.5	17	49.3	33.7

Model Year	Engine		HP/ CID	Drivetrain		Transmission		FI	Fuel Metering			DSL	Four Valve
	CID	HP		FWD	4WD	Manual	Lock		Port	TBI	Carb		
1975	311	142	0.476	0	17.1	37	0	0.1	0	0	99.9	0	0
1976	319	141	0.458	0	22.9	34.8	0	0.1	0	0	99.9	0	0
1977	318	147	0.482	0	23.6	32	0	0.1	0	0	99.9	0	0
1978	314	146	0.481	0	29	32.4	0	0.1	0	0	99.1	0.8	0
1979	298	138	0.486	0	18	35.2	2.1	0.3	0	0	97.9	1.8	0
1980	248	121	0.528	1.4	25	53	24.6	1.7	0	0	94.9	3.5	0
1981	247	119	0.508	1.9	20.1	51.6	31.1	1.1	0	0	93.3	5.6	0
1982	243	120	0.524	1.7	20	45.7	33.2	0.7	0	0	90	9.3	0
1983	231	118	0.543	1.4	25.8	45.9	36.1	0.6	0	0	94.7	4.7	0
1984	224	118	0.557	4.9	31	42.1	35.1	2.6	0	0	95.1	2.3	0
1985	224	124	0.586	7.1	30.6	37.1	42.2	12.3	0	0.2	86.7	1.1	0
1986	211	123	0.621	5.9	30.3	42.7	42	40.5	21.8	18.7	58.7	0.7	0
1987	210	131	0.654	7.4	31.5	39.9	44.8	66.9	33.3	33.6	32.9	0.3	0
1988	227	141	0.65	9	33.3	35.5	53.1	87.7	43.3	44.4	12.1	0.2	0
1989	234	146	0.653	9.9	32	32.7	56.8	93.5	45.9	47.6	6.3	0.2	0
1990	237	151	0.668	15.5	31.3	28.1	67.4	96	55.2	40.8	3.9	0.2	0
1991	228	150	0.681	9.7	35.3	31	67.4	98.2	55	43.2	1.6	0.1	0
1992	234	155	0.685	13.6	31.4	27.3	71.5	98.4	65.9	32.5	1.5	0.1	0
1993	235	162	0.71	15.1	29.5	23.3	75.7	99	73.4	25.7	1	0	0.2
1994	240	166	0.716	13.3	37.4	23.3	75.2	99.6	76.8	22.8	0.4	0	2.5
1995	244	168	0.715	17.7	40.7	20.5	78.6	100	79.8	20.2	0	0	8.1
1996	243	179	0.757	20.1	37.1	15.6	83.5	99.9	99.9	0	0	0.1	10.4
1997	248	187	0.775	13.9	43.3	14.6	84.9	100	100	0	0	0	11.3
1998	242	187	0.795	18.7	42	13.5	86	100	100	0	0	0	15.2
1999	249	197	0.814	17.4	44.6	9.1	90.5	100	100	0	0	0	16.2
2000	242	197	0.832	19.4	42.5	8	91.7	100	100	0	0	0	20.5
2001	243	209	0.882	18.5	43.8	6.3	93.4	100	100	0	0	0	27.1
2002	246	219	0.91	18.3	48	6.4	93.2	100	100	0	0	0	32.2
2003	245	220	0.919	18.1	49.1	5.9	93.3	100	100	0	0	0	33.7

Key for Appendix IV

- Inertia weight – Curb weight + 300 lb.
- 0-60 time – Acceleration from zero to sixty miles per hour (Calculated from formulae, function of weight, horsepower, and transmission type)
- Top Speed – Average top speed (Calculated from formulae)
- Adjusted 55/45 mpg – Combined fuel economy
- CID – Engine Displacement (Cubic Inches)
- Volume – Interior Volume (Cubic Feet)
- DSL – Diesel Engine
- Four valve – Four valves per cylinder
- FWD – Front wheel drive
- 4WD – Four wheel drive
- Manual – Manual transmission
- Lock – Automatic transmission with lockup
- FI – Fuel Injection
- Port – Port fuel injection
- TBI – Throttle Body Injection
- Carb – Carburetor