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Report to the Chairman, Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, House of Representatives

July 1992

MOTOR VEHICLE REGULATIONS

Regulatory Cost Estimates Could Be Improved

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Resources, Community, and
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July 9, 1992

The Honorable John D. Dingell
Chairman, Subcommittee on Oversight and
Investigations
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

In response to your request, this report evaluates federal and industry methods of estimating the cost of proposed safety, emissions, and fuel economy regulations affecting the automobile. We also evaluated the extent to which federal agencies consider total regulatory costs in any one year. The report contains recommendations to the Secretary of Transportation and the Administrator of the Environmental Protection Agency on improving their cost estimates.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to the Secretary of Transportation; the Administrator, Environmental Protection Agency; the Administrator, National Highway Traffic Safety Administration; and the Secretary of Energy. We will also make copies available to others on request.

This work was performed under the direction of Kenneth M. Mead, Director, Transportation Issues, who can be reached at (202) 275-1000 if you or your staff have any questions. Other major contributors are listed in appendix III.

Sincerely yours,

J. Dexter Peach
Assistant Comptroller General

Executive Summary

Purpose

Federal safety, emissions, and fuel economy regulations have helped to reduce highway deaths and injuries, decrease motor vehicle pollutants, and improve fuel economy. These benefits, however, are not without costs to both the manufacturer and the consumer.

Concerned about widely different regulatory cost estimates made by federal agencies and motor vehicle manufacturers, the Chairman, Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce, asked GAO to determine (1) the methods federal agencies and the automobile industry use to estimate the cost of proposed automobile regulations, (2) the reasons for any differences between federal and industry estimates, and (3) the extent to which federal agencies coordinate and exchange information on (a) the cost of individual proposed vehicle regulations and (b) the total cost of vehicle regulations in any one year.

Background

The Department of Transportation (DOT), the Environmental Protection Agency (EPA), and the Department of Energy (DOE) have the primary federal responsibility for regulations that affect the motor vehicle industry. DOT's National Highway Traffic Safety Administration (NHTSA) establishes vehicle safety regulations and Corporate Average Fuel Economy (CAFE) standards. EPA establishes vehicle emissions control regulations and measures the fuel economy performance of various vehicles. DOE is responsible for consulting with NHTSA on CAFE standards.

Federal agencies determine the costs and benefits of proposed rules likely to cost over $100 million per year under Executive Order 12291, issued in 1981 by the Office of Management and Budget (OMB). During the rulemaking process, interested parties can comment on the cost and benefit estimates determined by the federal agencies. OMB reviews proposed regulations for cost-effectiveness.

Results in Brief

Federal agencies and the automobile industry estimate regulatory costs by figuring component costs and then adding in the costs of manufacturer and dealer overhead and profit (markup) to arrive at the consumer cost. However, cost estimates made by federal agencies and industry often vary, sometimes substantially. For example, NHTSA estimated the consumer cost of a driver's-side air bag at $220, while industry estimated the cost at about $500. The cost differences are due, in large part, to several factors. First, there is a great deal of uncertainty about what the actual design, and

therefore the final components, of the new system will be because agencies set performance levels but do not specify equipment design. Second, the agencies and the motor vehicle industry use different data and assumptions on vehicle production volumes, manufacturer and dealer markups, and the cost of components. In particular, GAO observed that agencies generally assume lower manufacturer and dealer markups than industry does.

Federal agencies also differ amongst themselves with regard to certain cost-estimating practices, including the calculation of manufacturer and dealer markups. EPA and NHTSA estimate the markups differently and arrive at substantially different results. Also, NHTSA does not estimate an overall consumer cost for fuel economy improvements, while DOE does.

Although federal agencies consider the potential interaction among safety, emissions, and fuel economy regulations when directed to do so, they do not consider interactive costs or the total cost to industry in a given year. Instead, agencies estimate the cost of individual regulations under their jurisdiction separately. While OMB reviews agencies' cost estimates, it does not assess either the interactive or the total cost of regulations.

Principal Findings

Cost Estimates Differ for a Number of Reasons

Agency and industry cost estimates differ in part because the two groups do not share much cost information. According to NHTSA and EPA officials, industry generally does not comment on cost during the regulatory comment period, and when industry does comment, it provides little supporting data unless the proposed regulation is significant and controversial. Industry officials said they do not know enough about how agencies arrive at their estimates to make detailed comments. Also, manufacturers do not want to appear to be opposing socially beneficial regulations, such as those to increase safety or control pollution, on the basis of cost. Therefore, they are more likely to comment on the technical aspects of a rule. In regard to fuel economy, for example, the debate has focused largely on manufacturers' technological ability to meet tougher fuel economy standards and not on the cost.

When motor vehicle manufacturers do comment on the costs of proposed regulations, their estimates are usually higher than the agencies' estimates.

For example, NHTSA estimated the cost of center, high-mounted rear stoplights at $4.13-$7.07 for passenger cars, while industry estimated the costs at $8-$17. Similarly, EPA has estimated the cost of an onboard system to recover refueling vapors at approximately $12, while industry consultants believe the system will cost between $40 and $100 initially, and less over time.

One general reason cost estimates may differ is that industry views the cost of additional regulations in the context of overall pricing and competitive strategies, while agencies view each regulation as a separate cost entity. There are a number of more specific reasons as well. First, agencies base their estimates on a large production volume and average costs across the industry. However, individual models produced by the three largest domestic auto manufacturers have very different volume and cost profiles, which an industrywide cost estimate will not reflect. Second, the agencies' estimates of manufacturer and dealer markups are generally lower than industry's. Third, the agencies' cost methodology assumes that all regulatory costs are passed directly on to the consumer, but manufacturers said they are not always able to pass all costs on because of competitive pressures. Finally, agencies do not always have the most current cost data from industry, and, in some cases, EPA and NHTSA use their own cost data bases—developed in the late 1970s—which are not applicable to current vehicles.

Agencies' Cost-Estimating Practices Vary

Certain cost-estimating practices vary among federal agencies. EPA and NHTSA, for example, use different methods for determining manufacturer and dealer markups, and arrive at substantially different outcomes. NHTSA estimates the markup at approximately 51 percent of cost, while EPA estimates it at around 26 percent of cost. Neither agency has attempted to reconcile this difference. Agency methods for estimating fuel economy costs also differ. NHTSA estimates the consumer cost of several options that could be used to improve fuel economy. However, NHTSA does not select from among these options the ones it believes manufacturers are most likely to use and therefore does not estimate a consumer cost per vehicle. DOE, however, selects the options for improving fuel economy that it believes manufacturers will most likely implement and estimates a per-vehicle consumer cost based on those options.

Agencies Do Not Consider the Interactive or Total Cost of Regulations

Agencies consider the potential interactive effects of safety, emissions, and fuel economy regulations when required to by law or administrative procedure, but do not consider the additional cost such interactions may

impose. NHTSA, for example, must consider the effects of safety and emissions regulations on manufacturers' fuel economy capability when formulating fuel economy standards. However, the agency is not required to estimate the potential interactive cost of implementing all of these regulations at the same time. Similarly, EPA and NHTSA meet quarterly to discuss upcoming safety and emissions regulations and any potential interactive effects, but the agencies are not required to incorporate the costs of such interaction in their individual cost estimates.

Agencies are not required to and do not consider the total yearly cost to the auto industry of all safety, emissions, and fuel economy regulations when formulating new regulations. Furthermore, although OMB reviews agency cost analyses of proposed major regulations under Executive Order 12291, OMB evaluates each regulation individually and does not assess the overall impact or total costs of all regulations affecting one sector of the economy. OMB is encouraging agencies to submit cost estimates with their proposed regulatory agendas.

Recommendations

To improve cost estimates, GAO is recommending, among other things, that the Secretary of Transportation and the Administrator, EPA,

- standardize their cost-estimating methods wherever possible, particularly when calculating the manufacturer and dealer markups;
- publicize the method agreed upon and solicit comments from industry and other interested parties; and
- update and combine their data bases for calculating the component costs of proposed safety and emissions regulations.

Other recommendations for improving motor vehicle regulatory cost estimates are contained in chapters 2 and 3.

Agency Comments

GAO discussed the information contained in this report with officials in NHTSA's Office of Rulemaking and Office of Plans and Policy; EPA's Office of Mobile Sources and Office of Policy, Planning, and Evaluation; DOE's Energy Demand Policy Office; and the motor vehicle industry. Agency and industry officials generally agreed with the facts presented, and their comments were incorporated where appropriate. As requested, GAO did not obtain written agency comments.

Contents

Abbreviations

BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
CAFE	Corporate Average Fuel Economy
DOE	Department of Energy
DOT	Department of Transportation
EPA	Environmental Protection Agency
GAO	General Accounting Office
LTV	light trucks and vans
MVMA	Motor Vehicle Manufacturers Association
NHTSA	National Highway Traffic Safety Administration
OMB	Office of Management and Budget
RIA	Regulatory Impact Analysis
RPE	retail price equivalent

Introduction

Federal safety, emissions, and fuel economy regulations have resulted in safer, less-polluting, and more efficient automobiles for U.S. consumers. These benefits are not without costs, however, which are borne by auto manufacturers at the outset and passed on to the consumer in the long run. In evaluating proposed major regulations, federal agencies are required to prepare Regulatory Impact Analyses (RIA) that include an estimate of benefits and costs. Agencies prepare these analyses as part of the regulatory process, which includes a time period for public comment.

Federal Agencies Regulate Safety, Emissions, and Fuel Economy

Three federal agencies are responsible for safety, emissions, and fuel economy regulations that affect the auto industry. The Department of Transportation's (DOT) National Highway Traffic Safety Administration (NHTSA) develops and implements safety and fuel economy regulations, the Environmental Protection Agency (EPA) develops and implements emissions regulations and supplies NHTSA with data on motor vehicle fuel economy, and the Department of Energy (DOE) consults with NHTSA on fuel economy regulations. Regulations affecting the auto industry, therefore, are handled by three separate agencies, although the regulations have overlapping and sometimes offsetting effects.

NHTSA Controls Safety Regulations

NHTSA is responsible for developing, enforcing, and testing federal automobile safety regulations under two of its three authorizing laws (the National Traffic and Motor Vehicle Safety Act of 1966 and the Motor Vehicle Information and Cost Savings Act). The regulations fall into three categories: (1) crash avoidance, (2) occupant protection, and (3) protection against fire. Manufacturers are responsible for testing and certifying compliance with the federal safety regulations, and NHTSA tests a limited number of motor vehicles each year to monitor industry compliance.

NHTSA safety regulations are initiated in three ways. One avenue is by statute, in which the Congress specifies that a particular safety standard be implemented. The second source is citizen petition, in which members of the public ask NHTSA to issue a regulation to rectify what they perceive as an auto safety problem. Third, NHTSA has the authority to initiate standards on its own, based on the conclusion of the NHTSA Administrator that a safety problem exists that can be corrected by federal regulations. Most safety regulations are initiated under the agency's own authority or by citizen petition.

Since 1967, NHTSA has issued standards aimed at increasing vehicle safety, including standards requiring head restraints, side impact protection, passive restraints (automatic belts or air bags), increased roof crush resistance, and center, high-mounted rear stoplights. These standards and others have helped reduce the highway fatality rate per 100 million vehicle miles traveled from 3.3 in 1980 to an estimated 1.9 in 1991. NHTSA hopes to bring this rate down even further by issuing additional safety standards for passenger cars and extending current passenger car standards to light trucks and vans.

EPA Is Responsible for Emissions Regulations

The Clean Air Act of 1970 and subsequent amendments in 1977 and 1990 established air quality goals for the nation, including reductions in motor vehicle emissions. EPA is charged with implementing the provisions of the Clean Air Act and has authority to issue rules regarding mobile source emissions under section 202a of that act. The major standards pertaining to the auto industry concern reduction of nitrogen oxide, hydrocarbons, and carbon monoxide emitted from mobile sources of pollution, such as motor vehicles.

EPA emissions regulations set limitations on pollution from both mobile and stationary sources. In contrast to NHTSA's safety regulations, many of EPA's regulatory actions are specifically mandated in legislation. The Clean Air Act Amendments of 1990, for example, set out specific reductions to be achieved for a number of pollutants as well as timetables for those reductions.

As a result of regulations required by the Clean Air Act of 1970 and subsequent amendments, harmful automobile emissions have been reduced. Since federal standards went into effect, both hydrocarbons and carbon monoxide have been reduced by 96 percent, while nitrogen oxide emissions have been reduced by 76 percent, using cars with no emissions controls as a baseline measure. Without further emissions reductions, however, these benefits will be offset by the increase in the number of vehicles on the road (vehicle registrations increased by 68 percent between 1970 and 1988) and the number of miles driven (currently increasing at a rate of 25 billion miles per year). The Clean Air Act Amendments of 1990 require further reductions of mobile source pollutants.

NHTSA, EPA, and DOE Cooperate on Fuel Economy Regulations

The Energy Policy and Conservation Act amended the Motor Vehicle Information and Cost Savings Act by adding a new title (title V) requiring motor vehicle fleets to meet certain fuel economy standards, referred to as Corporate Average Fuel Economy standards, or CAFE. NHTSA is responsible for implementing the standards, in consultation with DOE, and EPA is responsible for collecting data on the fuel economy performance of various models.

The Congress set specific fuel economy standards for passenger cars for 1978-80, and for 1985 and thereafter. The Secretary of Transportation was given the authority to set standards for the intervening years. The Secretary may amend the standards within a certain range for a given model year, if necessary. DOT was also given the authority to set standards for light trucks for 1979 and thereafter. The Secretary must consider four factors when setting or modifying the standard: (1) technological feasibility, (2) economic practicability, (3) the effect of other federal motor vehicle standards on fuel economy, and (4) the nation's need to conserve energy. DOT conducts its cost analyses of fuel economy within the framework of these four considerations. EPA supplies NHTSA with current vehicle mileage data for the CAFE analysis, and DOE acts as a consultant to NHTSA in setting CAFE standards.

In 1978, when the first CAFE standard went into effect, the fleet fuel economy average for passenger cars was 19.9 miles per gallon. By 1991, that average had improved to 28.2 miles per gallon, an increase of 42 percent (the domestic auto fleet improved by 46 percent and the import auto fleet by 9 percent). Concerned with oil security and the potential environmental problems caused by carbon dioxide emissions, the Congress is again considering raising CAFE standards. A Senate bill introduced in the 102nd Congress would require fuel economy improvements of 40 percent over 1988 performance by 2001, while a companion House of Representatives bill would require improvements of 60 percent over 1988 performance by 2001.

Auto Regulations Interact

Safety, emissions, and fuel economy regulations, which continue to affect the auto industry, interact with each other in a number of ways. For example, safety and emissions regulations often require the addition of equipment to the vehicle, resulting in increased weight that detracts from fuel efficiency. On the other hand, EPA officials claim that certain emissions control equipment has the side benefit of improving engine efficiency, thereby improving fuel economy in the long term.

Safety and emissions regulations may sometimes be at odds as well. For example, the Congress directed EPA to consult with NHTSA on the safety of on-board fuel vapor recovery systems, particularly with regard to an increased potential for engine fires, before issuing a rulemaking on such systems. EPA did so, and NHTSA reported that it could not certify onboard systems as safe. Similarly, manufacturers, NHTSA, and some public interest groups believe that requirements for increased fuel economy can affect safety. Manufacturers claim that the only way they can meet stricter standards is by reducing the size of the current fleet of cars. NHTSA and certain public interest groups consider small cars to be inherently less safe than larger cars. Other public interest groups believe that all cars are safer today and that further improvements may largely mitigate the safety differences between small and large cars. Also, a GAO report has shown that the linkage between size and safety is not always clear.[1]

Because of these possible interactions, costs calculated for individual regulations may be somewhat misleading. In some cases, there may be interactive costs as well, when individual safety, emissions, and fuel economy regulations are implemented at the same time. For example, if adding safety or emissions equipment decreases fuel economy, it will cost more to arrive at a given level of fuel economy than it would in the absence of safety and emissions regulations.

Appendix I provides a more complete listing of current and anticipated federal safety, emissions, and fuel economy regulations.

Executive Orders Require Cost Analysis and Planning for Major Regulations

Executive Order 12291 was issued in 1981 "to reduce the burdens of existing and future regulations, increase agency accountability for regulatory actions, provide for presidential oversight of the regulatory process, minimize duplication and conflict of regulations, and insure well-reasoned regulations." Under the order, federal agencies must evaluate the cost-effectiveness of proposed regulations costing $100 million or more per year. This evaluation is published as a Regulatory Impact Analysis (RIA), which is reviewed by the Office of Management and Budget (OMB). Agencies must prepare RIAs for major regulations even if the authorizing legislation precludes consideration of cost in making regulatory decisions, which is the case for a number of EPA statutes.

[1]Highway Safety: Have Automobile Weight Reductions Increased Highway Fatalities? (GAO/PEMD-92-1, Oct. 8, 1991).

Executive Order 12498, issued in January 1985, was designed to structure the rulemaking process even further by requiring agency heads to plan their regulatory program for the upcoming year (beginning April 1 of each year). The regulatory plan is submitted to and reviewed by OMB and may be reviewed by other agencies at OMB's discretion. Regulations proposed by agency heads during the year are evaluated against the regulatory plan established at the beginning of the year. The annual Regulatory Program of the United States Government contains the administration's regulatory priorities, organized by agency.

While the two executive orders gave OMB review authority over both the planned regulatory program and individual regulations, a subsequent memorandum dated June 13, 1986, clarified that agency heads retain ultimate rulemaking authority. In the memorandum, OMB also outlined its intent to restrict communications to OMB from outside parties, such as auto industry officials. Outside parties are instructed to send any comments they have on regulations to the agency responsible, with a copy to OMB.

Objectives, Scope, and Methodology

The Chairman, Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce, asked GAO to determine (1) the methods federal agencies and the automobile industry use to calculate the cost of proposed automobile regulations, (2) the reasons for any differences between federal and industry estimates, and (3) the extent to which federal agencies coordinate and exchange information on (a) the cost of individual proposed automobile regulations and (b) the total cost of vehicle regulations in a model year.

To carry out the first two objectives, we interviewed agency and industry officials responsible for estimating the cost of proposed safety, emissions, and fuel economy regulations. Specifically, we spoke to the Associate Administrator and other officials in NHTSA's Office of Rulemaking and the Director and other officials in NHTSA's Office of Plans and Policy. We also spoke to the Director and other officials in EPA's Office of Mobile Sources and a senior economist and other officials in EPA's Office of Policy, Planning, and Evaluation. We spoke to EPA officials at the Mobile Source Emissions Testing Laboratory in Ann Arbor, Michigan, as well. In addition, we interviewed the Director and a policy analyst in DOE's Energy Demand Policy Office and the DOE contractor who estimates feasible levels of fuel economy attainment. We interviewed Chrysler Corporation, Ford Motor Company, and General Motors Corporation officials through the Motor Vehicle Manufacturers Association and at the individual companies. We

also reviewed the public dockets for a number of past and ongoing regulations to determine the extent and nature of industry comments on cost. We reviewed RIAs and other agency support documents on specific rules to see how the costs of proposed rules were estimated and whether industry comments on cost had been received and incorporated into the final RIAs.

To carry out the third objective, we identified any statutes or regulations on agency coordination. We interviewed agency officials on the extent to which they discussed cost methodology or yearly regulatory costs with officials from other agencies with responsibilities for regulating the auto industry. We also interviewed OMB officials on their role in reviewing agency regulations and reviewed OMB's Regulatory Program of the United States Government and executive orders relevant to agency cost analysis or coordination.

As requested by the Chairman, we focused our work on the initial cost to the consumer of safety, emissions, and fuel economy regulations as reflected in vehicle price increases. We did not examine operating costs over the lifetime of the vehicle and/or operating benefits such as lower fuel bills from increased fuel economy. Nor did we examine other benefits to the individual, such as an increased level of safety, or to society as a whole, such as reduced levels of automobile pollutants.

We conducted our work between February 1991 and January 1992 in accordance with generally accepted government auditing standards, with updates through April 1992. We discussed the information in this report with officials in NHTSA's Office of Rulemaking and Office of Plans and Policy; EPA's Office of Mobile Sources and Office of Planning, Policy, and Evaluation; DOE's Energy Demand Policy Office; and at the Chrysler Corporation, General Motors Corporation, and the Ford Motor Company. These officials generally agreed with the facts presented, and we incorporated their comments where appropriate. As requested, however, we did not obtain written agency comments on a draft of this report.

Agencies and Industry Use Similar Methodology to Estimate Costs but Differ on Consumer Cost Estimates

Agencies responsible for implementing regulations affecting the auto industry use a method similar to that used by industry to estimate the consumer costs of proposed regulations. In many cases, however, the agencies' cost estimates are much lower than those of industry. We found that these differences resulted partly from the use of different data and assumptions by the agencies and industry. Furthermore, agency and industry cost estimates generally are made before the design that industry will use to meet the standard has been finalized, which introduces a measure of uncertainty to the estimate.

Agency and Industry Cost Estimates Differ

When auto manufacturers comment on agency cost estimates for proposed regulations, their estimates are usually higher than the agencies' estimates. For example, in 1984, when calculating the cost of the proposed passive restraint standard, NHTSA estimated the cost of a driver's-side air bag at $220. Industry analysts, on the other hand, projected that driver's-side air bags would cost about $500 for domestic vehicles. Another safety standard on which the agency and industry disagreed was the center, high-mounted rear stoplight. In 1982 and 1990 respectively, NHTSA estimated the cost of the stoplight to the consumer at between $4.13 and $7.07 for passenger cars, and at $9.50 for light trucks and vans (LTV), while industry estimated the cost at $8-$17 for passenger cars and $20 for LTVs.

While manufacturers sometimes place their cost estimates in the public record, few, if any, contest safety regulations on the basis of increased cost. The Motor Vehicle School Bus Safety Amendments of 1974 require a manufacturer seeking to block a safety standard for cost reasons to provide full cost information to the Secretary of Transportation and the public. Trade secrets are exempt from public disclosure but the Secretary is required to prepare an analysis of manufacturers' cost claims. Since at least 1980, no manufacturer has tried to block a safety rule strictly on the basis of cost.

For emissions regulations, EPA and industry also have varied widely in their cost estimates. According to EPA officials, EPA cost estimates are always lower than industry's estimates. One example of this disparity is the rulemaking on onboard refueling vapor recovery systems. In a 1988 report prepared for the Motor Vehicle Manufacturers Association, Sierra Research, Inc., noted that EPA had estimated the consumer cost of the onboard system at $17, while industry estimates ranged from $40 to $85 for large-volume manufacturers to over $100 for small-volume manufacturers. Another study commissioned by the association estimated

the cost to the consumer of the onboard system at $80 initially and $38 in the long term, as changes are incorporated into vehicle redesign. EPA revised its original estimate, and the new estimate was even lower, at $12 for passenger vehicles.[1] EPA has also recently made an initial cost estimate for onboard diagnostic systems, which will alert drivers to emissions-systems malfunctions. The agency estimated the consumer cost at $94 per vehicle for passenger cars. Again, industry analysts believe this figure is too low.

There has been less disagreement between federal agencies and the auto industry on fuel economy costs than on safety and emissions costs because manufacturers are currently more concerned about their technological ability to meet legislatively set fuel economy standards than about costs. Their primary disagreement with federal agencies and the Congress is over what constitutes a feasible level of fuel economy. When agencies and the industry have discussed costs, however, they have disagreed in some areas. For example, in NHTSA's final RIA on CAFE standards for model-year-1989 passenger automobiles, the agency compiled data on the cost of fuel economy technologies from a number of manufacturers as well as from a DOE contractor. NHTSA analysts thought a number of industry cost figures were too high, on the basis of its own analysis of potential fuel economy technologies. In contrast, NHTSA thought that a number of the DOE contractor's cost estimates were too low. NHTSA analysts used their own judgment on costs for publication in the RIA. Again, however, cost is not the primary source of disagreement between federal agencies and the auto industry on fuel economy standards.

We were not able to determine which cost estimates were closer to actual costs because the data available on the actual costs of implementing federal regulations are incomplete or not in a usable format for comparison. Consumer costs relating to safety, emissions, and fuel economy regulations are generally included in the base price of a vehicle and not shown separately in retail prices. Air bags, however, are generally included in the base price for most vehicles but are also offered as an option on a few vehicles. For 1992 model vehicles, the consumer cost for driver's-side air bags ranged from $224 to $800. These costs are in the range of the original agency and industry estimates. They are also in line with one industry official's estimate of less than $400 for current consumer costs for driver's-side air bags.

[1]EPA decided recently not to issue the onboard rulemaking because of safety concerns.

Several organizations have compiled cost data relating to federal regulations. As stated above, however, the data is not entirely suitable for comparing agency and industry cost estimates against actual costs. The Department of Labor's Bureau of Labor Statistics (BLS) publishes figures on motor vehicle regulatory price increases for the yearly producer price index, but BLS often combines categories of regulations (such as fuel economy and emissions), and they are not easily separated. Also, BLS gets its information on annual retail price increases directly from industry and does not perform an independent analysis. We noted that the BLS published price increase for center, high-mounted rear stoplights was $27, which is considerably higher than either the agency or industry cost estimates.

Another potential source of cost figures is the Department of Commerce's Bureau of Economic Analysis (BEA), which publishes Pollution Abatement and Control Expenditures reports. BEA's reports, however, account only for broad categories of spending on pollution control, such as total consumer or business spending in a year on motor vehicle emission abatement. Also, according to an EPA official, the BEA data are not current because the agency has suffered budget cuts and has not been able to get the data it needs. Further, the official said that BEA numbers on capital costs are obtained from BLS, which, as noted above, obtains data directly from industry.

A third source of information on actual costs is agency evaluations made after a regulation has been implemented. NHTSA evaluates selected regulations to determine how close its original estimates came to the actual cost. NHTSA uses the same methodology for evaluations as it does for original estimates, but agency analysts know what components were actually used to implement the regulation when they do the evaluations. For the regulation on center, high-mounted rear stoplights, for example, NHTSA found the average consumer cost to be $9.05, while the agency's original estimate was between $4.13 and $7.07. EPA does not currently evaluate its regulatory cost estimates after the regulation has been implemented.

The Motor Vehicle Manufacturers Association, using annual BLS regulatory cost data, has estimated that the cumulative effect of federal regulations since 1968 has added approximately $2,500 to the price of a 1991 passenger car. We could not confirm the reliability of this estimate, however, for the reasons cited above. Also, we believe that the cumulative cost does not take into account the fact that the cost of regulations declines as added safety, emissions, or fuel economy equipment is

incorporated into vehicles when they are redesigned. By 1991, the cost of a number of regulations implemented in previous years could be negligible.

Appendix II gives further details on agency, industry, and other estimates of the consumer cost of federal regulations.

Agencies Use an Engineering-Based Methodology

Federal agencies responsible for regulations on safety, emissions, and fuel economy determine the cost to the consumer of any proposed regulation using an engineering-based method. That is, the analysis begins with a determination of which components will be needed to fulfill the regulation and the cost of those components. Cost calculations must take into account both variable costs and fixed and mixed costs.[2] Agencies may complete cost estimates within the agency or contract them out. The cost of fuel economy regulations is more difficult to estimate than that of safety and emissions regulations, because fuel economy improvements are more a function of a combination of vehicle changes than of the addition of discrete components.

Estimating the Cost of Safety and Emissions Regulations

Both NHTSA and EPA begin their regulatory cost estimates with an evaluation of the cost of the individual components that make up the additional piece of safety or pollution control equipment required by the proposed regulation. After figuring the component cost, the agencies add in labor and amortized fixed costs. Next, they calculate manufacturer overhead and profit as a fixed percentage of variable costs, using company annual reports and financial statements. Finally, the two agencies add in dealer costs and profit to arrive at the cost to the consumer. The methods NHTSA and EPA use to calculate manufacturer and dealer costs and profit differ, and will be discussed in more detail in chapter 3.

The agencies either estimate costs within the agency or hire a contractor, depending on several factors. When NHTSA performs its own analyses, the agency relies on an internal data base compiled from analyses of passenger car equipment that determine the components that make up a particular piece of equipment and the cost of each component. For NHTSA's more substantive and lengthy rulemakings, however, the cost analysis is contracted out.

[2]Variable costs are costs that vary directly with production, such as materials and labor. Fixed and mixed costs, which generally do not vary with production, include research and development, maintenance, and selling costs.

For emissions regulations, EPA uses a contractor to estimate costs when internal expertise is lacking. For example, an EPA official stated that the agency has considerable expertise in estimating vehicle costs and therefore seldom uses a contractor for cost analysis in that field. The agency has much less expertise in estimating the costs of different motor vehicle fuels, however, and is more likely to contract out this type of analysis.

Estimating the Cost of Fuel Economy Regulations

Estimating the cost of fuel economy improvements requires a different type of analysis than that used for safety and emissions equipment, because increased fuel economy is more a function of systemic changes to the vehicle than of discrete add-ons of equipment.[3] These changes may involve the use of one or more fuel- economy-improving technologies, materials, or vehicle designs, such as more efficient engines and transmissions, tires with lower rolling resistance, and reductions in weight and drag. NHTSA does not calculate an overall consumer cost but instead estimates the costs of the individual technologies that could be used to improve fuel economy.[4] The DOE and its contractor calculate an overall consumer cost on the basis of their estimate of the kind of fuel economy improvements manufacturers are most likely to make in the near and long term.

NHTSA examines the cost of increased fuel economy in the context of what is economically practical for the automobile industry, as mandated by the Energy Policy and Conservation Act. NHTSA asks manufacturers for data on how they plan to meet CAFE standards in the future and gets data from EPA on whether the manufacturers have met the existing standard. NHTSA also gets input on feasible levels for CAFE standards and the cost of fuel economy technologies from DOE, which has contracted for a number of studies on fuel economy.

The DOE contractor that estimates costs of fuel economy determines the "maximum feasible" level of fuel economy. That is, the firm assumes that a given quantity of technological improvement currently available will be used only to improve fuel economy. All technologies that the firm examines are in use in existing models, although the technologies may not yet be widely used. The company constructs a base case to estimate the

[3]NHTSA and industry officials have noted that more recent safety standards, such as dynamic side-impact and roof crush protection, can affect the entire vehicle design.

[4]NHTSA does not perform fuel economy analyses for passenger cars unless the agency is considering a change to the standard. NHTSA's most recent analysis for passenger cars was done in 1988.

fuel economy improvements manufacturers would have made in the absence of CAFE regulations. Any added cost above the base case is attributed directly to the regulations.

The DOE contractor determines the cost of particular fuel economy technologies by examining the prices of cars with and without that technology. First, the contractor performs an engineering assessment to determine what the technology is supposed to do. Second, the contractor compares prices between model lines with and without the fuel-efficient technology. Third, the contractor considers data published by industry on miles-per-gallon performance for particular models. The firm also looks at figures from the supplier industry on the cost of the parts if the technology is discrete and easy to measure, such as a 4-valve versus a 2-valve engine.

Agency and Industry Estimates Differ Because of Differing Data and Assumptions, and Design Uncertainty

Agency and industry cost estimates differ for several reasons. Federal agencies do not always have the most current data on automobile costs or production plans. Also, because agency and industry analysts estimate costs for different reasons and from different perspectives, the two groups would not be expected to arrive at exactly the same estimates. When agencies produce their cost estimates, they necessarily make a number of simplifying assumptions that may account for some of the differences between their estimates and those of industry. The differences are heightened because both agency and auto industry analysts often make their estimates before knowing the precise design that will be employed to meet the standard.

Agencies May Not Have Most Current Cost Data

One reason agency and industry cost estimates differ is that agencies do not always have the most current manufacturer cost or product plan data, which industry considers confidential data. Although agencies are entitled to obtain industry cost and production data to support their cost estimates, they do not always do so. Until recently, EPA did not ask for confidential data because agency officials wanted the manufacturers' comments on proposed regulations to be part of the public record. According to EPA officials, they are making more use of confidential data now. However, an EPA official stated that when the agency tried to use confidential data to prepare an EPA report on the costs of environmental regulations entitled Environmental Investments: The Cost of a Clean Environment, it was unable to obtain the necessary supporting materials. The official said that rules established by federal statistical agencies to protect the use of confidential data prevented EPA from examining the

basis and reliability of the industry data presented. EPA analysts wanted industry data to help them evaluate the cost of mobile source pollution control, but chose to rely on an agency contractor to estimate costs rather than use data they could not verify.

NHTSA uses confidential business data, but the agency does not ask for confidential data on costs unless manufacturers disagree strongly with NHTSA's cost estimates and have provided no specific data to back up their objections. NHTSA officials told us that in many cases NHTSA is not aware of industry's plans for reallocations of manufacturing capacity or shifts in plant production levels and therefore may not be aware of additional industry costs. For competitive reasons, industry prefers to keep this information confidential.

It is important that agencies make an effort to obtain additional data, including confidential data, when regulatory cost estimates are controversial and the gap between industry and agency estimates is large. Obtaining such data would not completely eliminate the gap between estimates, but would ensure that federal agencies were working from the most up-to-date information and would make federal estimates stronger. It is also important for industry to recognize that certain cost and production data industry considers confidential may be needed by federal agencies if they are to estimate costs reliably.

NHTSA and EPA sometimes use outdated internal cost data bases to estimate the cost of proposed regulations. As noted, NHTSA generally relies on contractor support for estimating the costs of significant rulemakings. For estimates on lesser rulemakings, responses to petitions, or analysis of manufacturer cost submissions, however, the work is performed by staff from NHTSA's Rulemaking Office. The staff use a cost data base, developed from a number of vehicle equipment analyses done in the 1970s, to estimate the variable cost of the proposed safety component. EPA analysts also estimate costs using a component cost data base originally compiled in the 1970s to perform analyses within the agency. Both agencies adjust the data for inflation.

In the view of industry officials, the 1970s analyses are no longer applicable for today's automobiles, even with an inflation adjustment. The officials said that cars have changed too much since the 1970s for the data to be relevant. Specifically, older cars were much bigger than cars today and had more room for additional safety and emissions components. Now, adding components requires extensive design changes, thereby adding to

the cost. Also, cars today are more complex, with much more electronic equipment. Industry officials stated that this complexity makes it difficult simply to add new safety or emissions components without making extensive—and costly—changes to the entire system. NHTSA officials agreed that their data base should be updated but said that the update would cost $300,000 to $350,000 and that it may be difficult to obtain agency funding for this purpose.

Because of the many significant changes in vehicles and vehicle equipment that have taken place since the 1970s, agency data bases that rely on equipment component analyses done at that time are of questionable value. To estimate costs reliably when they use internal resources, it is important for NHTSA and EPA to have up-to-date information on component costs.

Agency and Industry Assumptions on Safety and Emissions Regulations Differ

Federal agencies use several simplifying assumptions that may contribute to differences in cost estimates between the agencies and industry. For example, agencies assume a large production volume when calculating costs. NHTSA assumes a production run of 300,000 to 350,000 cars, and EPA has assumed an industrywide annual volume of between 8 million and 12 million for passenger cars. Industry officials stated that production volume varies significantly both among manufacturers and within individual manufacturers' product lines, with the production levels for the majority of the lines below 300,000. Since manufacturers will spread fixed costs over the number of units produced, a larger production volume will result in lower fixed costs per vehicle and therefore a lower consumer cost. Small producers then, or certain lines of large producers, can have significantly higher per-vehicle costs than those projected by the agencies. NHTSA officials believe that their volume assumption is reasonable because only a few suppliers manufacture the particular parts needed and the production lines for some of the different models of the domestic manufacturers are virtually the same.

Second, agencies use an average markup figure to approximate manufacturer and dealer overhead and profit. An industry official noted that individual regulations, however, may involve more or less overhead than the average figure. Depending on the regulation, EPA and NHTSA markup estimates may either understate or overstate consumer costs. A General Motors Corporation official believes that the company data from the years the two agencies used to arrive at their average markup numbers

are not representative of the industry today.[5] As a result, the agencies are likely to understate consumer costs.

Third, agency methodology assumes that all the costs of implementing federal regulations, including overhead and profit, are passed on to the consumer directly. The implication is that industry will make a profit on all new regulations. While industry will try to price its products in order to recover costs in the long run, industry officials said they cannot always recover costs directly. It may be possible, for example, to add more of the cost of components required by federal regulations to a luxury car than to the cost of an economy car without risking an excessive loss in sales. Passing on the full cost in the economy model could price the manufacturer out of that particular market. Industry officials said that, in some cases, competitive pressures prevent them from passing any of the costs on to the consumer in certain models, and it is not always possible to make up the difference in other models.

It is reasonable, however, for the agencies to make the assumptions of average markup and full cost pass-through. Industry must recover its costs eventually or go out of business. Although the manufacturers' price increase for certain models may be above or below the agencies' estimates, the agencies' estimate is not invalid. The point of contention between the agencies and industry seems to be that if the costs are not passed through to the consumers, as industry claims is the case for certain federal regulations, industry must absorb the costs. Industry officials believe that if that is the case, agency analyses are not accurately conveying the cost to the manufacturer.

As noted earlier, agencies must make some simplifying assumptions in the course of their cost analysis, which make the final estimates less precise. Given this fact and given the range of differences among manufacturers, or even among the different product lines of one manufacturer, it might be helpful for agencies to publish a range of estimates instead of a single, global figure.

Agency and Industry Assumptions on Fuel Economy Costs Differ

As noted earlier, the fuel economy debate has dealt more with technological feasibility than with cost. But, according to a representative from the DOE contractor's office, the firm's previously outlined method for estimating the costs of fuel economy improvements has several limitations

[5]NHTSA uses data from 1972 through the current year, while EPA used data from 1975 through 1984 to determine average markup figures.

that may contribute to agency and industry differences in this area. It is often difficult to separate out the source of an added fuel economy cost. Certain technologies, such as weight reduction, drag reduction, and engine friction reduction, are difficult to attribute to one particular component. Instead, these improvements are functions of design changes that may occur in the regular production cycle. Also, it is not always possible to estimate industry costs by considering only price. In the domestic auto industry, competitive pressures may prevent the manufacturers from passing on the entire cost of implementing CAFE standards in the price of a car.

Industry analysts point out several other problems with trying to estimate the cost of fuel economy improvements. One problem is that fuel economy technologies are not necessarily additive. That is, a 1-percent improvement from drag reduction and a 2-percent improvement from a particular engine modification does not necessarily result in a 3-percent overall fuel economy improvement. Also, improved fuel economy is a function of the entire system. Industry analysts say that the DOE contractor's method assumes the entire car will be redesigned each time a new fuel economy technology is added on to best accommodate that change. In reality, it is not possible to redesign the car with each addition, given the approximate 4- to 5-year lead time on new designs.

Fuel economy cost analysis is made more complex because vehicle changes that may increase fuel economy can also make the vehicle less desirable in some other way. Loss of power, size, or other valued attributes may result in customer dissatisfaction. In recent years, U.S. gasoline prices have been relatively low, resulting in increased demand for powerful cars instead of fuel-efficient cars. Consumers are less willing to pay for fuel economy improvements in this environment. Some analysts argue that this loss of consumer satisfaction represents an additional cost to the consumer for fuel economy improvements.

Uncertainty About Design Contributes to Differences

Agency and industry cost estimates also differ because federal agencies set performance standards but do not specify how those standards are to be met. The flexibility allowed by performance standards encourages innovation and cost-effectiveness but also contributes to agency and industry differences on costs. Cost estimates often are made before industry decides on the actual design and technology that will be used to implement the standard. Both federal and industry analysts, therefore, must base their cost estimates on their best approximation of the design

and the technology that will be used. Since federal and industry analysts have different emphases and agendas, they often will make different design and technological assumptions, resulting in different cost estimates.

NHTSA officials said that in the RIA they will estimate costs for a number of alternatives that could satisfy the standard. They then try to choose the alternative most likely to be marketed by industry, and the final regulation generally reflects the cost of this alternative. NHTSA officials noted, however, that industry has other things to consider, such as performance or styling, that may result in its choosing a more expensive alternative. NHTSA does not incorporate these other concerns into its cost analyses.

In the view of industry officials, federal agencies, particularly EPA, overestimate the performance of theoretical systems when determining costs. They said that EPA analysts construct an oversimplified system in laboratory conditions and base cost estimates on that system. Industry officials say that problems arise, however, in trying to fit the new design into the existing systems, or in using the new design under actual driving conditions. Furthermore, industry must take into account warranty considerations and equipment performance under extreme conditions. Industry officials say it is difficult for their own engineers to predict exactly how a new design will look and operate before actually trying it out, and they believe the agencies are much more removed from the actual engineering process. Several industry representatives said they thought that it was difficult for those outside the industry to understand the magnitude of retooling changes needed to incorporate additional equipment, particularly in an era of increased automation in the auto industry.

Industry officials also stated that EPA is technology-forcing, meaning that the agency estimates costs based on theories, rather than on actual systems, and relies on the industry to come up with the actual technology needed. EPA officials acknowledged that they try to encourage technological breakthroughs in this way, but said that they base cost estimates on systems that are already in use, although perhaps not generally available.

Another factor contributing to the uncertainty about cost estimates is the amount of lead time assumed. According to industry officials, a typical design cycle is 4 to 5 years, and imposing regulations near the end of this cycle results in far greater costs than if the changes needed to comply with

the regulations had been included at the beginning. NHTSA and EPA have different approaches in their consideration of lead time. NHTSA generally allows manufacturers 2 years to implement a safety regulation and then several more years to phase in the standard in all models. NHTSA also allows additional lead time if special equipment is required. To test the new dynamic side-impact standard, for example, manufacturers had to acquire a new test dummy and a movable crash barrier, so NHTSA provided two compliance schedules from which manufacturers could choose. One schedule provided for a lead time of 2 years, with an additional 3-year phase-in period, and the other schedule provided for a lead time of 3 years with no phase-in. Both NHTSA and industry officials noted that the agency has become much more aware of the issue of lead time over the past few years.

In contrast, EPA tends to be more assertive on lead time. In the view of EPA analysts, industry would take as much time as the agency allowed them, even though industry has the ability to implement the standards much faster. While EPA officials are aware that limited lead time increases costs, they are wary of granting industry too much leeway in this area. In addition, EPA often has statutory deadlines with which to comply that allow for little lead time in implementing emissions standards. The Clean Air Act Amendments of 1990, however, allow a phase-in of new tailpipe standards for hydrocarbon, carbon monoxide, and nitrogen oxide emissions beginning with 1994-model-year automobiles.

Finally, uncertainty about fuel prices and the future vehicle product mix are also factors in estimating the cost of a given increased level of fuel economy, as the analysis involves projecting into the future and trying to account for a number of unknown variables. For example, the willingness of consumers to pay for additional fuel economy is heavily dependent on the price of oil, which has been difficult to predict in recent years. Also, fleet fuel economy depends on the particular mix of vehicles to be produced in future years. Since agencies generally do not obtain production plans from industry, it is difficult to assess the mix. When they perform their CAFE analyses, DOE's contractor analysts assume that the current production mix will be maintained into the future. Industry analysts say this is unlikely, since demographics indicate a shift to larger cars as the bulk of the population ages and has families.

Uncertainty about design, fuel prices, future market configuration, or other factors is endemic to economic analysis. Agencies and industry must make their best estimate of future conditions. The more uncertainty that

exists, however, the less stable a particular cost estimate will be. When there is a great deal of uncertainty, the credibility of agency estimates could increase if agencies test the volatility of their assumptions by making small changes and seeing what effect those small changes have on the ultimate estimate—that is, by performing a sensitivity analysis.

Industry Comments Do Not Always Yield Helpful Cost Information

Agencies publish preliminary RIAs, containing their initial cost estimates, at the same time they publish a proposed rule. Industry has a chance to comment on proposed rules and the accompanying RIA analysis before the RIA and the rule become final. While the auto industry frequently comments on technical aspects of emissions, safety, and fuel economy rules, NHTSA, EPA, and industry officials said that the industry does not often comment specifically on costs unless the proposed regulation is particularly far-reaching and controversial. In the dockets we reviewed for a number of safety and emissions rulemakings, there were few industry comments on costs. As noted earlier, the debate surrounding fuel economy has focused more on technological feasibility than on costs, so the public record contains few industry comments on fuel economy costs.

Industry officials gave several reasons for not commenting on costs. First, the industry is reluctant to use cost as an argument against socially beneficial standards for increased safety, pollution control, or fuel efficiency. One industry representative commented, for example, that when the argument is presented in terms of lives saved, manufacturers can say little about cost. Instead, the debate shifts to lead time and the technical aspects of the rule. Also, a manufacturer that wishes to contest a safety regulation on the basis of costs is required to make public extensive cost information, including markups. This requirement has dampened industry objections based on cost.

A second reason industry officials may not comment on costs in great detail is that the industry is not structured to estimate costs in the same way that federal agencies do. Companies tend to figure cost by department or production unit. For example, the General Motors Corporation does its cost accounting by department, and each unit competes with the others to keep costs down. Under this structure, it is difficult to determine an overall consumer cost per vehicle. Also, companies are more concerned with long-term investment and overall pricing strategy than with the average per-vehicle consumer cost of a particular regulation. Industry officials told us that they review the RIAs but do not always consider the cost estimates accurate. Industry officials believe that the cost analysis in

the RIAs is useful but is not a realistic approximation of overall industry costs for safety, emissions, and fuel economy regulations.

Even when industry comments on costs and submits data to support its comments, there is no guarantee that federal and industry cost estimates will match in the final rule. Agency analysts may disagree with the design industry chooses to comply with the regulation and the costs attached to that design. Individual manufacturers themselves will submit different designs and cost estimates. For example, a Ford Motor Company representative stated that Ford submitted detailed data to NHTSA on the design and cost of an air bag after NHTSA published its initial estimates in the preliminary RIA. NHTSA acknowledged the company's data but believed its own assumptions and analysis were more legitimate. NHTSA officials said they make changes to their estimates when they believe industry's comments to be legitimate. These officials submitted data to us demonstrating changes made to their initial analyses in response to industry comments on various proposed rules.

Finally, industry and agency analysts do not appear to have much knowledge of each other's cost estimating methods. Industry representatives questioned us about agency methods when we spoke to them, and did not seem to know how the agencies calculated costs, particularly manufacturer and dealer markup. Similarly, agency officials told us they were not sure how industry officials estimated costs and did not have much contact with industry officials on cost methodology.

Industry and agency representatives have had some success in coordinating their efforts on proposed regulations outside of the formal regulatory process. With the dynamic side-impact ruling, for example, industry and NHTSA analysts met early in the process to discuss and develop cost estimates. A task force set up by the Motor Vehicle Manufacturers Association used data developed by NHTSA and the industry, met regularly, tracked the efforts of each party to calculate the cost of the proposed regulation, and developed the weight estimates and related cost implications for the features necessary to meet the standard. An industry representative told us that this approach was adopted because the proposed standard was very complex, involving new crash test dummies, test speeds, and criteria for measuring compliance. He said early exchange of data was vital to the task force's effectiveness.

Industry and the federal government also worked together outside of the formal process in the recent roundtable discussion on implementing

provisions of the Clean Air Act Amendments of 1990. Representatives from EPA, the auto industry, the fuels industry, and various public interest groups met to work out some of the specific details of the 1990 act.

Agency/industry efforts such as these give the two groups an opportunity to reconcile their differences in a less formal manner than under that set up by the regulatory process. Opening up informal information channels between the two groups could help bring cost estimates closer together.

Conclusions

Because federal agencies and the motor vehicle industry have different missions and operate under different constraints, it is likely that the two groups will continue to differ on cost estimates for proposed regulations. Still, it may be possible for agency and industry officials to communicate more often than they do now and reach agreement on basic procedures and data from which to estimate costs. For example, while manufacturers are reluctant to release confidential business information to the agencies because they fear it will jeopardize their competitive position, they should realize that federal agencies using the most up-to-date information will produce more accurate cost estimates. Also, cooperation between the federal and industry sectors early in the process, on both a formal and informal level, could help improve cost estimates. We believe that if agencies and the industry were more aware of each other's procedures for estimating costs, it would be easier to resolve differences.

Federal agencies could unilaterally take some steps that would lend more credibility to their analyses as well. As noted previously, a great deal of uncertainty is involved in estimating the costs of regulations affecting the auto industry, particularly since cost estimates are based on federal performance standards and not on specific design standards. Agencies could compensate for this uncertainty by issuing a range of estimates for the cost of a regulation, instead of single, global figure. Also, agencies could make greater use of specific analytic techniques designed to test the sensitivity of assumptions to small changes. NHTSA and EPA could also improve their estimates by updating their internal cost data bases. Having up-to-date internal component cost data would allow NHTSA and EPA to estimate costs more accurately and consistently. To make the best use of limited funds, the two agencies could share one component data base.

Recommendations

To improve federal agency cost estimates, we recommend that the Secretary of Transportation and the Administrator, Environmental Protection Agency,

- request additional data, including confidential data, from industry when cost estimates are controversial and industry and agency estimates are far apart;
- publicize the current methods agencies use to estimate costs and solicit comments from industry and other interested parties on the procedures;
- explore options outside the formal regulatory process for soliciting industry comments and cooperation, such as informal contacts between agency and industry analysts on cost methods, or workshops such as those used in implementing the 1990 Clean Air Act Amendments;
- account for the variations among auto manufacturers and product lines by publishing a range, instead of a single cost estimate for proposed regulations, and testing assumptions thoroughly when a great deal of uncertainty exists; and
- update the data base for calculating the component costs of proposed safety and emissions regulations, combining NHTSA's and EPA's efforts and using one data base on component costs to reduce federal costs and avoid duplication.

Agencies Do Not Coordinate on Cost Methodology or Total Cost

Although safety, emissions, and fuel economy regulations have a number of interactive effects, federal agencies responsible for implementing those regulations focus primarily on individual regulations specifically under their jurisdiction. The agencies do not coordinate on the methodology they use for estimating the cost of motor vehicle regulations or on the total costs affecting the auto industry. For example, NHTSA and EPA calculate manufacturer and dealer overhead and profit differently and arrive at very different final figures. OMB reviews agency cost estimates contained in the RIAs, but it evaluates these estimates for cost-effectiveness on an individual basis and does not evaluate their interactive or cumulative cost effect in a given year.

Agencies Focus on Individual Regulations Under Their Jurisdiction

Agencies are free to construct their own cost methodology within the broad guidelines of Executive Order 12291. As a result, the three federal agencies concerned with regulations affecting the auto industry have developed their own methods for calculating the cost of proposed regulations. These methods are based largely on the type of regulation and the legislative mandate behind it. When, for example, the goals and standards for implementing a regulation are set out by the Congress very specifically, there is less need and incentive for the agency to do a cost analysis. When, however, the regulation is self-initiated or its implementation method has not been specified by the Congress, cost analysis—among various possible alternatives—becomes more useful and necessary.

Safety regulations are initiated mainly at NHTSA's discretion, in response to citizen petition or in response to a safety problem identified by agency analysts. Because most of its regulations are self-initiated, NHTSA has always analyzed cost-effectiveness in terms of potential fatalities and injuries avoided, even before being required to do so by Executive Order 12291. In some areas, however, such as school bus safety, NHTSA implements regulations without regard to cost-effectiveness. Also, the Congress included a number of specific rulemakings for NHTSA in its 1992 reauthorization bill (P.L. 102-240). These rulemakings addressed the rollover propensity of passenger cars and light trucks, the extension of passenger car side-impact standards to light trucks, the safety of child booster seats, improved design for safety belts, and improved interior head protection. The reauthorization bill may signal a new willingness on the part of the Congress to specify NHTSA's regulatory agenda.

In contrast to NHTSA's experience, EPA regulations are often the result of a specific legislative direction. According to EPA officials, in many cases the agency has little discretion over the content of regulatory standards because the statutory language directs the agency to issue regulations aimed at reducing pollutants to a specific level irrespective of cost. For this reason, EPA initiated cost-benefit analyses only in 1981, when Executive Order 12291 was issued. EPA officials said that they use cost-benefit analysis to rank possible alternatives, rather than to decide whether or not to go forward with the regulation. All the alternatives may be costly, but the ranking allows the agency to choose the most cost-effective among them. EPA has some discretionary authority in implementing regulations, but agency officials said that any standards put forth under EPA's discretion are scrutinized very carefully by OMB. Officials also noted that with the passage of the Clean Air Act Amendments of 1990, EPA's regulatory agenda is fairly well prescribed for the next 5 years.

The analysis required for consideration of the costs of fuel economy standards is set out in the CAFE statute and falls largely under NHTSA's jurisdiction. NHTSA also receives information from EPA on manufacturers' mileage performance to date and from DOE on the technological feasibility of the projected standards. The consumer cost of various fuel economy technologies is discussed in the RIAs, but NHTSA does not determine a per-vehicle consumer cost for a specific level of fuel economy.

Agencies Use Different Methods to Calculate Markup

While both NHTSA and EPA use an average-cost-of-sales analysis (averaged across the three largest domestic manufacturers and across product lines) to estimate the average manufacturers' markup, each agency uses a different method and arrives at a different number. NHTSA has calculated a 33-percent markup while EPA estimates the markup at 19 percent. NHTSA and EPA determine the manufacturers' markup by analyzing domestic corporate annual reports to calculate company variable costs. For competitive reasons, companies do not report their variable costs in these reports, but NHTSA and EPA analysts approximate these costs by examining specific accounts in the reports. NHTSA analysts also use notes to the consolidated financial statements or data from the manufacturers' filings to the Securities and Exchange Commission, and include more detail in their analysis than EPA does. For example, in the annual reports, companies use a general category called "Costs and Expenses." Under this heading, companies include a category called "Cost of Sales," which includes variable costs and also some fixed and mixed costs. NHTSA analysts identify the fixed and mixed costs—maintenance and repairs,

taxes other than income, and research and development—by locating these accounts in notes to the financial statements or in the Securities and Exchange Commission filings, and subtracting them from the Cost of Sales. The remainder is presumed to be company variable costs. In contrast, EPA takes into account only those overhead costs specified in the annual reports. Both agencies "common-size" their estimates—that is, they group the manufacturers' costs and expenses together to obtain variable costs for the industry as a whole.

NHTSA next calculates the variable margin on sales. That is, the agency determines what percentage of revenue is available to cover manufacturers' fixed and mixed costs after sales to dealers. The variable margin determines whether the company will have a profit or loss. NHTSA examines the manufacturers' cumulative operating results from 1972 through the most current year for which data are available to determine the average margin for the three largest domestic auto manufacturers. In this way, NHTSA analysts arrived at an average markup of 33 percent. EPA analysts calculate overhead as a percentage of the cost of sales, without any intervening steps. They do this by summing overhead accounts listed in the financial statements, then dividing the total of those accounts into the overall Cost-of-Sales figure. The overhead accounts EPA uses are (1) selling, general, and administrative expense and (2) pension expense, depreciation and amortization, and interest expense. With this method, EPA arrives at a 19-percent markup. The agency's most recent analysis was performed on the companies' operating data between 1975 and 1984.

The two agencies calculate the additional markup imposed by the dealer differently as well. NHTSA arrives at its average dealer markup by examining wholesale and retail price data for domestic cars obtained from Automotive Invoice Services. NHTSA has calculated the markup at 14 percent. EPA arrives at an average dealer markup by estimating an average dealer profit margin, interest expense, and sales commission expense for new cars. Since these data are not readily available, EPA estimates new car sales profit by analyzing National Automobile Dealers' Association data on total dealership sales and profit and obtains estimates of interest and sales commission expenses from the association. EPA then estimates the markups for dealer profit and interest expense as a percent of the dealers' cost of sales. In EPA's most recent analysis, these markups plus a 2-percent sales commission rate resulted in a total dealer markup of about 6 percent. EPA does not include dealer overhead in its markup because EPA officials do not believe the addition of emissions control equipment to vehicles changes the dealer's overhead expenses.

Agencies calculate the total markup by multiplying these manufacturer and dealer markups. For NHTSA, therefore, 1.33 times 1.14 yields a total markup of 1.51 times the variable cost. For EPA, 1.19 times 1.06 yields a total markup of 1.26 times the variable cost.

NHTSA's and EPA's variable cost estimates differ because the component and tooling costs for safety and emissions equipment are different. However, the two agencies could use the same numbers to estimate average manufacturer and dealer markup.

Agencies Coordinate on Some Issues, but Not on Costs

The Clean Air Act Amendments of 1977 and 1990 and the CAFE legislation require agencies to coordinate on certain regulations, but none of the statutes discussed in this report require the agencies to consult on cost-estimating methodology or total costs. For example, the Congress directed EPA to consult with NHTSA on the safety of the onboard refueling vapor recovery regulation, but did not mention costs or cost methodology. Also, as noted earlier, the Congress directed DOT in the CAFE legislation to consider other regulations affecting the auto industry when deciding on fuel economy standards. The agency's emphasis, however, is on technological capability and the extent to which safety and emissions standards might detract from increased fuel economy. Again, the total cost of regulations affecting the auto industry is not considered. In addition, EPA and NHTSA signed a memorandum of understanding in 1988 outlining their intention to meet quarterly to discuss upcoming regulations. Officials of both agencies told us that cost methodology and total costs in a model year are not discussed at these meetings.

OMB Reviews Regulatory Cost Estimates but Does Not Coordinate Estimates

OMB has issued guidelines for implementing Executive Order 12291, but has left the choice of a specific cost-estimating methodology to the agency. The guidelines stress the need for professional judgment in determining what type of analysis is appropriate and urge agency officials to consult with OMB on analytical techniques when questions arise.

OMB officials review each regulation that comes before them independently against the considerations set out in Executive Order 12291. Although they review methodology, they do not impose a particular methodology. OMB officials said they expect the agencies responsible for implementing regulations affecting the auto industry to be aware of any interactive effects between the regulations and to incorporate these effects into their analysis when appropriate. OMB does not attempt to assess the interactive

effects of individual safety, emissions, and fuel economy regulations or the total costs imposed on the auto industry by these regulations in a given model year.

OMB requires agencies to submit their proposed regulatory agendas for the upcoming year and publishes two documents containing the overall federal regulatory agenda. One is the regulatory agenda, which is published every 6 months. This document lists every ongoing regulatory action by statute and also by status—pre-rulemaking, proposed and final rules, and completed action—and provides a short abstract and an agency contact. Because the regulatory review process focuses on individual regulations, OMB also develops and publishes the Regulatory Program of the United States Government, which sets out the administration's regulatory priorities for the upcoming year. The Regulatory Program covers the period from April 1 of a given year to March 31 of the following year.

In the Regulatory Program which covers April 1, 1990, to March 31, 1991, OMB notes its intention to begin collecting cost information from agencies when they submit future regulatory programs. OMB officials told us that they had begun to receive some cost estimates from the agencies, but they were unsure about the methodology used and would not vouch for the accuracy of the numbers. However, OMB officials hope that they can begin to compile useful cost information on planned regulations yearly.

Conclusions

Federal agencies have developed their own methods for estimating the cost of proposed regulations affecting the motor vehicle industry. These methods, however, are not entirely consistent. While it is necessary for agencies to retain the flexibility to account for differences among their missions and legislative directives, we believe that federal cost estimates affecting one sector of the economy, such as the auto industry, should be prepared consistently whenever possible. In particular, the agencies' calculation of manufacturer and dealer markup should be the same. Standardizing this calculation across the agencies that estimate motor vehicle regulatory costs would lend more accuracy and credibility to federal cost estimates.

Recommendation

GAO recommends that the Secretary of Transportation and the Administrator, Environmental Protection Agency, standardize their methods of estimating the cost of proposed regulations affecting the auto

industry, particularly their approach to determining the manufacturer and dealer markups, when calculating the consumer cost.

Current and Future Federal Safety, Emissions, and Fuel Economy Standards

Federal Motor Vehicle Safety Standards

Approximately 50 major safety standards cover the three major areas of crash avoidance, occupant protection, and post-crash protection. These standards and the vehicles to which they apply are listed in table I.1.

Table I.1: Federal Motor Vehicle Safety Standards (FMVSS)

FMVSS number	Car[a]	MPV[b]	Truck[c]	Bus[d]	Equipment[e]
100 Series: Crash avoidance					
101 Controls, location, and identification	•	•	•	•	
102 Transmission shift lever sequence	•	•	•	•	
103 Windshield defrosting and defogging	•	•	•	•	
104 Windshield wiping and washing system	•	•	•	•	
105 Hydraulic brake system	•	•[f]	•[f]	•[f]	
106 Brake hoses	•	•	•	•	•
107 Reflecting surfaces	•	•	•	•	
108 Lights and reflectors	•	•	•	•	•
109 New tires for passenger cars[g]					•
110 Tire selection and wheels for passenger cars	•				
111 Rearview mirrors	•	•	•	•	
112 Headlamp concealment devices	•	•	•	•	
113 Hood latch system	•	•	•	•	
114 Theft protection	•	•	•		
115 Vehicle identification number (location)	•	•	•	•	
116 Hydraulic brake fluids	•	•	•	•	•
117 Retreaded tires					•
118 Power-operated window systems	•	•	•		
119 New tires for trucks, buses, etc.					•
120 Tire selection and wheels for trucks, buses, etc.		•	•	•	
121 Air brake systems			•	•	
122 Motorcycle brake systems					
123 Motorcycle controls and displays					
124 Accelerator control systems	•	•	•	•	
125 Warning devices					•
126 Truck-camper loading					•
200 Series: Occupant protection					
201 Occupant protection in interior impacts	•	•[f]	•[f]	•[f]	
202 Head restraints	•	•[f]	•[f]	•[f]	
203 Steering wheel impact protection	•	•[f]	•[f]	•[f]	
204 Steering system rearward movement	•	•[f]	•[f]	•[f]	
205 Glazing materials	•	•	•	•	•

(continued)

FMVSS number	Car[a]	MPV[b]	Truck[c]	Bus[d]	Equipment[e]
206 Door locks and hinges	•	•	•		
207 Anchorage of seats	•	•	•	•	
208 Occupant restraints	•	•[f]	•[f]	•[f]	•
209 Seat belt assemblies[g]					•
210 Seat belt anchorages	•	•	•	•	
211 Wheel nuts, wheel discs, and hub caps	•	•			•
212 Windshield mounting	•	•[f]	•[f]	•[f]	
213 Child restraint system					•
214 Side door strength	•	•[f,h]	•[f,h]	•[f,h]	
215 Exterior protection	•				
216 Roof crush resistance	•[f]	•[f,h]	•[f,h]	•[f,h]	
217 Bus window strength and emergency release				•	
218 Motorcycle helmets					
219 Windshield zone intrusion	•	•[f]	•[f]	•[f]	
220 School bus rollover protection				•[f]	
221 School bus body joint strength				•[f]	
222 School bus seats				•[f]	
300 Series: Post-crash protection					
301 Fuel system integrity	•	•[f]	•[f]	•[f]	
302 Flammability of interior materials	•	•	•	•	

[a]Passenger car: Motor vehicle with motive power, except a multipurpose passenger vehicle, motorcycle, or trailer designed for carrying 10 persons or fewer.

[b]Multipurpose passenger vehicle: Motor vehicle with motive power, except a trailer, designed to carry 10 persons or fewer, which is constructed either on a truck chassis or with special features for occasional off-road operation.

[c]Truck: Motor vehicle with motive power, except a trailer, designed primarily for the transportation of property or special purpose equipment.

[d]Bus: Motor vehicle with motive power, except a trailer, designed for carrying more than 10 persons.

[e]Equipment: Individual vehicle components or systems, whether installed on a new vehicle or provided as a replacement.

[f]Applicability or requirements vary for specific vehicle types or gross vehicle weight ratings.

[g]Vehicle application is implied or is specified in other federal motor vehicle safety standards.

[h]Effective September 1, 1993.

Source: MVMA Motor Vehicle Facts & Figures '91, updated by GAO.

NHTSA plans a number of future rulemakings as well, some of which were mandated in the Intermodal Surface Transportation Efficiency Act of 1991 (P.L. 102-240). Standards included in this legislation address (1) the rollover propensity of passenger cars and light trucks, (2) the safety of child booster seats, (3) improved design for safety belts, and (4) improved interior head protection. Many future rulemakings are aimed at extending current passenger vehicle safety standards to light trucks and vans (LTV).

Federal Motor Vehicle Emissions Standards

Federal emissions standards for new light-duty vehicles were first set out in the 1970 Clean Air Act. The law required major reductions in emissions of hydrocarbons, oxides of nitrogen, and carbon monoxide. Emissions of these pollutants were to be reduced by 90-95 percent of the average for 1968 passenger vehicles, with reductions in carbon monoxide and hydrocarbons completed by 1975, and reductions in oxides of nitrogen completed by 1976. These standards were not met, however, and the Congress subsequently modified the requirements in the 1977 Clean Air Act amendments by extending the time available to achieve them and relaxing the standard for oxides of nitrogen. The next major action on emissions was contained in the Clean Air Act Amendments of 1990 (P.L. 101-549), which require further reduction in emissions of hydrocarbons, carbon monoxide, and oxides of nitrogen and include a number of other emissions control requirements.

In addition, the Clean Air Act Amendments of 1990 provide for further reductions if EPA determines, by the end of 1999, that such reductions are necessary, feasible, and cost-beneficial. These additional reductions—0.125 grams per mile for hydrocarbons, 1.7 grams per mile for carbon monoxide, and 0.2 grams per mile for oxides of nitrogen—could be phased in beginning with 2004-model-year vehicles.

The Clean Air Act Amendments of 1990 also

- establish a cold-temperature carbon monoxide tailpipe standard of 10.0 grams per mile, measured at 20 degrees Fahrenreit, beginning with 1994 models;
- establish a clean-fuel vehicle pilot program in California and allow other states to adopt the California program;
- set a diesel particulate standard for urban buses;
- give EPA authority to control emissions from non-road engines that contribute to pollution in nonattainment areas;
- extend the warranties of auto emissions control equipment;

- establish a schedule for a rulemaking requiring onboard emission diagnostic systems; and
- improve enforcement provisions.

Federal Motor Vehicle Fuel Economy Standards

Average fuel economy standards for manufacturers' fleets of passenger cars were established by the Congress in the Energy Policy and Conservation Act of 1975 (P.L. 94-163). The law specified Corporate Average Fuel Economy (CAFE) standards for 1978-80, and for 1985 and beyond. CAFE levels for the intervening years were to be determined by the Secretary of Transportation. When establishing or modifying the standards, the Secretary must require the maximum feasible fuel economy, considering (1) technological feasibility, (2) economic practicability, (3) the impact of other government regulations, and (4) the need of the nation to conserve energy. The standards are shown in table I.2.

Table I.2: Corporate Average Fuel Economy Standards

Miles per gallon

Model year	Passenger car standard
1978	18.0
1979	19.0
1980	20.0
1981	22.0[a]
1982	24.0[a]
1983	26.0[a]
1984	27.0[a]
1985	27.5
1986	26.0[b]
1987	26.0[b]
1988	26.0[b]
1989	26.5[b]
1990	27.5
1991	27.5
1992	27.5

[a]Established by regulation.

[b]Modified by regulation from a statutory standard of 27.5 miles per gallon.

The 1975 law also required that CAFE standards be set for LTVs. The Secretary was given the authority to set the standard for LTVs by rule for

each model year, beginning with model-year 1979. Table I.3 lists the fuel economy standards enacted for LTVs.

Table I.3: Fuel Economy Standards for LTVs

Miles per gallon

Model year	Composite fleet standard[a]	Two-wheel-drive vehicles	Four-wheel-drive vehicles
1979	17.2	17.2	15.8
1980	[b]	16.0	14.0
1981	[b]	16.7	15.0
1982	17.5	18.0	16.0
1983	19.0	19.5	17.5
1984	20.0	20.3	18.5
1985	19.5	19.7	18.9
1986	20.0	20.5	19.5
1987	20.5	21.0	19.5
1988	20.5	21.0	19.5
1989	20.5	21.5	19.0
1990	20.0	20.5	19.0
1991	20.2	20.7	19.1
1992	20.2	[c]	[c]

[a]Manufacturers have the option of meeting either the composite fuel economy standard or the separate standards for two- and four-wheel-drive vehicles.

[b]NHTSA did not set a composite standard for these years.

[c]NHTSA eliminated separate standards in 1992.

The future of fuel economy standards is somewhat uncertain. In the 102nd Congress, bills requiring fuel economy improvements of 40 and 60 percent over current performance by 2001 were introduced in the Senate and House of Representatives. These bills have not been enacted, however. In addition, the National Research Council released a report examining the levels of fuel economy that are feasible given constraints of cost and technology, and providing for safety and emissions considerations, in April 1992. That report, entitled Automotive Fuel Economy: How Far Should We Go?, set out prospective levels of achievable fuel economy that were lower than those proposed in the Congress. Finally, a public interest group sued NHTSA over fuel economy standards on the grounds that the standards adversely affect vehicle safety. The court ordered NHTSA to reexamine its current CAFE standards in light of the potentially adverse safety effects.

Impact of Federal Regulations on the Consumer Cost of Passenger Cars

While today's vehicles are safer, less polluting, and more fuel efficient than those of the past, these improvements have not come without a cost. Generally, regulatory costs are passed on to consumers in vehicle price increases. It is difficult to say, however, precisely how much of a vehicle's increased price is the result of federal regulations. As noted earlier, federal agencies do not routinely compile the total estimated costs of regulations. Also, the specific cost components of a manufacturer's price increase are not generally apparent. In addition, it is difficult to separate out the added consumer cost attributable to federal regulations from that which would have occurred even in the absence of regulations, particularly with regard to fuel economy and safety.

In spite of the difficulties outlined above, several organizations have estimated the cost to the consumer of federal regulations as reflected in a vehicle's price. The Motor Vehicle Manufacturers Association (MVMA) has compiled data for a limited number of new cars showing the average retail price increases for these cars due to federal safety, emissions, and fuel economy regulations from 1968 to 1991. These data are compiled from annual cost data submitted by the domestic auto manufacturers, for 13 to 21 sample passenger cars, to the Bureau of Labor Statistics (BLS) for use in updating the producer price index. The MVMA data show that federal safety regulations have increased the average retail price of a new 1991 car by about $1,087 and emissions and fuel economy regulations have added another $1,495, bringing the cumulative average retail price increase to $2,582.

The MVMA figures, however, may be somewhat high for a number of reasons. First, they do not account for the decline in manufacturing costs as added safety, emissions, and fuel economy equipment are incorporated into vehicles as they are redesigned over time. Second, because some regulations are phased in over a number of years, the same federal regulatory costs could be counted in more than one year, so that the cumulative total is overstated. According to a BLS official, this was the case for the passive-restraint standard.

Another estimate of the consumer cost of federal regulations, for safety regulations only, was compiled by NHTSA. In 1991, NHTSA prepared an estimate showing that safety regulations added about $594 to the retail price of a new 1990 passenger car. This estimate was based primarily on NHTSA's earlier estimates, which were made before the standards were implemented.

EPA compiled per-vehicle costs for mobile source emission controls for its report entitled Environmental Investments: The Cost of a Clean Environment. We converted EPA's data to 1990 dollars. Table II.1 summarizes the estimates made by MVMA, NHTSA, and EPA of the effect of federal regulations on new car prices.

Table II.1: Estimates of Average Retail Price Increases for New Cars Due to Federal Regulations (1990 Dollars)

Year	MVMA (safety)	NHTSA (safety)	MVMA (emissions/fuel economy)	EPA (emissions)
1968	$ 68.84	$101.00	$ 37.15	[a]
1969	31.83	64.00	0	[a]
1970	16.95	18.00	12.43	[a]
1971	0	0	41.24	[a]
1972	4.38	53.00	13.14	$ 23.09
1973	187.13	28.00	60.56	23.58
1974	222.63	110.00	2.90	0
1975	20.38	(82.00)	227.03	295.48
1976	(8.24)	15.00	13.61	0
1977	11.83	10.00	24.33	0
1978	0	0	15.79	0
1979	8.42	0	17.72	0
1980	18.01	1.00	159.97	58.15
1981	5.48	6.00	596.63[b]	93.33
1982	0	0	104.15[b]	2.90
1983	0	0	77.53[b]	35.54
1984	(14.09)	0	68.63[b]	41.71
1985	0	0	22.66	0
1986	29.70	89.00	0	0
1987	0	0	0	.48
1988	67.04	0	0	0
1989	23.27	89.00	0	0
1990	177.91	92.00	0	0
1991	215.06[c]	[a]	0	0
Total	**$1,086.53**	**$594.00**	**$1,495.47**	**$574.26**

[a]Not applicable.

[b]These years include data on fuel economy costs as well as on emissions.

[c]According to the Bureau of Labor Statistics, this figure includes costs for changes to the vehicle other than for safety reasons.

Source: MVMA, BLS, and GAO's analysis of NHTSA and EPA data.

Neither NHTSA nor DOE have prepared estimates of the consumer cost of fuel economy to date. Nor has the auto industry estimated the cost of fuel economy regulations.

Concerning the impact on the prices of vehicles in future years, the National Resource Council estimated retail price increases for fuel economy, safety, and emission regulations in model year 2006 in its April 1992 report entitled Automotive Fuel Economy: How Far Should We Go?. The Council's estimates, shown in table II.2, were based on data submitted by federal agencies and industry.

Table II.2: Estimated Retail Price Increases for Improved Fuel Economy, Improved Occupant Safety, and Tier I Emission Controls in Model Year 2006 Vehicles (1990 Dollars)

	Fuel economy to technically achievable levels	Occupant safety	Tier I emission controls
Passenger cars	$500 - $2,500	$300	From a few hundred dollars to $1,600
Light truck	$500 - $2,750	$500	From a few hundred dollars to $1,600

Source: Automotive Fuel Economy: How Far Should We Go?, National Research Council, 1992.

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