

# Vehicle Manufacturer Technology Adoption and Pricing Strategies under Fuel Economy/Emissions Standards and Feebates

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Corporate Average Fuel Economy (CAFE) Standards and Greenhouse Gas Emissions Standards require automobile manufacturers to meet minimum fleet average fuel economy standards for passenger cars and light trucks. In meeting the standards, manufacturers have two major options: adopting fuel economy technologies that increase fuel economy at a cost, and employing pricing strategies to shift sales toward fuel-efficient vehicles (or away from fuel-inefficient vehicles) to increase fleet average fuel efficiency.

This paper analyzes manufacturer decision making over the period (2011 – 2020), and explores the role that both technology adoption and pricing strategies might play in meeting the new post-2010 CAFE and carbon dioxide (CO<sub>2</sub>) emissions standards, assuming the use of currently available, proven technologies. Pricing is clearly an important tool that manufacturers

may use to cope with uncertainties in production, consumer demand, and fuel price fluctuation in the short term; however, the intended purpose of the regulation is to induce technology adoption and spur innovation over time. Pricing might be used to add flexibility, but would only be expected to play a major role if individual manufacturers had difficulty meeting standards using the available technology. Thus an examination of the relative role of technology adoption and pricing strategies helps us understand the functionality of the new standards. We also examine how a feebate program implemented along with CAFE and emissions standards might affect manufacturer decisions and fuel efficiency improvement. A feebate is a market-based policy that levies fees on new vehicles with low fuel efficiency and provides rebates to new vehicles with high fuel efficiency. Finally, we explore potential benefits and costs to consumers, including average vehicle technology cost, fuel savings, new vehicle sales and sales mix, and the average footprint size of the new vehicle fleet.

Results indicate that technology adoption is likely to play the predominant role in meeting new CAFE and emissions standards, consistent with the intention of the policy. The use of pricing to induce sales shifts is minor for most of the analysis period, but may be employed in outer years if cost-effective technologies are less plentiful. In those instances when pricing is used, the percentage of emissions reduction due to pricing is small, at around 4% to 6%. It suggests that compared with the option to adopt readily available fuel saving technologies, pricing is a relatively costly way to comply with the standards.

Implementing feebates along with standards can bring additional emissions reductions, but the benefit may diminish over time if feebates act as a replacement for manufacturers' pricing strategies when the standards are increasingly binding.

Results also show that the impact of the policy on consumers could be relatively limited. In the long run the policy requires increasing up-front technology costs to consumers that outweigh the perceived benefit of fuel savings, and there is some loss in total new vehicle sales. However, the net effect is limited, and the full value of fuel savings to society is substantial. Examining fleet average footprints shows a small decrease in average vehicle footprint size, indicating that efficiency improvements are primarily distributed across all vehicle sizes, consistent with the intent of the policy.