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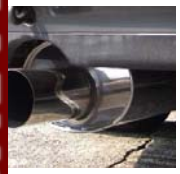
004 EPA STAR Graduate Fellowship Conference Next Generation Scientists—Next Opportunities

The Effect of Tailpipe Emissions Regulation on Vehicle Attributes, Cost, and Price

Overview

Federal regulation of tailpipe emissions n light-duty vehicles has been one of the st successful examples of technology-ing policy. Today's vehicles are reaching r zero emissions of criteria air pollutants n minimal impact to the consumer. Looking k to the late-1970's and early-1980's when ssion standards were sharply tightened—



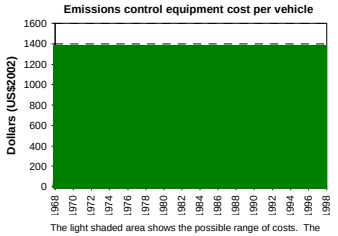
forcing the installation of catalytic converters—provides insights into how to shape future regulations given engineering and economic constraints.

esearch Questions:

What costs were associated with the technologies used to comply with new regulations?
Did manufacturers change the volume and mix of vehicle types offered for sale in response to increased costs?
Did manufacturers pass on the cost of compliance to consumers by increasing vehicle prices?
How did manufacturers overcome consumer resistance to price increases?

Research Highlights

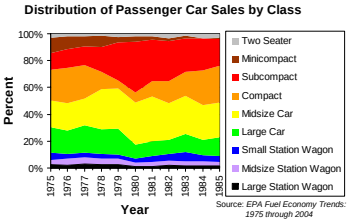
Costs for emissions control per vehicle peaked in the early 80's



The light shaded area shows the possible range of costs. The dark shaded area shows our assessment of the most likely range.

- Large cost increases correspond to the introduction of oxidation catalysts in 1975 and three-way catalysts in 1981. Since then, costs have remained about the same despite more stringent regulations.
- Compliance costs are imprecise due to the complexity of emissions control systems and confidential data
- Industry tends to overestimate costs with greater margins of error while government regulators tend to underestimate costs

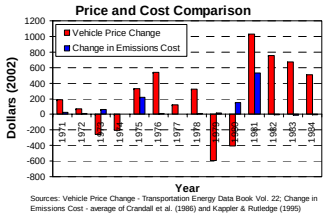
Vehicle size and power did not change dramatically in response



Source: *EPA Fuel Economy Trends: 1975 through 2004*

- Changing vehicle attributes such as size or power could help reduce emissions but not enough to comply with the new standards. In addition, automakers were reluctant to make changes that might hurt sales.
- The large increase in sales of smaller vehicles between 1977 and 1980 (see figure) was due to surging gas prices as opposed to emissions regulation.

Costs for compliance were not equally passed along to consumers



Sources: Vehicle Price Change - Transportation Energy Data Book Vol. 22; Change in Emissions Cost - average of Crandall et al. (1986) and Kappler & Rutledge (1995)

- Automakers are reluctant to raise prices and fully pass on the added costs of emissions control initially if they believe it will decrease sales. Vehicle prices did not always increase when emissions control costs rose (see figure).
- Vehicles are priced based on a variety of factors, only one of which is the cost of production. Emission control costs account for only a part of the increase in vehicle prices.

Vehicle sales can improve with incentives but also depend on other economic conditions

- Manufacturers try to boost sales by using marketing strategies such as advertising, creative financing, and customer rebates. But, their success ultimately depends on how consumers viewed the quality of the vehicle.
- The late-1970's and early-1980's were marked by economic recession, high auto interest rates, rising gas prices, and new fuel economy regulations which also affected vehicle sales.

Research Impact

This research was used to support the rulemaking of greenhouse gas regulations from motor vehicles in California. Over 10% of all new vehicles sold in the country are sold in California. Other states also have the option of adopting California air quality standards. The successful implementation of this regulation can lead to significant changes within the auto industry in the United States and abroad that will reduce greenhouse gas emissions from motor vehicles.

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