An Analysis of the Impact of Sport Utility Vehicles in the United States

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ABSTRACT

During the 1990s, sport utility vehicles (SUVs) became the fastest growing segment of the auto industry. In 1999, SUV sales reached almost 19% of the total light vehicle market and the mix of SUVs on the road was about 8.7%. Some has called this popularity a passing fad, but the continued increases in SUV sales seem to indicate a more permanent trend. Additional explanations for SUV popularity include the general economic well-being in the US, a perception of safety, and "utility."

Generally larger and heavier than the typical automobile, SUVs require more fuel and produce greater amounts of pollutants. They are also driven further annually than are automobiles of the same vintage, a fact that exacerbates the fuel-use and emission problems.

Although buyers believe that SUVs are safer than automobiles, which they are in some cases, SUVs are more prone to roll-overs than are automobiles. In addition, SUVs, with their higher bumpers and greater weight, may be a threat to other vehicles on the highway.

With sales projected to grow to over 3 million units per year in 2001, SUVs show no sign of decreasing in popularity. It is clear that automobiles and SUVs will be sharing the highways for years to come.

AN ANALYSIS OF THE IMPACT OF SPORT UTILITY VEHICLES IN THE UNITED STATES

It may be labeled sport utility vehicle, SUV, sport-ute, suburban assault vehicle, or a friend of OPEC (Organization for Petroleum Exporting Countries). It has been the subject of comics, the object of high-finance marketing ploys, and the theme of *Dateline.* Whatever the label or the occasion, this vehicle is in great demand. The popularity of sport utility vehicles (SUVs) has increased dramatically since the late 1970s, and SUVs are currently the fastest growing segment of the motor vehicle industry. Hoping to gain market share due to the popularity of the expanding SUV market, more and more manufacturers are adding SUVs to their vehicle lineup.

This study has two purposes. One purpose is to analyze the world of the SUV to determine why this vehicle has seen such a rapid increase in popularity. Another purpose is to examine the impact of SUVs on energy consumption, emissions, and highway safety.

INTRODUCTION

To analyze the impact of the rising popularity of SUVs, we look at the historical market share of SUVs and compare it with the market share of other types of personal vehicles. This examination compares sales trends of the SUV with sales of other types of vehicles. We also look at general economic trends in the United States as well as increases in personal mobility across all age groups. We look at other concerns, such as energy use and emissions, and at public perceptions of environmental problems. We examine buyer and driver profiles and review public opinion polls for anecdotal evidence. Finally, we examine safety issues.

HISTORICAL GROWTH OF THE SUV MARKET

Passenger vehicles are usually described by size (e.g., "compact") or price (e.g., "luxury"). The SUV is available with engine sizes ranging from 1.6 to 6.5 liters, curb weights from about 2,700 pounds to over 5,500 pounds, and price ranges (*1*) from under $14,000 to over $65,000 (1999 models). It is, therefore, difficult to analyze SUVs without subdividing them into categories. Table 1 lists SUVs in three categories based on engine size. Other categories (e.g., price, weight, or wheelbase) would result in slightly different groupings. Throughout this report, unless otherwise noted, SUVs are described as being "small" (less than 3 liters), "medium" (3-5 liters), or "large" (greater than 5 liters) based on engine size. Some models have engine sizes in two categories; these models are placed in the category of the more popular engine size.

Figure 1 shows the sales of SUVs beginning in 1980. As shown in this figure, total sales climbed consistently beginning in the early 1980s and rose rapidly in the 1990s. The SUV market accounted for 7% of vehicle sales in 1990 and 19% in 1999 (*2*). Most SUV sales are medium-sized vehicles, with engine displacements between 3.0 and 5.0 liters. Through the years, the large SUVs have maintained a small but consistent share of the SUV market. The medium and small SUVs have seen more fluctuation in their share of the SUV market; the majority of sales of small SUVs were between 1983 and 1987. In 1988, Consumers Union published reports indicating that small SUVs were less safe than other vehicles. Sales of small SUVs declined about that time, and sales of medium SUVs rose sharply.

When SUVs appeared to be increasing in popularity, many manufacturers added SUV models to their product listings. The number of SUV models grew from 11 in 1980 to 45 in 1999. As a matter of clarification, many of these "different" models are actually the same basic vehicle with slightly different trim and a different name (*3*).

Sales of SUVs have grown from slightly over 243 thousand units in 1980 to over 3 million units in 1999. Figure 2 compares the market shares of sales of SUVs with sales of other new light vehicles from 1980 through 1999. Sales of minivans, pickups, and vans (including all vehicles with gross vehicle weight ratings less than 8,500 pounds) and SUVs (all sizes) grew from about 20% of the market in 1980 to almost half in 1999. In the 1990s, strong SUV sales, combined with an increase of minivan, pickup, and van sales, caused quite a decline in market share for cars. Based on these charts, it would appear that SUV sales could be expected to increase dramatically in the next few years unless something occurs to change the market trend (e.g., a fuel shortage occurs). Polk estimates that SUV sales will be about 23% of the light vehicle market from 2001-2005 (*4*). According to AutoPacific's *The US Car and Light Truck Market*, sales of SUVs are projected to

be over 3 million units annually throughout the next decade with the fastest growing SUV category that of medium-sized SUVs (*5*).

ECONOMIC FACTORS AND MOBILITY TRENDS

Many articles have been written about SUVs being road hogs and gas-guzzlers. In addition, they are not budget-priced. Profits on automobiles are quite slim in comparison with profit margins on SUVs (*6*). When the economy is booming, however, the ticket price is not always the deciding factor (*7*).
The gross domestic product since 1980 shows that the US is producing more and continues a trend of steady growth. In the 1990s, real growth of household income showed a steady increase. In addition to steady real growth in household income during the 1990s, personal income per capita grew 11% from 1990 to 1997 (in constant dollars) (*8*).

Since 1980, automotive technologies have improved and the passenger vehicle has become safer and more comfortable. As highways were built, widened, and improved, fuel prices increased very little in comparison with the general economy. Until early 2000, fuel prices were rather low compared to the early 1980s. Since 1990, the percentages of average annual household expenditures which consumers spend on vehicle purchases and fuel have remained fairly constant at about 10-11% of all consumer expenditures (7-8% for vehicle purchases and 3-3.5% for fuel costs) (*9*).

A good economy, improved roads, and low fuel prices contributed to greater mobility of the average American citizen. Between 1983 and 1990, the average daily vehicle trips per household increased by almost 15%; between 1990 and 1995, the average daily vehicle trips per household increased by another 12% (*10*). The average annual person miles traveled (PMT) from 1983 to 1990 and from 1990 to 1995 increased by 9% and 14%, respectively (*9*). Each year, the total vehicle miles traveled (VMT) in the United States increases; these increases have been at a rate of around 3% annually throughout the 1990s. Higher population, more vehicles registered, increased PMT, and increased VMT indicate that transportation activity is continuing to grow.

The economy is holding steady. Although U.S. citizens travel more and go further every year, expenditures for vehicles and fuel remain at approximately the same share of the household income as in the past.

SUVS AND THEIR BUYERS/DRIVERS

To understand the success of the SUV and to project the level of interest in SUVs in the near future, we examine typical profiles of both the vehicles and their owners.

Vehicle Characteristics

Generally speaking, SUVs are described as being large, sturdy, high-priced, appropriate for hauling/towing, safe (to the SUV occupants), and "trendy." In terms of size, the small SUV category (dominated by the Honda CR-V and the Toyota RAV4) allows buyers to purchase the SUV image without paying a huge price. Base model prices range from almost $14,000 to $23,000. The sales-weighted average price for a small SUV in 1999 was $17,833

The middle SUV category (led by the Ford Explorer, Jeep Grand Cherokee, Chevrolet Blazer, Jeep Cherokee, and Toyota 4Runner) has the largest number of nameplates as well as the greatest sales. Base model prices range from under $15,000 to over $66,000 (Table 1). The sales-weighted average price for a medium SUV in 1999 was $28,754.

The large SUV category (including the Ford Expedition, Chevrolet Tahoe, Dodge Durango, and Chevrolet Suburban) has larger engines but not necessarily larger price tags than SUVs in the middle category. Base model prices for vehicles with significant sales range from under $25,000 to almost $46,500 (Table 1). The sales-weighted average price for a large SUV in 1999 was $30,538.

Small SUVs have fuel economies similar to that of cars but the additional height, weight, and power requirements of the medium and large SUVs cause them to be less fuel-efficient than cars. The sales-weighted

fuel economies of new light vehicles in 1999 indicate that the large SUVs are, on average, the least fuel-efficient type of light vehicle (Table 2).

Because SUVs are currently categorized as light trucks, they are required to meet Federal fuel economy and emissions standards for light trucks. Corporate Average Fuel Economy (CAFE) standards for light trucks are less stringent than for cars. For example, the CAFE standard for automobiles is currently 27.5 mpg, while it is only 20.7 mpg for light trucks (*9*). The purpose of these relaxed fuel economy requirements for light trucks is to benefit small businesses that use trucks in their businesses (*11*). These days, however, most SUVs (84%) and pickup trucks (73%) are being used mainly for personal transportation (*12*).

As more and more people switch from cars to less fuel-efficient SUVs, the United States as a whole will increase its oil demand to fuel these vehicles. Table 2 shows an average annual fuel use for each vehicle size class. Large SUVs, on average, use 65% more fuel than large cars use in one year.

Because the cost of fuel in the United States has traditionally been fairly low, fuel economy is not as important to U.S. consumers as it is to consumers in Europe or Asia. In a survey conducted by AutoPacific in 1998, 30% of all new *car buyers* considered fuel economy to be "extremely important"; however, only 18% of *SUV buyers* considered fuel economy as "extremely important," and only 10% rated the fuel economy of their new SUV as "excellent." The same survey noted that SUV owners expected a fuel economy of only 19 mpg and that it would take a 70% increase in the price of fuel for them to change their vehicle type (*5*). Another national survey, which was not aimed specifically at new car buyers but the population in general, indicated that less than 5% of the survey respondents rated fuel economy as "most important in the choice of the next vehicle they purchased" (*13*). Because of the rising fuel prices in early 2000, the number of people ranking fuel economy as important may increase in future surveys. Possibly in anticipation of this occurrence, Ford and General Motors recently announced intentions of improving SUV fuel economies in the next few years.

Federal emission standards for automobiles and light trucks have varied over the years; generally, standards for trucks have been less stringent. At the current time, the smallest light trucks [up to 6,000 pounds gross vehicle weight rating (GVWR)] have the same standard was automobiles, but light trucks with a GVWR over 6,001 pounds have less stringent emission standards than the smaller vehicles (*9*). All of the large SUVs, most of the medium SUVs, and a couple of the small SUVs fall in this category. So, from the start, most SUVs are allowed to emit more pollutants than cars. Then, as vehicles get older, the amount of pollution they produce increases (*14*). According to the *Green Guide to Cars & Trucks*, the average new light truck pollutes 40% more than the new average car (*15*). This will change in the future because of the Environmental Protection Agency's Tier 2 Federal Emission Standards, which are scheduled to be phased in from 2004–2007. "This regulation marks the first time that SUVs and other light-duty trucks—even the largest passenger vehicles—are subject to the same national pollution standards as cars" (*16*).

Buyer/Driver Profiles

In the fall of 1998, AutoPacific surveyed 40,000 people to obtain information on the type of vehicle that purchasers/leasers were considering for their next purchase/lease. For those 30 years of age and under, 73% indicated that they were considering an SUV for their next purchase, as did 63% of survey participants in their 30s and 50% of those in their 40s. For those 65 and older, only 13% were considering buying an SUV. Overall (i.e., all ages), 48% responded that they were considering an SUV (*19*).

The average SUV customer is male (63.7%), married (76.4%), aged 45 years, in a household with an income of $94,400, and at the head of the household (84%). SUV customers expect to drive 14,367 miles each year and 39% are prior owners of another SUV (*5*). Because SUV owners are fairly affluent, the price of the vehicle and of fuel is not sufficiently important to cause them to consider changing the type of vehicle they drive.

Based on data from the 1995 Nationwide Personal Transportation Study (NPTS), Niemeier determined that 29.3% of total household vehicles (i.e., non-commercial vehicles) on the road are SUVs, vans, or trucks (most of these are pickup trucks), and only about a third of these vehicles are owned by persons with annual incomes under $35,000 (*11*).

Although the primary SUV customer is male, women are beginning to enter the SUV market because of their perception that the SUV is safer and provides better visibility. This perception of safety is based on the size, shape, and rugged image of the vehicle, rather than published reports or statistics. In addition, soccer moms who drove minivans are changing their persona when they move from a minivan to a sport utility vehicle. It has been projected that 53.8% of future SUV buyers will be female. In the United States, women influence "as much as 80% of all vehicle buying decisions" (*20*).

Opinion polls taken in December 1996 and in February 1998 asked questions concerning the characteristics most desired in vehicles. In both polls, the most important characteristics were dependability and safety, and both of these characteristics were listed as even more important to consumers in 1998 than in 1996. In both polls, fuel economy and low price were the least important attributes, and they were listed as of lesser importance in 1998 than in 1996 (*13*).

SUV purchasers have been categorized by J. D. Powers as either "Domestic Indulgents" (those who buy a vehicle based on size, status, and luxury equipment) or "Utility Seekers" (those who buy for functionality – hauling, towing, room for more passengers, and safety) (*20*). Owners of minivans and SUVs are more likely to have children than owners of any other automotive category.

According to The Polk Company, the Babyboomer generation is leading the way in buying SUVs. The basic sedan was the vehicle of choice when the family only owned one car. The number of vehicles per household in the United States had grown to 1.9 in 1998; however, and now most households own one car and one truck (*23*).

SUV Usage And Travel

The 1995 NPTS shows that SUVs travel more than automobiles on an annual basis. In fact, when comparing average annual vehicle miles by vehicle age, SUVs traveled more than cars for each vehicle age category in the 1995 NPTS except those automobiles with a vehicle age of 16 years or greater. SUVs (all ages) were driven 13% more than the average of all vehicles, and 16% more than automobiles.

It has been suggested that driver characteristics could explain the high annual mileage of SUVs. The following observations were made using data from the 1995 NPTS. The information is based on data from the primary driver of the vehicle. It should be noted that *driver* data, as compiled by NPTS surveys, differs slightly from the *buyer* profiles provided by AutoPacific.

- Sixty percent of those driving SUVs are male, while only 44% of those driving cars are male. The annual VMT of males is approximately 4% more than that of females.
- Thirty-eight percent of those driving SUVs have a family income of $40,000 – $79,999 as compared to 29% of car drivers. The annual VMT for drivers with a family income of $40,000 – $79,999 is approximately 13% higher than those drivers whose family income is less than $40,000.
- Fifty-two percent of those driving SUVs are in families that consist of more than one adult plus children; this compares to 38% of car drivers. The annual VMT for drivers with a family of more than one adult plus children is approximately 8% higher than the average for all families.
- The average age of an SUV driver is 40.2 years. This is the lowest average driver age of all vehicle types. The average age of a car driver is 44.1 years. Drivers between the ages of 26 to 35 have the highest annual VMT. (Age categories in the 1995 NPTS are ten-year increments beginning with 16 years of age.)
- Fifty percent of those driving SUVs have two vehicles in their household, while only 43% of those driving cars have two vehicles. The annual VMT for drivers with two vehicles in their household is approximately 4% higher than the average for all households with vehicles.
- Twenty percent of SUV drivers live in rural areas whereas 18% of car drivers live in rural areas. The annual VMT for all drivers living in rural areas is approximately 6% higher than the national average.
- Thirty-three percent of SUV drivers live in areas with a population density of 0 to 500 people per square mile as opposed to 27% of car drivers. The annual VMT for drivers in areas with a population density of 0 to 500 people is approximately 6% over the national average.

WHY BUY A SPORT UTILITY VEHICLE?

As stated, the sales of SUVs have increased dramatically, especially during the past ten years. Many people are referring to the increase in SUV sales as a fad, based on the purchaser perception that they are fashionable and make a statement about an active or high-income lifestyle. (Actually, purchase costs vary widely from the economy versions to the luxury models, and the longevity of the SUV popularity makes it unlikely to be a fad.) Popularity of SUVs could also be encouraged by the relatively low fuel prices and good fuel availability in the U.S. and by the absence of public pressure to conserve energy or to control pollution. In addition, the United States economy is strong, and individuals have more money to spend on luxuries. Furthermore, because the SUV market is so good, almost every manufacturer offers at least one SUV option. Most recently the **luxury** sport utility hit the market, with sticker prices above $45,000.

Advertising plays a major role in influencing purchasing decisions. In the fall of 1999, Ford Motor Company started a new ad campaign for its suite of SUVs; the ads emphasize outdoor adventures, with "no boundaries." The *image* is what sells; the implication is that one **could** go anywhere in the SUV, if one weren't so busy commuting to work and running errands (*24*). Bradsher, in an article in *The New York Times,* stated that few drivers actually take their SUVs off-road. "According to an internal memorandum, the Big Three found in a joint 1995 study that only 13% of sport utility vehicles were driven off-road" (*18*).

Although image is important when making a vehicle purchase, the height of the SUV is also a factor. Market surveys show that "visibility from the driver's seat ties a vehicle's driving performance and interior comfort as the most important attributes that buyers seek" (*7*). Finally, SUV owners profess to feeling more protected and more in control of their safety in traffic when encased within an SUV. These perceptions and other safety issues are examined in the next section.

SUVS AND SAFETY

The public believes that SUVs are safer than cars because they are generally larger (considered a weight advantage in crashes with other vehicles), higher (improved visibility), and more rugged (a vehicle that can climb mountains and cross streams of water will surely be more than adequate on a city street). Recently, however, the Insurance Institute for Highway Safety, Consumers Union, and the National Highway Traffic Safety Administration (NHTSA) published reports that indicate SUVs are not as safe as they might appear to be.

Table 3 shows the number of fatalities from 1980 through 1998 for SUV-involved crashes in small, medium, and large SUV categories and compares these numbers with total highway fatalities (*26*). The numbers of SUV fatalities in this table are the sum of SUV occupants, occupants of non-SUV vehicles (when the crash involved an SUV), and non-motorists. As shown in Table 3, the number of fatalities involving SUVs is increasing, as is the percentage of SUV-related fatalities over total fatalities. While the number of total highway fatalities fell from 51,091 in 1980 to 41,471 in 1998 (a reduction of 18.83%), SUV-involved fatalities rose from 991 to 4,607, during the same time period.

However, there are many more SUVs on the roads today than there were in the 1980s, or even the early 1990s. Figure 3 compares the share of SUV registrations (over total registrations) and the share of SUV-involved fatalities (over all fatalities) between 1985 (the earliest registration data available to ORNL) and 1998. As can be seen in this figure, the share of SUV fatalities is increasing but not faster than the increase in the share of SUVs on the road.

Based on a comparison of fatality data for SUVs to other vehicles, the registered-vehicle-fatality rate (defined as number of fatalities per number of registered vehicles) for SUVs is higher than the registered-vehicle-fatality rate for other vehicles. Figure 4 shows the fatality rates for all vehicles and for SUVs since 1985.

The Insurance Institute of Highway Safety has published some fatality/exposure comparisons by vehicle type and size. According to their data, the fatality rate is highest for small and very small cars, medium-sized pickups, and small SUVs. The fatality rate is lowest for occupants of SUVs weighing over 5,000 pounds.

An overall "safety" factor, when defined as vehicle crashworthiness (occupant protection in a crash), is difficult to compute. There are various crash tests for head-on, frontal offset, side impact, and rollover tests, but there is no comprehensive scale to weight results from different types of tests. Although crash statistics indicate that large vehicles provide more protection than small vehicles in crashes, there is no methodology to compare crash test results across vehicle models in different size categories (*25*). Actually, crash test results are followed by a caution that the ratings are valid only for vehicles of approximately the same weight.

Safety concerns related to SUVs fall into two categories: (1) occupants of the SUV and (2) non-occupants of the SUV in multiple-vehicle and non-motorist crashes involving an SUV. Occupants of SUVs are in greater danger of rollover crashes than are automobile occupants. SUVs tend to roll over more easily than automobiles or minivans because of their high centers of gravity, greater weight, and off-road tires, all of which hinder maneuverability (*7*). Almost 81% of all small SUV, single-vehicle fatalities result from rollover crashes. "The single-vehicle rollover death rate in these vehicles in 1998 was more than 5 times as high as the rate in the largest cars (110 deaths per million registered vehicles compared with 22)" (*28*). Not only are SUVs more likely to tip and to roll over than are non-SUVs, their construction does not provide the same protection as does that of automobiles (*29*). The proportion of rollover fatalities for occupants of non-SUV vehicles involved in single-vehicle crashes from 1980 through 1998 is much lower (only about 45%) than that of small SUVs.

In multiple-vehicle crashes involving small SUVs, more SUV occupants are fatally injured than occupants of the other vehicle. For multiple-vehicle crashes of medium and large SUVs, the non-SUV occupants are more often fatalities.

Medium and large SUVs pose a potential threat to occupants of other vehicles in crashes, just as any other heavy vehicle would. As the size of the SUV increases, the danger to occupants of the "other" vehicle increases. In collisions with medium-sized SUVs, occupants of the non-SUV suffer twice as many fatalities; in collisions with large SUVs, occupants of the non-SUV suffer three times as many fatalities.

Because the bumper and frame on medium and large SUVs are higher than on cars, the SUV may override the bumpers on a car in a collision, causing more intrusion into the automobile. Side impacts are even more hazardous for the automobile occupants than are frontal crashes. In multi-vehicle crashes, when a car is struck by an SUV in a side-impact collision, the occupants of the car are "27 times more likely to die" (*30*). These dangers are brought on by the SUV's added weight, height, and rigid frame design.

CONCLUSIONS

This study analyzed the growth in popularity of SUVs and examined the impact of SUVs on energy consumption, air quality, and highway safety. The SUV market in the 1990s has seen an increase in the number of available models as well as expanding sales. Since 1990, growth has been greatest for the medium-sized SUV category. It should be noted that while the market for SUVs has grown rapidly, so has the entire light-truck market share. In addition, sales of SUVs, as well as light trucks, are projected to continue to increase between 2000 and 2003.

Several possible reasons have been suggested to explain the popularity of SUVs:

- a sign of economic wellbeing – the percentage of total household expenditures for vehicle purchases and fuel costs has remained almost constant, as the available income has increased in the 1990s,
- a perception of safety – the size of the vehicle and its greater visibility give a perception of safety, and
- "utility" – the average U.S. citizen is more mobile than ever; the SUV combines the hauling/towing power of a pickup truck with the roominess and seating capacity of a minivan.

Though many have called the rising popularity of SUVs a "fad," with over 16 million registered SUVs (over 3 million sold in 1999 alone – 19% of all light vehicle sales), the SUV is going to be very visible on our highways for years. If the economy takes a down swing or fuel prices increase substantially, sales may begin to stabilize or decline. The popularity of SUVs, however, is not based on vehicle price or fuel economy but on the sporty, rugged image of the vehicle and a perception of safety when encased within its sturdy frame. These reasons for purchasing an SUV are not likely to change. Therefore, SUV popularity will almost certainly continue at the forecast rate (over 3 million units annually after 2000).

Except for those in the small-size category, SUVs generally use more fuel and emit more pollutants than automobiles. In addition, because SUV owners drive more miles per year than the average automobile owner, these additional fuel uses and pollutant emissions are compounded. Even small SUVs use more fuel annually than large cars; therefore, the popularity of SUVs increases the nation's dependency on imported oil and comes at a cost to the environment.

As the number of SUVs on the highways grows, the fatal crashes involving SUVs also increases, particularly the medium SUVs, which are the best sellers. In 1998, Polk data indicated that 8.7% of light vehicles were SUVs. During this same year, 11.1% of all fatalities were in crashes that involved SUVs. The fatality rate for SUVs is higher than that of non-SUVs. Does this mean that SUVs are dangerous? No one can say for sure. Usually, larger, heavier vehicles protect their passengers in crashes better than smaller, lighter vehicles. Therefore, larger, heavier SUVs may have safety advantages (for their occupants) when compared to smaller, lighter vehicles. Smaller SUVs would not have the same advantage. And there are certainly concerns about SUV rollovers. Small SUVs are involved in more single-vehicle rollover fatalities than non-SUVs. Purchasing decisions, however, will most often be made by whether the buyer *feels* safe in the vehicle, instead of using hard facts. The safety of these vehicles, therefore, may simply be in the eye of the beholder.

What does the future hold? As new models are developed, their fuel economy may improve, as may their emissions controls. Manufacturers of small, economy cars will develop marketing strategies that will emphasize the advantages of smaller vehicles to a particular market. Some may realize that 4-wheel-drive is not a necessity on city streets. But the SUV will continue as a significant player in the personal vehicle industry and will continue to be useful as a station wagon/minivan/pickup truck/all-terrain vehicle — rolled into one.

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LIST OF FIGURES

TABLE 1 Currently Available SUVs by Size Category, Model Year 1999[a]

Nameplate	Liters (Low Value)	Liters (High Value)	Wheel-Base (inches)	Gross Vehicle Weight (lbs)	MY 1999 Sales	Low Mpg[b]	High Mpg[b]	Est. Ghg[c] (Tons/Yr)	Low Base Price[d]	High Base Price[d]
Small SUVs (engine < 3.0 liters)										
Chevrolet Tracker	1.6	2.0	86.6	3,100	32,569	22-25	25-28	11-12	$14,000	$16,300
Honda Cr-V	2.0	-	103.2	4,740	115,614	22-25	-	12	$19,000	$20,900
Isuzu Amigo	2.4	3.2	96.9	4,650	9,972	17-21	21-24	12-15	$16,300	$20,745
Kia Sportage	2.0	-	104.3	4,200	46,645	19-23	-	13-14	$15,200	$19,000
Subaru Forester	2.5	-	99.4	4,110	50,582	21-26	21-27	12-13	$19,200	$22,700
Suzuki Sidekick 2door	1.7	-	86.6	3,307	669	23-26	-	11-12	$13,500	$19,800
Suzuki Grand Vitara	2.5	-	97.6	3,990	24,222	18-20	19-22	11-14	$18,400	$20,400
Suzuki Vitara 2 Door	1.6	2.0	86.6	3,373	4,666	22-25	25-28	11-12	$13,900	$18,400
Toyota Rav4	2.0	-	86.6	3,649	61,942	22-26	24-29	7-12	$16,100	$18,200
Sales-Weighted Avg.			**98.3**			**26.4**			**$17,833**	
Medium Suvs (3.0 Liters <= Engine < 5.0 Liters)										
Acura Slx	3.5	-	108.7	4,740	689	15-19	-	17	$36,800	-
Chevrolet S10 Blazer	4.3	-	100.5	4,850	220,197	15-18	17-23	14-16	$19,000	$33,300
Ford Explorer	4.0	4.9	101.7	4,811	439,250	14-19	18-23	15-18	$20,600	$35,100
Gmc Jimmy	4.3	-	100.5	4,850	72,527	15-18	17-23	14-16	$19,100	$31,600
Gmc Envoy	4.3	-	107.0	5,350		15-18	-	n/a	$34,125	-
Honda Passport	3.2	-	106.4	n/a	24,826	16-20	18-21	15	$23,100	$29,400
Infiniti Qx4	3.3	-	106.3	5,150	21,194	15-19	-	17	$36,000	-
Isuzu Rodeo	2.2	3.2	106.4	4,850	61,997	16-20	21-24	13-15	$18,700	$31,100
Isuzu Trooper	3.5	-	108.7	5,510	19,018	15-19	16-19	16-17	$27,600	-
Isuzu Vehicross	3.5	-	91.8	4,652	889	15-19	-	15	$29,400	-
Jeep Cherokee	2.5	4.0	101.4	4,900	162,430	16-21	21-25	12-15	$16,600	$23,200
Jeep Wrangler	2.5	4.0	93.4	4,450	88,908	15-18	18-20	14-16	$14,900	$20,700
Jeep Grand Cherokee	4.0	4.7	105.9	n/a	288,264	15-19	16-21	19	$26,500	$34,700
Land Rover Defender	3.9	-	110.0	n/a	10	15-19	-	n/a	$34,600	-
Land Rover Discovery II	3.9	-	100.0	6,019	19,590	13-16	14-17	18-19	$34,800	-
Land Rover Range Rover	3.9	4.6	108.1	6,130	7,454	13-16	-	19	$58,600	$66,600
Lexus Rx300	3.0	-	103.0	4,950	66,734	18-22	-	n/a	$32,500	$33,900
Lexus Lx450/470	4.7	-	112.2	6,470	15,281	13-16	-	19	$56,700	-
Mercedes-Benz Ml320	3.2	-	111.0	6,000	36,474	17-21	-	15-16	$35,500	-

Nameplate	Liters (Low Value)	Liters (High Value)	Wheel-Base (inches)	Gross Vehicle Weight (lbs)	MY 1999 Sales	Low Mpg[b]	High Mpg[b]	Est. Ghg[c] (Tons/Yr)	Low Base Price[d]	High Base Price[d]
Mercedes-Benz Ml430	4.3	-	111.0	6,000	6,948	15-18	-	14-16	$44,400	-
Mercury Mountaineer	4.0	4.9	111.6	5,050	48,114	14-19	15-20	16-18	$27,800	$30,200
Mitsubishi Montero	2.3	3.5	107.3	5,730	4,691	16-18	22-24	16-17	$31,800	-
Mitsubishi Montero Sport	3.0	3.5	107.3	5,350	46,161	15-18	17-20	12-15	$18,800	$33,100
Nissan X-Terra	2.4	3.3	104.3		26,940	15-19	19-24	15-19		
Nissan Pathfinder	3.3	-	106.3	5,150	68,526	15-19	17-19	15-17	$24,700	$33,500
Oldsmobile Bravada	4.3	-	107.0	5,300	28,330	16-20	-	16	$31,700	-
Toyota Land Cruiser Wagon	4.7	-	112.2	6,470	18,179	13-16	-	19	$47,000	-
Toyota 4runner	2.7	3.4	105.3	5,250	126,970	17-20	18-23	13-16	$21,500	$36,200
Sales-Weighted Avg.			**103.4**			**20.4**			**$28,754**	
Large Suvs (Engine >= 5.0 Liters)										
Am General Hummer	6.5	-	130.0	10,300	n/a	n/a	-	n/a	$69,200	$86,500
Cadillac Escalade	5.7	-	117.5	8,600	18,860	12-16	-	8-10	$46,500	-
Chevrolet C/K1500 and C/K2500 Suburban	5.7	6.5	131.5	6,800	135,160	14-18	-	18	$26,400	$30,500
Chevrolet C/K1500 Tahoe	5.7	6.5	111.5	6,250	132,035	12-16	15-19	18-19	$24,700	$33,100
Dodge Durango	4.7	5.9	115.9	6,400	191,649	12-16	15-20	19-20	$26,600	-
Ford Expedition	4.6	5.4	119.1	6,750	242,711	12-16	13-18	16-19	$30,000	$39,600
Gmc C/K1500 and C/K2500 Suburban	5.7	-	131.5	6,800	46,397	14-18	-	18	$26,400	$31,000
Gmc C/K1500 Yukon	5.7	6.5	117.5	6,800	56,176	12-16	15-19	18	$30,700	$43,600
Lincoln Navigator	5.4	-	119.0	7,000	40,987	12-16	13-17	16-17	$41,400	$45,000
Sales-Weighted Avg.			**119.7**			**17.1**			**$30,538**	

[a]In this table, "n/a" means not available, and "-" means there is no "high" value.

[b]Differences in miles-per-gallon (MPG) ranges are caused by factors such as two-wheel-drive (2WD) vs. four-wheel-drive (4WD), number of cylinders, and/or manual vs. automatic transmission.

[c]GHG = green house gas.

[d]Differences in base price are based on factors such as 2WD vs. 4WD, convertible or not, and/or 2-door vs. 4-door.

Sources: Base prices from Crain Communications, *Automotive News, '99 Market Data Book,* May 1999, pp. 91-104, Model Year 1999. Sales and specifications are from the Oak Ridge National Laboratory Light Vehicle MPG and Market Shares System. Greenhouse gas emissions estimates are from DiCicco and Martin, "Green Guide to Cars and Trucks," Model Year 1998 and 1999 editions, American Council for an Energy-Efficient Economy.

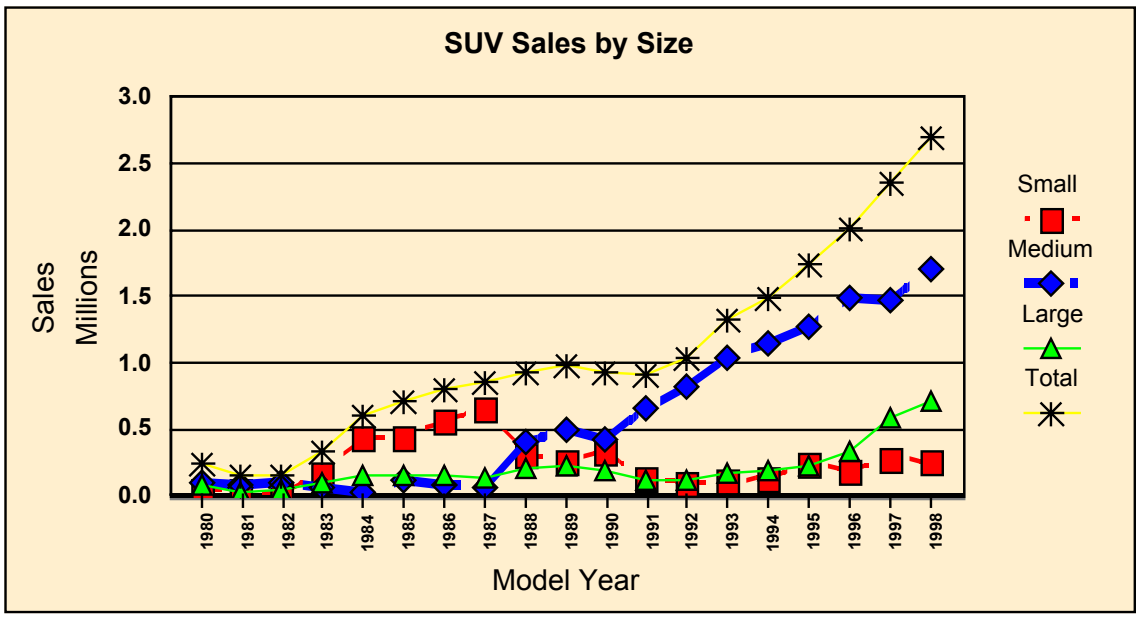

FIGURE 1 SUV Sales by Engine Size for Model Years 1980 through 1999
Source: Oak Ridge National Laboratory, Light Vehicle MPG and Market Shares System.

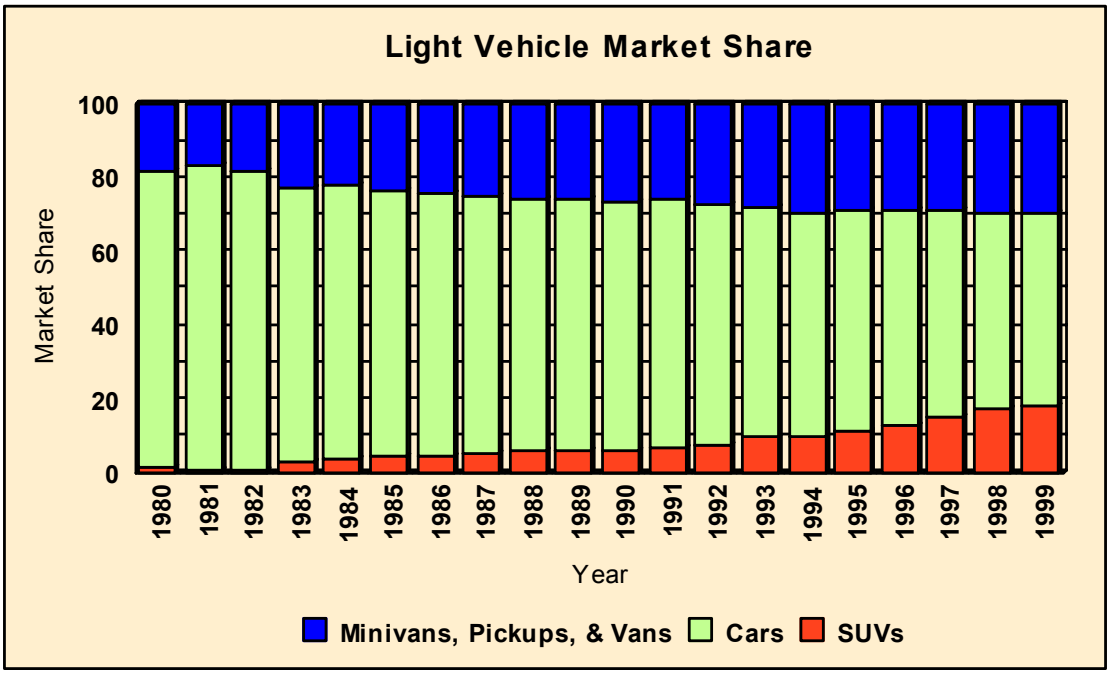

FIGURE 2 Market Shares of Sales of SUVs in Comparison with Sales of Other Light Vehicles, 1980-1999
Source: Oak Ridge National Laboratory, Light Vehicle MPG and Market Shares System.

TABLE 2 Estimated Fuel Economy and Annual Fuel Use by Size Class

Automobiles	Sales-weighted fuel economy (miles per gallon)	Annual fuel use[a] (gallons)	Light trucks	Sales-weighted fuel economy (miles per gallon)	Annual fuel use[a] (gallons)
Subcompact car	31.4	382	Small pickup	24.5	492
Compact car	30.8	389	Small SUV	27.3	507
Midsize car	26.9	446	Minivan	23.3	612
Minicompact	25.5	470	Std. pickup	19.1	632
Large car	24.6	487	Medium SUV	20.3	682
			Standard van	18.2	783
			Large SUV	17.3	801

[a] Based on annual miles of 11,988 for all automobile classes; 14,256 for minivans and standard vans; 13,853 for all SUV classes; and 12,064 for all pickup classes.

Source: Average annual miles from the Nationwide Personal Transportation Survey divided by fuel economies from the ORNL Light Vehicle MPG and Market Shares System.

TABLE 3 Fatalities in SUV-Involved Crashes, 1980-1998, by SUV Size Category

Year	Total highway fatalities	Crash fatalities, including all vehicle occupants and non-motorists[a]							
		Small SUVs	Percent small	Medium SUVs	Percent medium	Large SUVs	Percent large	Total SUVs	Percent of total
1980	51,091	0	0.0%	586	1.1%	405	0.8%	991	1.9%
1981	49,301	38	0.1%	631	1.3%	431	0.9%	1,100	2.2%
1982	43,945	388	0.9%	174	0.4%	222	0.5%	784	1.8%
1983	42,589	366	0.9%	156	0.4%	235	0.6%	757	1.8%
1984	44,257	368	0.8%	207	0.5%	253	0.6%	828	1.9%
1985	43,825	425	1.0%	469	1.1%	357	0.8%	1,251	2.9%
1986	46,087	368	0.8%	907	2.0%	468	1.0%	1,743	3.8%
1987	46,390	312	0.7%	982	2.1%	453	1.0%	1,747	3.8%
1988	47,087	276	0.6%	1,176	2.5%	486	1.0%	1,938	4.1%
1989	45,582	250	0.5%	1,385	3.0%	520	1.1%	2,155	4.7%
1990	44,599	280	0.6%	1,448	3.2%	574	1.3%	2,302	5.2%
1991	41,058	373	0.9%	1,560	3.8%	510	1.2%	2,443	6.0%
1992	39,250	339	0.9%	1,602	4.1%	448	1.1%	2,389	6.1%
1993	40,150	414	1.0%	1,846	4.6%	456	1.1%	2,716	6.8%
1994	40,716	449	1.1%	2,160	5.3%	513	1.3%	3,122	7.7%
1995	41,817	426	1.0%	2,466	5.9%	567	1.4%	3,459	8.3%
1996	42,065	460	1.1%	2,830	6.7%	554	1.3%	3,844	9.1%
1997	42,013	506	1.2%	3,190	7.6%	614	1.5%	4,310	10.3%
1998	41,471	498	1.2%	3,457	8.3%	652	1.6%	4,607	11.1%

[a]Percentages represent the percent of fatalities in a particular size category to total fatalities.

Source: National Highway Traffic Safety Administration, "Traffic Safety CD-ROM, Fatality Analysis Reporting System (FARS): 1975-1994, and General Estimates System (GES): 1988-1994," BTS-CD-10, Bureau of Transportation Statistics, U.S. Department of Transportation; also FARS On-Line Query System at http://www-fars.nhtsa.dot.gov/www/query.html.

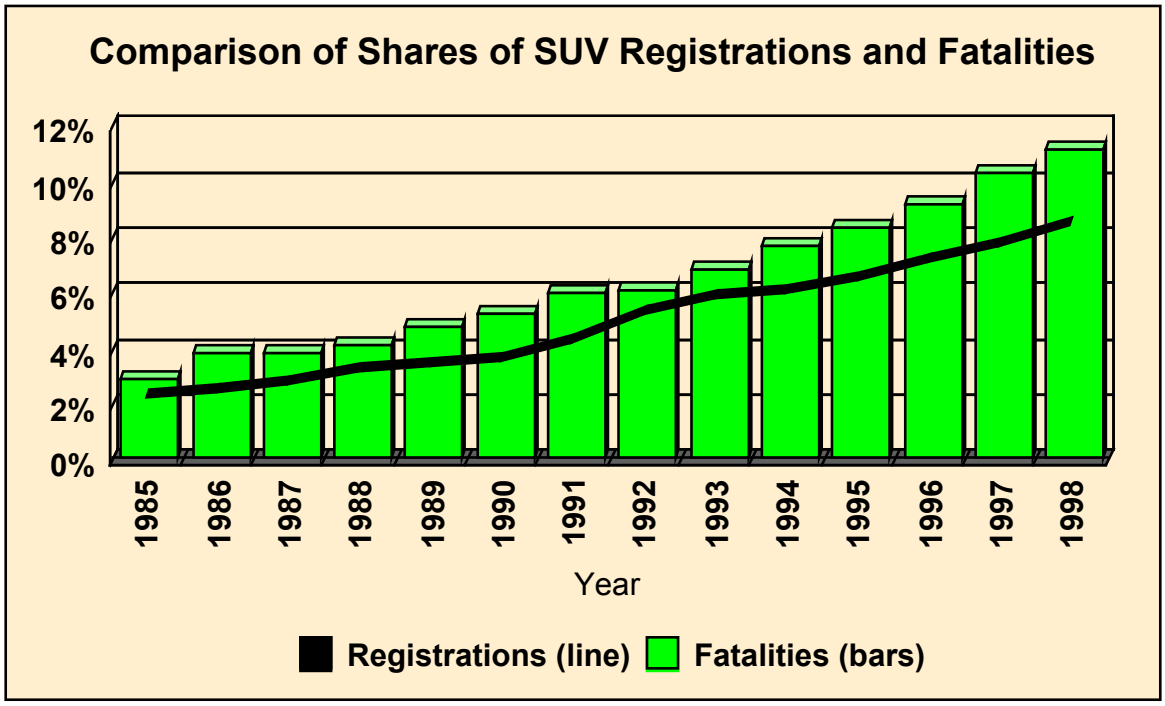

FIGURE 3 Comparison of the Share of SUV Registrations to Total Registrations (line) and the Share of SUV-Involved Fatalities to Total Fatalities (bars), 1985-1998. Source: The Polk Company, National Vehicle Population Profile 1985-1998, computer data files, and National Highway Traffic Safety Administration, "Traffic Safety CD-ROM" and FARS On-Line Query System at http://www-fars.nhtsa.dot.gov/www/query.html.

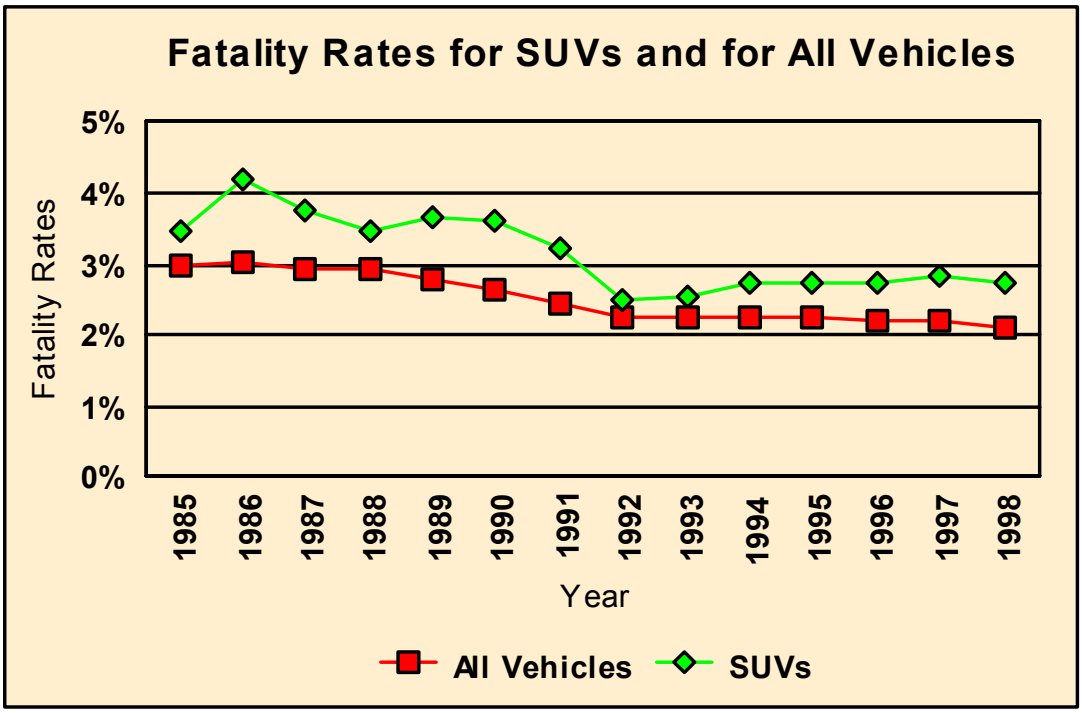

FIGURE 4 Fatality Rates for All Vehicles and for SUVs, Where Fatality Rate Is Defined as the Number of Fatalities per 100 Registered Vehicles
Source: The Polk Company, National Vehicle Population Profile 1985-1998, computer data files, and U.S. Department of Transportation, National Highway Traffic Safety Administration, "Traffic Safety CD-ROM" and FARS On-Line Query System at http://www-fars.nhtsa.dot.gov/www/query.html.