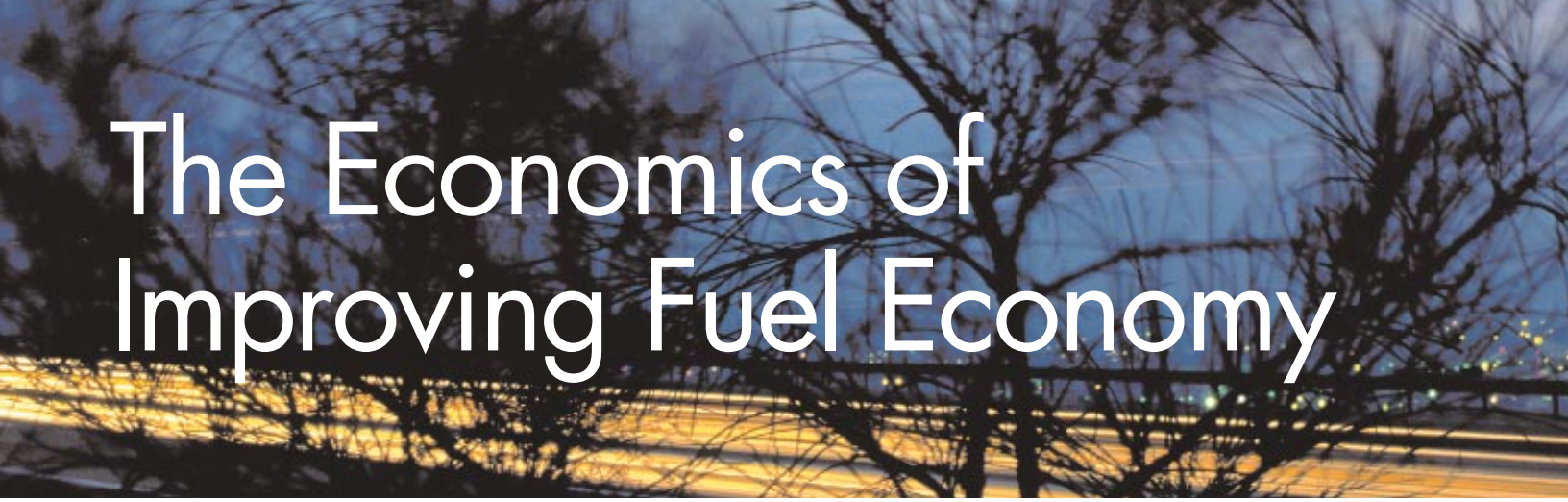

The Economics of Improving Fuel Economy

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Improving fuel economy offers us the promise of reducing our oil use without requiring us to sacrifice driving our vehicles. Reduced oil use, in turn, means both fewer carbon dioxide (CO_2) emissions and a smaller economic impact when oil prices rise, thereby improving both the environment and our economic security. Despite this promise, however, the average fuel economy of new light-duty vehicles (cars and light trucks) in the United States has worsened over the past 20 years as sales of larger and more powerful vehicles have risen. Why has this happened, and how should we think about policies to improve fuel economy?

Numerous studies suggest that improvements in fuel economy can be cost-effective; that is, the gasoline savings can pay for the cost of fuel-saving technologies. A 2004 summary by the bipartisan National Commission on Energy Policy (NCEP) estimated that fuel economy could be improved by 20 to 50 percent with a net savings (fuel savings minus vehicle cost) to car buyers (see figure 1 on page 22). Significant gasoline price increases since 2004 would only increase the level of cost-effectiveness, as would further penetration of gas-electric hybrid technology.

Why have market forces not driven consumers to demand—and manufacturers to produce—more fuel-efficient cars? Part of the answer is that most technologies that can be used to increase fuel economy can also be used to increase horsepower (see figure 2 on page 25). And, arguably, consumers have found greater value in vehicle power and size than in fuel economy. Imagine a $10 technology that can save $15 in fuel. If that same technology can be used to provide an increase in power or size that is worth $20 to consumers, the market will push technologies toward power and size over fuel economy.

If consumer choices about size and power versus fuel economy are carefully informed, the only rationale for government intervention is if the market price of oil does not reflect its true social costs, such as the environmental or security issues associated with oil use that affect society but are not reflected in market prices. Economists would say the best response is an oil tax based on these additional social costs. Oil taxes have the advantage of not only encouraging more fuel-efficient vehicles, but also encouraging less driving for a given vehicle (in contrast, fuel-economy improvements actually tend to spur more driving).

Several arguments, however, suggest that consumers and manufacturers are *not* making good decisions about fuel economy. The first is that consumers may not know, understand, or believe there really are differences in fuel economy among vehicles—a view possibly supported by EPA's recent rulemaking to significantly adjust fuel-economy labeling. Second, if consumers understand that those differences exist and are real, they may not rank fuel economy high enough to worry about when shopping for a car; cargo capacity, power, and styling may be more important. Finally, even if consumers do consider fuel economy, they may not find that the corresponding net gain of about $50–$500 (depending on the payback period) associated with fuel-economy decisions makes a big enough difference to sway their choice

of vehicle. Finally, consumers may not properly account for the full value of future fuel savings from a more fuel-efficient car, considering, for example, only the first few years of savings rather than the entire vehicle lifetime.

If some of these consumer undervaluation arguments are true, it might make sense to regulate fuel economy, regardless of the significant social costs regarding security and environment. But even if they are not, we might still pursue fuel economy if fuel taxes are politically unfeasible and the social costs are significant. Regardless of why we pursue fuel-economy standards, it will be important to consider not just the dollar cost of a technology to improve fuel economy (and its benefit in terms of reduced fuel use), but the value of that technology applied to its next-best alternative use—say, increasing power—in estimating a cost-effective standard.

Current and Past Policy

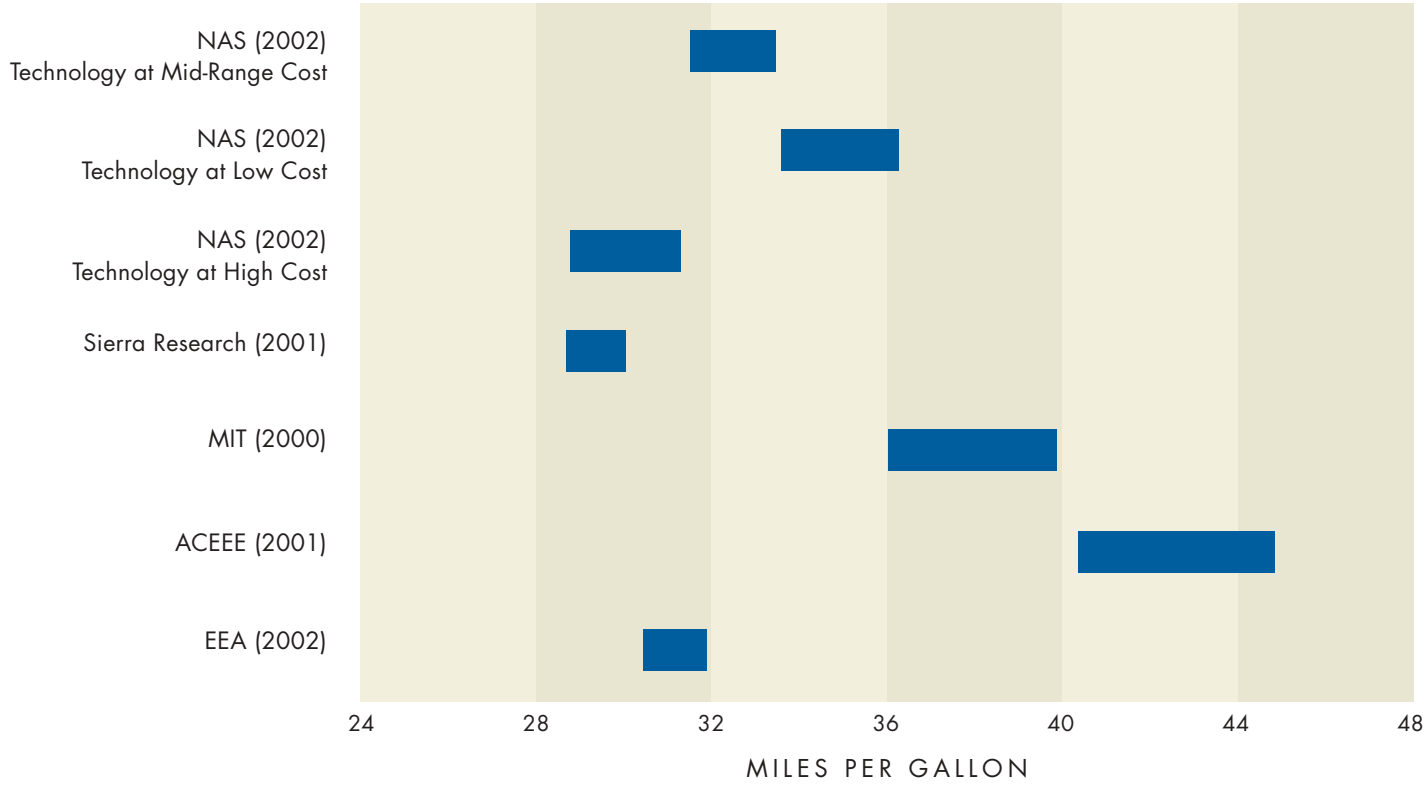
Under the Corporate Average Fuel Economy (CAFE) rules, vehicle manufacturers are required to meet a specific miles-per-gallon (mpg) standard, on average, for all the different classes of vehicles they produce. There are different standards for cars versus sport-utility vehicles (SUVs) and light trucks, and the standard for cars must be met separately for domestically manufactured vehicles and imports (that is, cars manufactured overseas cannot be averaged with cars manufactured within the United States).

Manufacturers that improve average fuel economy beyond the standard earn credits that can be saved or "banked" for use in that same fleet within the next three years. On the other hand, manufacturers that fail to meet the standard must pay a per-vehicle penalty based on how badly they miss it. The standard for cars has been 27.5 mpg since 1985; the standard for

FIGURE 1

Various analyses suggest a range (20–50 percent) of possible fuel economy improvements, versus the current, roughly 24-mpg average rating for new light-duty vehicles.

Source: National Commission on Energy Policy. *Ending the Energy Stalemate: A Bipartisan Straegy to Meet America's Energy Challenges* (2004).

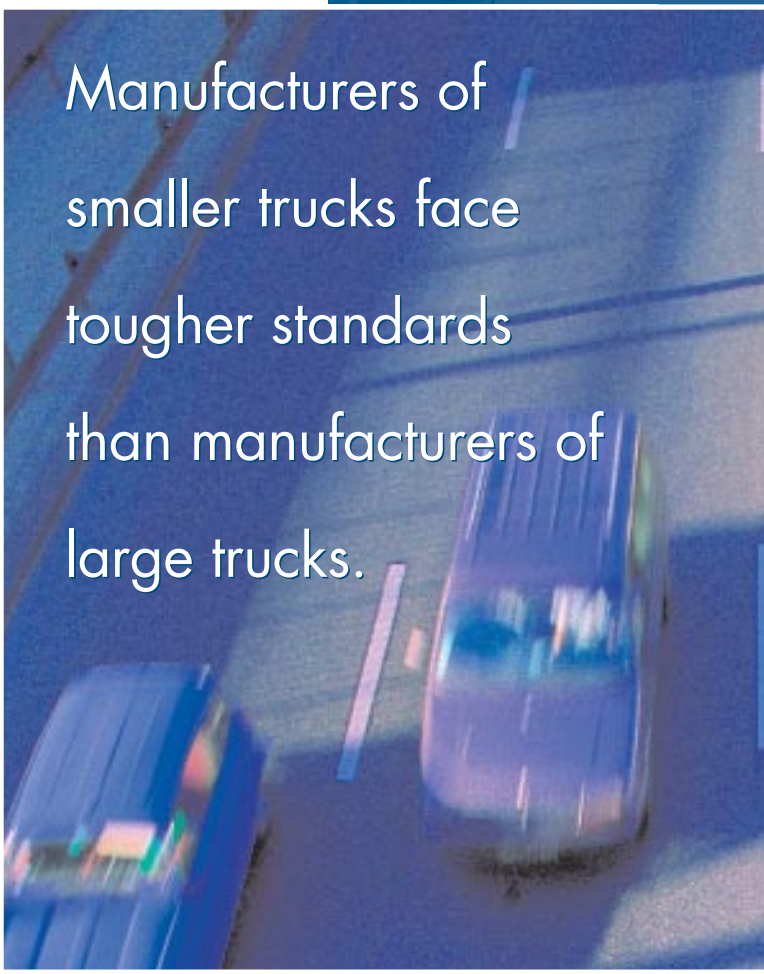


light trucks was unchanged at 20.7 mpg from 1996 until 2005. Since then, it has gradually increased about 0.5 mpg per year.

Most Asian manufacturers routinely beat the standard, while many European manufacturers routinely miss the standard and pay the penalty. U.S. manufacturers typically struggle to just meet the standard. These facts alone suggest that the current program is inefficient and inequitable across manufacturers, with clear differences in impacts and costs among manufacturers in different regions of the world.

Rather than installing new technologies to meet a fuel-economy standard, manufacturers can choose to make smaller cars that are naturally more fuel efficient—a phenomenon referred to as downsizing. While some might applaud a shift to smaller vehicles, this frequently raises concerns about safety as smaller cars tend to provide less protection in accidents.

Concerns about safety, inefficiency, and inequity among manufacturers recently led to significant changes in the CAFE standards for SUVs and light trucks. Because light trucks were a small part of the light-duty vehicle fleet (and primarily used in agriculture) in 1975 when the law was written, Congress gave the regulating agency (the National Highway Traffic and Safety Administration, or NHTSA) greater discretion to change the design of the light-truck regulations while the law is much more precise about the regulation of cars. This past year, NHTSA changed the regulation in a way that differentiated the standard by size: manufacturers of smaller trucks face tougher standards than manufacturers of large trucks. This new regulation reduces the aforementioned incentive to downsize and shifts the burden from high cost, (mostly U.S.) large-SUV and truck manufacturers toward lower cost, (mostly Asian) small-SUV and truck manufacturers that previously faced no real burden under CAFE.



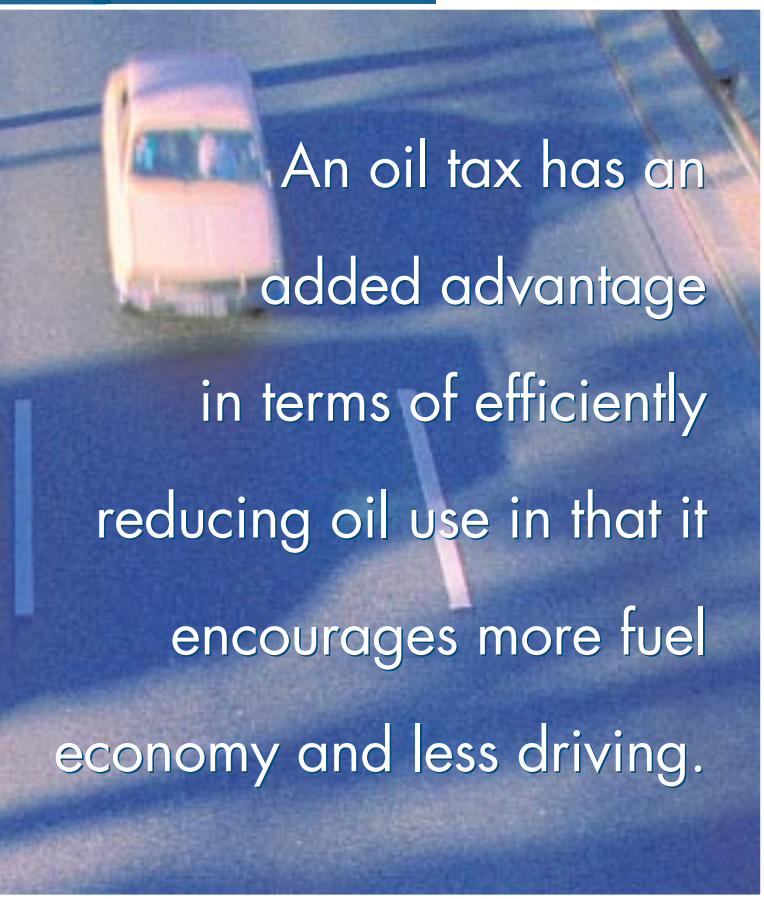
Potential Reforms to CAFE

Even with the noted changes to the light-truck CAFE regulations, the program remains largely inefficient. Suppose, for example, that improvements are particularly inexpensive for Honda to make in its imported fleet of cars but very expensive for General Motors to make in its domestic fleet of light trucks. As it stands, there is no way to trade off those obligations, forgoing potential savings to both GM and Honda. For this reason, economists would advocate making the program fully tradable—that is, credits earned in any fleet by any manufacturer when they beat the standard can be used to offset obligations in any other fleet of any other manufacturer. Economists would similarly advocate removing the three-year limit on banking credits. Finally, given the uncertainty surrounding the cost of various technologies, it would be sensible to turn the penalty provision into a "safety valve," whereby manufacturers could pay a fee (with no negative connotations) if it turns out to be too expensive to meet the standard.

Another, more subtle improvement could be made by considering longer time horizons in setting the standard. In the most recent light-truck rule, an important consideration that limited the achievement of tighter standards was lead time to phase in the use of new technologies. Partly as a consequence, the March 2006 final rule for model years 2008–2011 provides a roughly 8 percent improvement while many of the studies reviewed by the NCEP sug-

gested a larger improvement was cost-effective over a sufficiently long horizon. Setting standards further in advance would reduce this problem.

One way to solve the lead-time problem altogether is to shift to a "feebate" policy whereby each year vehicles above a set level, or "pivot point," of fuel economy would pay a graduated fee depending on how much they exceed the set level. These fees would then be rebated on a graduated basis to vehicles that beat the set level. The pivot point would be regularly adjusted in such a way that the revenue from the fees exactly equals the cost of the rebates. Aside from avoiding the question of lead time, another advantage of this system is that it provides manufacturers the flexibility to make, and consumers to buy, whatever vehicles they want subject to the applicable fees and rebates.



Given that further CAFE reforms will require new legislation (something sought by the administration this past spring), it is useful to think about whether the entire system ought to be replaced by either feebates or an oil tax. A fully tradable CAFE credit system would fix the overall mpg level, while leaving the cost somewhat uncertain (though perhaps capped if a safety valve is included in the reforms). Traditionally, that mpg level is fixed until new regulations are promulgated, although a recent bipartisan proposal by Senators Barack Obama (D-IL), Richard Lugar (R-IN), and others included a presumptive 4 percent annual improvement. Meanwhile, a feebate would provide a continual incentive for improving fuel economy, but would leave the actual level and trend in fuel economy uncertain. Both fully tradable CAFE credits and feebates put some of the consequences of fuel economy up front in the purchase price, effectively lowering the cost of more fuel-efficient cars and raising the price of less fuel-efficient cars. In this way, these policies might be viewed as more comprehensive versions of a gas-guzzler tax or the current gas-electric hybrid subsidy. Both tradable CAFE and feebates can be designed to be least-cost policies to improve fuel economy.

Under an oil tax, in contrast, the cost of fuel economy remains disbursed over future purchases; the tax also redistributes wealth from consumers to government as they pay the tax and, in turn, to whatever use (tax cuts or spending) the government finds for the revenue. Importantly, an oil tax has an added advantage in terms of efficiently reducing oil use in that it encourages more fuel economy *and* less driving, whereas CAFE and feebates, if anything, stimulate more driving as the cost per mile to consumers will fall.

What Lies Ahead

While fuel-economy standards do not reflect economists' preferred solution—namely, an oil tax—to various environmental and security concerns surrounding oil use, a tax does not address a possible failure in the way manufacturers and consumers make decisions about fuel economy and other vehicle attributes. However, the existing approach to regulating fuel economy could be significantly improved by increasing flexibility, in part by extending recent changes in light-truck regulations to include passenger cars. Such changes may require a political compromise that has not yet been struck in order to satisfy a range of stakeholder interests.

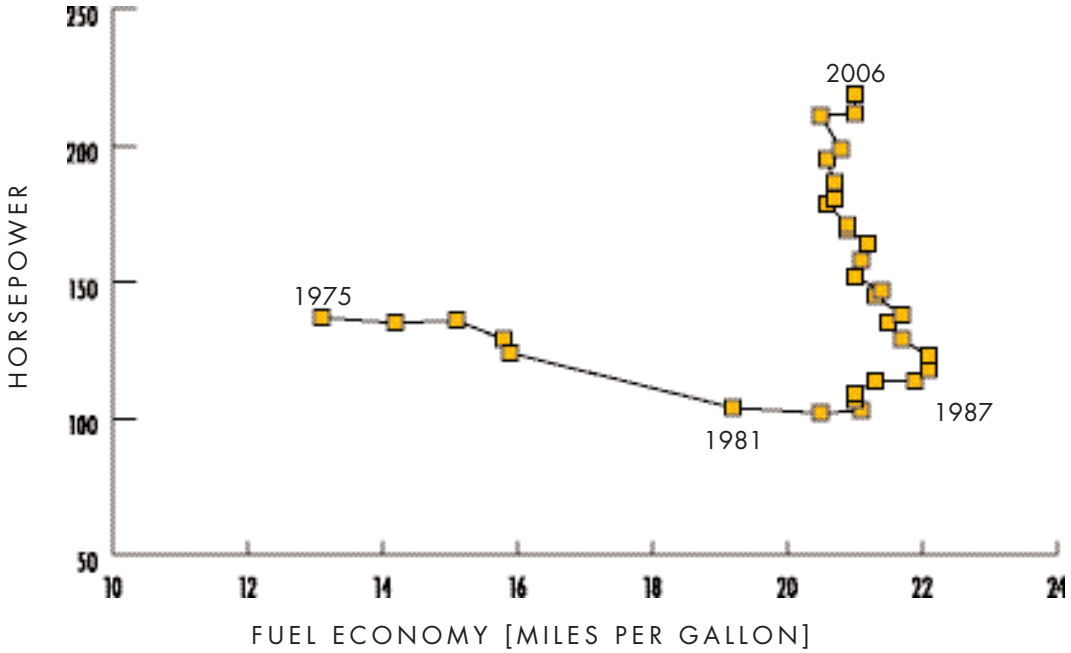


FIGURE 2

Average on-road fuel economy of new light-duty vehicles has declined since 1987 as average power has increased dramatically.

Source: EPA, *Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2006* (2006).

Specifically, consumers, manufacturers, labor unions, environmentalists, and security hawks all have an interest in fuel-economy regulation, and their often-opposing positions have been responsible for a nearly 20-year stalemate. Why has the debate been so heated?

A key reason is that traditional, undifferentiated fuel-economy regulations have been more burdensome for domestic than foreign manufacturers because domestic manufacturers produce, on average, larger and less fuel-efficient cars and trucks. Given the naturally lower fuel economy of larger vehicles, a single standard applied to all manufacturers will hit U.S. manufacturers harder than others. Domestic manufacturers are therefore opposed to significant increases in an undifferentiated standard. However, differentiating standards by size may make it easier for domestic manufacturers to move production of smaller vehicles overseas, production that is currently required domestically to balance domestic production of larger vehicles. Such a move could take away the domestic jobs that go with domestic production of small cars—a point made by the United Autoworkers Union at a recent hearing, leading them to oppose differentiated standards without an undifferentiated "backstop."

Against this backdrop, California recently enacted legislation to reduce carbon dioxide emissions from vehicles—implying a boost in fuel economy—by 30 percent over the next 10 years for cars and light trucks. This has prompted lawsuits over whether California has the legal authority to create such standards. Under federal law, states are preempted from setting vehicle-emissions standards above national standards, but California has a unique option to apply for an exemption because of its particularly difficult pollution problems (which, if approved, leaves other states free to adopt the tougher, California standard). If California wins the lawsuit, other states have already lined up to adopt the tougher standards. Meanwhile, the recent, aforementioned proposal to tighten fuel-economy standards at the federal level garnered bipartisan sponsorship from Senators Lugar, Gordon Smith (R-OR), and Joseph Biden (D-DE)—all defense hawks concerned about energy security.

All of this suggests that the debate over fuel-economy standards is far from over. While the obstacles that have hampered strengthening and reform over the past two decades remain, there is increasing pressure from the left and right to surmount those obstacles. The question is not only whether the pressure to strengthen and reform succeeds, but whether it does so in an economically sensible manner, sensitive to costs, benefits, and efficiency. ■