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Fuel Efficiency and the Economy

Input-output analysis shows how proposed changes to automotive fuel-efficiency standards would propagate through the economy

Roger H. Bezdek and Robert M. Wendling

In the fall of 1973, a new phrase entered the American lexicon: “energy crisis.” On October 17 of that year, the Organization of Petroleum Exporting Countries (OPEC) slapped an embargo on oil exports, hoping to punish the United States for its support of Israel in the Six Days’ War.

Although the embargo lasted only five months, its effect on the U.S. economy was profound. Long lines of cars became commonplace at filling stations, and gas rationing reared its head for the first time since World War II. No less profound was the impact of the embargo on the popular psyche. For the first time, most Americans awakened to the fact that they were dependent on oil from abroad—and not just from anywhere, but from one of the most politically volatile regions in the world. Recognizing the danger, Congress passed a variety of belt-tightening laws, including the Energy Policy and Conservation Act of 1975, which set up mandatory fuel-efficiency standards for automobile manufacturers.

Although the nation has become much more efficient in its use of energy since the 1970s, it nonetheless imports 60 percent of its oil, twice as large a

share as thirty years ago. Much of that oil still comes from the Middle East, a region that has become no more stable. The toppling of the Shah of Iran in 1978 precipitated a second energy crisis that winter. In 1981, the cost of gas at the pump reached its highest levels ever (nearly \$3.00 in inflation-adjusted dollars). Prices moderated over the following decades, but the terrorist attacks of September 11, 2001, and the ensuing wars in Afghanistan and Iraq have once again called into question the security of U.S. oil supplies.

Each of these episodes has led to talk of toughening the fuel-economy standards enacted in 1975. Most recently, a bill that senators John Kerry and John McCain sponsored in 2002, which would have raised the overall gas efficiency of American cars and trucks by nearly 30 percent over the next 10 years, failed to pass when 19 Democrats joined 43 Republicans in voting against it. Whereas environmentalists asserted that higher fuel-economy standards were needed to reduce gasoline consumption and emission of greenhouse gases, the auto industry and labor unions argued that these requirements would drastically increase the price of new cars and put hundreds of thousands of people out of work. The labor unions’ arguments—and their well-attended rallies—proved to be particularly persuasive for the Democratic legislators.

Although fuel-economy standards have not changed significantly in 20 years at the federal level, another player recently entered the debate. This fall, California, the only state with legal authority to regulate vehicle emissions, instituted new rules that would require auto manufacturers to reduce the output of greenhouse gases

(chiefly carbon dioxide) by 30 percent before 2016. Unlike carbon monoxide and other pollutants, carbon dioxide cannot be eliminated by add-on technology like catalytic converters; it can be reduced only by cutting fuel consumption. The fate of California’s rules will probably be played out in court, as auto manufacturers argue that the state has tried to bring in fuel-economy standards through the back door.

How much fuel would the nation save by enacting standards like the ones in California or the ones voted down in 2002? Would the stiffer requirements harm the economy? Would they really cost thousands of workers their jobs? Over a period of 30 years, first with the Department of Commerce and then as independent consultants, we have developed a quantitative model of the economy that is ideally suited to answer such questions. We have employed this model in the past for analyzing the cost and benefit of national acid-rain legislation, and for gauging the contribution of the environmental industry to the U.S. economy, among others uses. Our latest application of this model brings some good news: Fuel efficiency can go hand in hand with job growth.

CAFE: One Lump or Two?

When the energy crisis hit America in 1973, the fuel efficiency of the average U.S. passenger car had fallen to less than 13 miles per gallon (mpg). The Energy Policy and Conservation Act of 1975 instituted a new Corporate Average Fuel Economy (CAFE) program, which required automobile manufacturers to more than double the efficiency of the cars they sold. The increase was phased in over several years: For the 1978 model year, the standard for passenger cars was set at 18 mpg, and

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Figure 1. Long lines at the gas pump and odd- and even-numbered-day gas rationing were unpleasant facts of life for Americans in the winters of 1973–74 and 1978–79. These energy crises motivated Congress to pass legislation requiring better fuel mileage for new vehicles, standards that got progressively tougher from 1978 to 1985. But requirements have not changed since then, in large part because some fear that the imposition of stricter standards would cost jobs. The authors shed light on this issue by modeling various scenarios and predicting their economic consequences for the future.

it gradually increased to 27.5 mpg by 1985, the same level as today.

The new regulations had exactly the intended effect. The fuel efficiency of new passenger cars rose rapidly during the late 1970s and reached a plateau in the early '80s. Around this time, car manufacturers had gotten close enough to the target of 27.5 mpg that they could concentrate their efforts instead on improving engine performance. Beginning in 1982, while the mileage leveled off, the average acceleration time from 0 to 60 mph (a measure of performance) began to improve steadily. The manufacturers also used advances in technology to “buy” additional vehicle weight. That is, instead of continuing to increase the mileage of their fleet, they kept the fuel efficiency just above the legal requirement and gave the American car market what it really wanted: bigger, faster cars.

However, in recent years an unexpected thing has happened: The average fuel economy for *all* new vehicles has declined, from a peak of 26.2 mpg in 1987 to 24.7 mpg for model year 2004. The reason is a loophole in the

CAFE regulations, coupled with a dramatic shift in the tastes of car buyers. The CAFE standards treated “light trucks” differently, and more leniently, than passenger automobiles. Such vehicles were considered to be primarily for commercial use (though even by the late 1970s, two-thirds or more of them served as passenger carriers). Therefore the CAFE standard for light trucks was set at 20.7 mpg, where it has remained through the 2004 model year. (It will increase to 22.2 mpg by 2007.)

In 1976, shortly after the passage of the CAFE legislation, sales of light trucks amounted to less than 20 percent of all light vehicle sales. But thanks to the boom in sport-utility vehicles in the 1990s, the light truck category—which includes pickups, minivans, SUVs, mini-SUVs and even certain “crossover” vehicles like the Chrysler PT Cruiser—now accounts for nearly 50 percent of all new sales. Manufacturers have also taken advantage of the strict wording in the law. By simply making the rear seats removable in what most of us would consider a personal passenger vehicle, a manufacturer can

reclassify the vehicle as a light truck, thus exempting it from the stricter standards for passenger cars.

Not Beyond the Horizon

In 2002, the National Research Council (NRC), an arm of the National Academy of Sciences, published a landmark study of the CAFE standards. The NRC analyzed technical, safety and related aspects of the CAFE requirements and estimated how a variety of feasible technologies would affect vehicle costs. We have relied heavily on that NRC report to develop realistic scenarios for toughening the CAFE standards. Although over the years there have been other studies of the effects of CAFE on the national economy, ours is the first major research effort that was able to draw on such a detailed and thorough investigation of the costs of potential improvements in gas mileage.

The most important finding in the NRC report is that the technology to achieve major increases in fuel efficiency is not somewhere over the rainbow, nor is it dependent on future research breakthroughs. It exists today. The NRC iden-

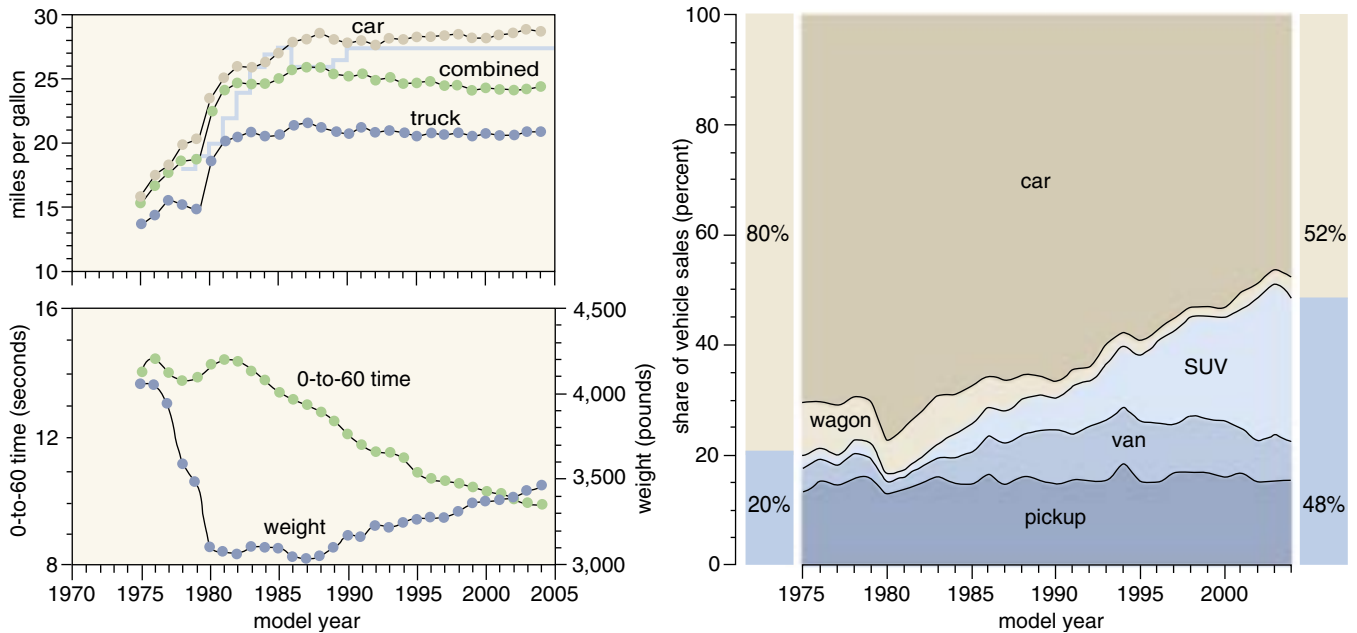


Figure 2. Fuel economy is a multidimensional problem, involving trade-offs of vehicle weight, engine performance and vehicle type. The introduction of the Corporate Average Fuel Economy (“CAFE”) program produced rapid gains in fuel economy of cars and trucks through 1985 (left, top). Since then, the mileage of both classes has stayed level and slightly above the federal targets (light blue). However, since 1987 the combined mileage for cars and trucks (green) has declined because of the increasing popularity of sport-utility vehicles (SUVs, right), which are classified as light trucks. Since the early 1980s, automobile manufacturers have also chosen to use advances in engine technology to improve engine performance (lower left, green) and to power heavier cars (lower left, blue) instead of improving gasoline mileage. (Source: U.S. Environmental Protection Agency).

tified more than two dozen technologies, many of which it labeled as “production intent.” That is, they are already available, are well known to manufacturers and their suppliers, and can be incorporated into vehicles as soon as a decision is made to use them. Some of these technologies have been used in certain makes for years. The NRC also identified a smaller number of “emerging technologies,” ones that are beyond the research phase and could be produced widely within 10 to 15 years. Only two of the technological improvements discussed by the NRC (fuel-cell vehicles and series hybrids) lie beyond the 15-year horizon, and we did not assume any contribution from them in our economic model. For each technology, the NRC identified its likely cost to the consumer and estimated the percentage improvement in fuel economy that it could achieve. There is no free lunch here: Everything on the menu comes at a price, from as little as \$8 for low-friction lubricants (a 1-percent improvement in fuel mileage) up to as much as \$560 for a “camless engine” (an emerging technology that would save 5 to 10 percent in fuel mileage).

Would it help Americans overall if the government required the higher fuel efficiency these technologies make possible? To estimate the consequences of changes in CAFE standards, we modeled the economic outcomes of three

scenarios, corresponding to different levels of governmental intervention. We based these three hypothetical futures on the NRC report, which ensured that they were feasible in terms of technology, economics and timing. Indeed, we were motivated in part by the appearance of the NRC study, as well as our desire to provide hard data to inform the contentious CAFE debate.

The base-case scenario (“business as usual”) assumes no change in CAFE standards and no increase in fleet gas mileage. It retains the current distinction between cars and “light trucks.” Under this scenario, we assume that average fleet fuel economy remains constant through 2030.

Our second version of the future, which we call the “moderate” scenario, assumes that CAFE-mandated fuel economy increases by 20 percent as of 2010, for cars from 27 mpg to 33 mpg and for light trucks from 20.7 mpg to 24.8 mpg. These increases are phased in from 2005 to 2010 and remain at those levels through 2030. We assume that the lowest-cost, currently available fuel-efficiency technologies are implemented (an economically reasonable assumption) and that the average vehicle prices increase by \$700 (3 percent).

Finally, our third version, the “advanced” scenario, pushes the envelope

on the fuel-efficiency gains possible from current or upcoming technologies. It assumes that “emerging technologies” likely to be available by 2015 are implemented. CAFE standards are increased by 30 percent in 2010—for cars from 27.5 to 35.8 mpg and for light trucks from 20.7 mpg to 26.9. By 2015, the standards rise by 50 percent, to 41.3 mph for cars and 31 mpg for light trucks. The changes are phased in between 2005 and 2015 and remain at the same levels through 2030. In this scenario, average vehicle prices increase by about \$2,700 (12 percent).

We believe that these sorts of gains in fuel economy are feasible and credible. They derive from published engineering studies and rely on innovations that are either currently available or well into research and development. Neither of our scenarios requires development of fundamentally “new” vehicles or exotic technologies. Even our advanced scheme is less ambitious than the original CAFE timetable, which mandated a 53-percent increase (from 18 mpg to 27.5 mpg) in just seven years, from 1978 to 1985.

Our two scenarios are comparable with the proposals that were debated in Congress in 2002, as well as with the target set this year by the California Air Resources Board (CARB). The moderate scenario is less ambitious than all of

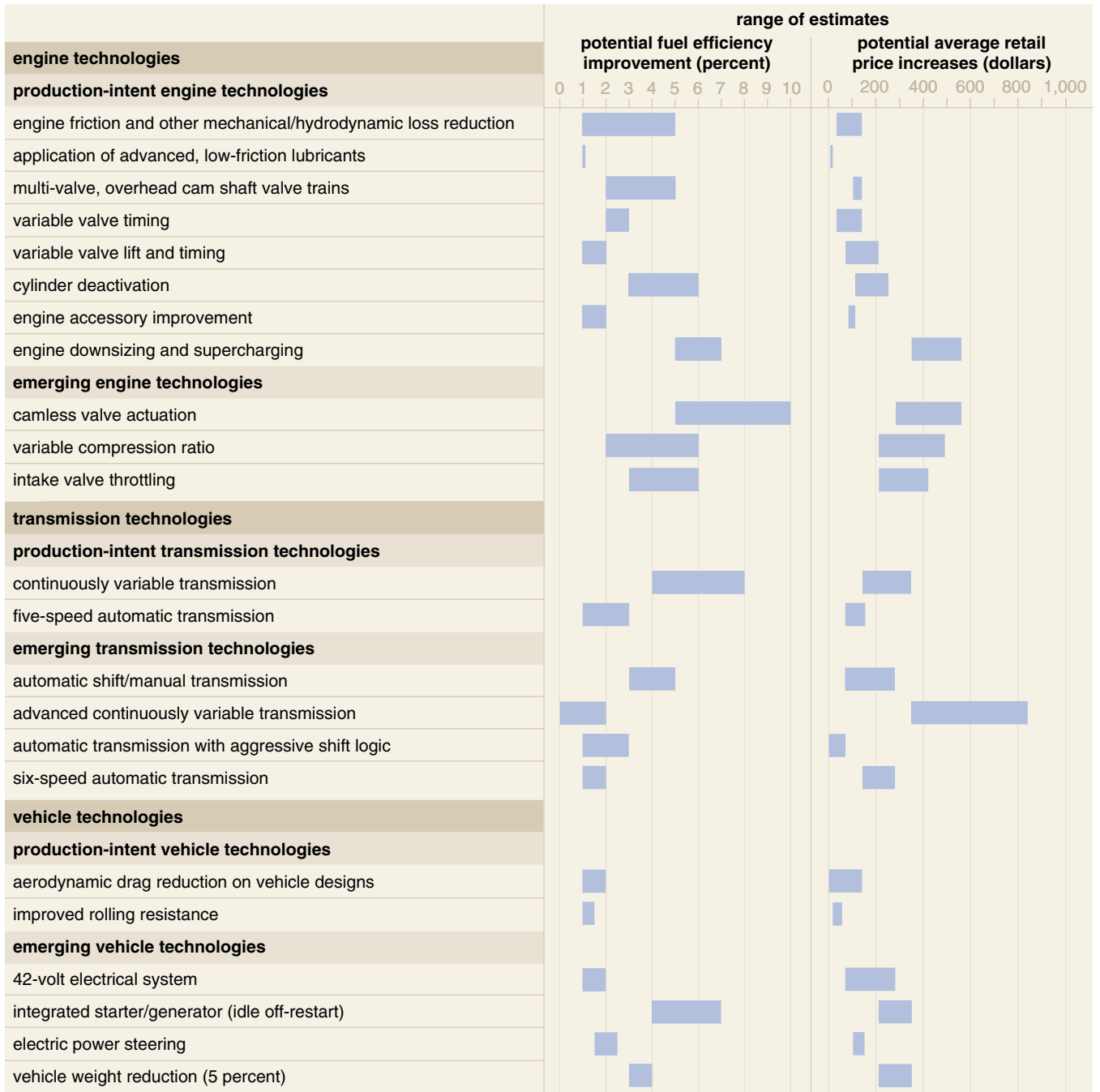


Figure 3. In 2002, the National Research Council (NRC) identified many technologies that could be used to further improve fuel efficiency. These technologies were divided into two categories: “production-intent” (already suitable for use in mass-produced vehicles) and “emerging technologies” (expected to be ready for mass production within 10 years). The authors’ economic model uses these estimates as inputs for two different scenarios, one with moderate increases in the CAFE standards and one with larger increases that would require deployment of some emerging technologies.

these regulatory solutions, whereas the advanced scenario is more ambitious. For example, Ernest Hollings, the South Carolina Democrat who chaired the Senate Commerce Committee, proposed raising the CAFE standard for passenger cars and light trucks to 37 mpg by 2014; John McCain, the ranking Republican on that committee, proposed 36 mpg by 2016; and McCain and Kerry’s bipartisan proposal called for a standard of 35 mpg by 2015. Al-

though the CARB regulations only set a target for the emission of greenhouse gases, they would effectively force automakers to improve the mileage of their passenger cars sold in California by 30 percent, to 36 mpg, by 2015.

By comparing our scenarios with present and past proposals, we do not mean to imply that the changes will be painless. The original CAFE enhancements were obtained by relatively easy weight reductions and by plucking

other low-hanging fruit. By contrast, we are now talking about improving engines and drivetrains that have already undergone 30 years of optimization. Advances will be hard-earned. And both scenarios will require manufacturers to produce vehicles that they would not otherwise choose to make. Consumers will have to accept these same vehicles, and pay more for them up front (the savings come later as drivers pay less for fuel). Even so,

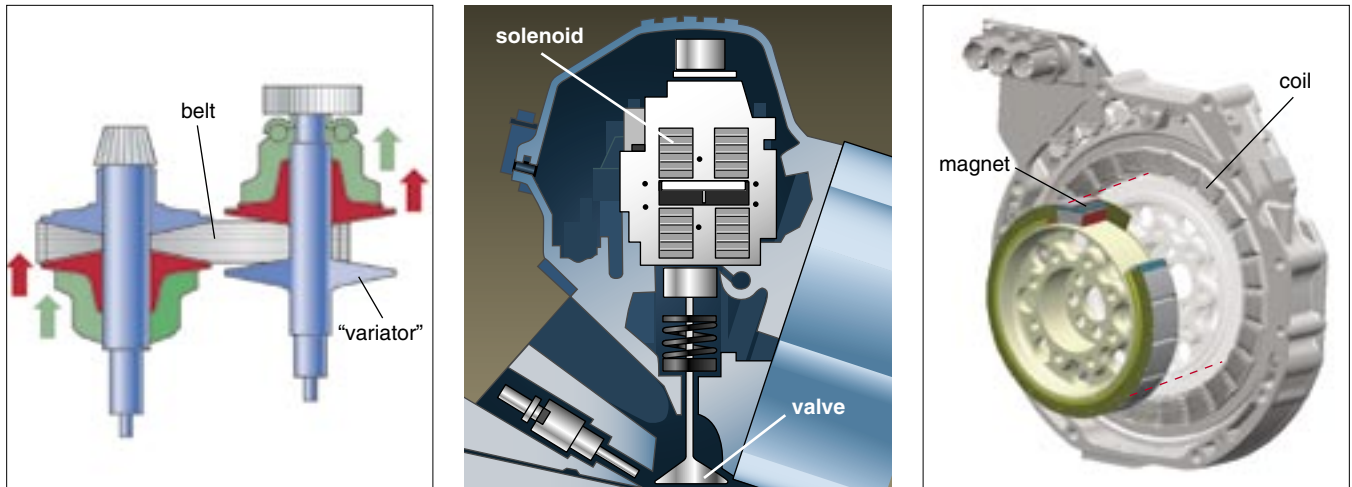


Figure 4. Automobile manufacturers are exploring and in some cases have already begun introducing technologies identified in the NRC report. Continuously variable transmission (left) in the Audi A6 features a “variator” with a wide interlinked chain passing over it. As the plates of the variator move together or apart, the radius of the chain on both ends—and therefore the gear ratio—changes in a smooth, continuous fashion. An emerging engine technology is camless valve actuation (center), shown here in a prototype configuration that uses solenoids to open and close the intake and exhaust valves. (In conventional engines, valves are controlled by a rotating cam shaft, which cannot adapt to changing engine conditions.) The Honda Accord Hybrid includes an integrated starter-generator (right), which allows the gasoline engine to shut down at stop-lights instead of wasting gas while idling. (Image at left courtesy of Audi AG; one at right courtesy of Honda Motor Co., Ltd.)

the standards will require a decade or more to curtail gasoline consumption significantly, because they apply only to *new* cars—they do nothing about existing cars with poorer mileage.

The cost estimates that we quoted above are consistent with those of CARB, which figured that compliance with its regulations would add \$1,050 to the price of a typical vehicle. They are not consistent with estimates by the Alliance of Automobile Manufacturers, which claims that the CARB mandate would cost about \$3,000 per vehicle—a higher cost for a good deal less improvement than our advanced scenario. We believe this estimate is inflated. Indeed, the auto industry has a long history of greatly overestimating the costs of vehicle environmental, safety and fuel-efficiency improvements. We chose to use estimates based on the work of the National Research Council, a body we believe to be impartial. Of course, the results of our economic model depend critically on these cost estimates, and those who think that our figures are too low may disagree with our conclusions.

Input-Output Models

Before we turn to the results of our forecast, we would like to explain how our model works. The main engine, input-output (or “I-O”) analysis, was first developed by economists in the Soviet Union in the 1920s. Input-output analysis might have ended up in the dustbin of history, had not Wassily Le-

ontief (1906–1999), a student of this science, emigrated to the United States and joined the faculty of Harvard University in 1931. While there, Leontief adapted input-output analysis to the U.S. economy. However, in the post-World War II frenzy of anti-Communist paranoia, Leontief’s funding was terminated, and such models fell out of favor. Only in the 1960s did economists finally recognize I-O analysis as useful for other purposes than the centralized “planning” of a socialist economy.

Fortunately, Leontief lived to see his work vindicated: He received the 1973 Nobel Prize in Economic Sciences for his pioneering efforts in developing this method. Today, I-O analysis is used regularly as a national and regional economic impact and forecasting tool. Probably its most visible and publicized use includes projecting the economic impacts of sports facilities. Another prominent use is projecting the negative impact brought to communities when military bases are closed. And anytime you hear estimates of what the tourism industry has brought into the state or local-area economy and the number of jobs generated, the projections were almost surely made by I-O analysis.

An input-output model divides the national or regional economy into various industrial sectors and tracks how much each industry must purchase from every other industry to produce one unit of output. In a socialized economy, a centralized planning

bureau would determine the targeted level of output for each industry; in a capitalist economy, market forces instead make that determination. The trickiest point to understand is that the model contains feedback loops that force most industries to produce more than the “direct output requirements” would seem to imply. For example, a demand for x percent more automobiles than last year requires y percent more steel. But steel mills require electricity to run. And an electric utility requires turbines from a factory to produce electricity. That factory in turn needs steel from steel mills to produce turbines, and the steel mill requires more electricity, and so on.

Leontief discovered an ingenious mathematical method through matrix inversion that collapses all of these feedback loops into one step and calculates the extra (“indirect”) output requirements they create. The ratio of the total requirements to the direct requirements is called the input-output multiplier.

To apply our model, we first translated the increased expenditures for re-configured motor vehicles (those meeting the revised CAFE standards) into per-unit output requirements for every industry in the economy. We used these demands to derive the “direct” output requirements for each industry and then applied Leontief’s mathematical formulae to compute the indirect production needed. Next, we used the total output requirements to compute sales volumes, profits and value added

for each industry. Finally, using governmental data on man-hours, labor requirements and productivity, we estimated the number of jobs created within each industry. (Jobs were the main focus of our project, but we could just as easily have estimated the effects of CAFE on personal income, corporate profits or government tax revenues.)

For this study, we went into even greater detail, breaking the effects of the CAFE standards down by occupation and geography. The geographic analysis uses a region-by-region version of our national model, which we can take all the way down to the county level of detail if needed. (For this project, though, we went down only to the state level.) Because of the comprehensive nature of the modeling system, the regional analysis uses the same data and gives results consistent with the national analysis.

In all, our national model currently includes 495 industries and 699 occupations. At the state level we used a more coarse-grained model with 85 industries, but kept the full occupational detail. We mention these numbers solely to give an idea of the scale of the undertaking. It is very important to realize that size alone is no guarantee of a model's accuracy. Just as important, in our opinion, is the quality of the data that go into the model. We use data that come directly from U.S. government statistical agencies and very rarely from other sources. These data are unbiased, are respected worldwide and, most important, are gathered in a comparable fashion across states and across industries.

Running the Numbers

Our first job was to estimate the overall effects of the "moderate" and "advanced" CAFE scenarios on gasoline consumption. Do they solve the problem they are intended to solve? In both cases, the country uses less fuel than it does in the base scenario, which is of course as one would expect. In 2000, the United States consumed about 125 billion gallons of gasoline. Under the base scenario, this amount would increase to 150 billion gallons by 2015 and 190 billion gallons by 2030. Under the moderate scenario, the increases are smaller: 140 billion gallons by 2015 and nearly 170 billion gallons by 2030.

Clearly, the moderate plan reins in America's galloping appetite for oil but fails to end it. The advanced solution

has more dramatic effects: After rising through 2010, gasoline consumption actually begins to drop as the vehicle fleet is gradually transformed—older vehicles are scrapped and replaced with new, more fuel-efficient ones. Eventually, though, because of the continually increasing number of vehicles on the road, the trend turns around. By 2030, the nation is back to consuming about 130 billion gallons per year, about the same amount as in 2005. In effect, the advanced scenario "buys" the country a 25-year delay in its tendency to consume more gasoline with each passing year.

The reductions in fuel consumption translate into financial savings for American consumers. The extent of the windfall depends, of course, on the cost of gasoline. Because we cannot forecast gas prices with any accuracy, we used a range of hypothetical values from \$1.25

to \$1.75 per gallon (in 2002 dollars). In the moderate scenario, by 2030, consumers spend \$35 billion to \$50 billion less on gasoline than they do in the base scenario. But the savings come at a cost: the higher price of the more fuel-efficient vehicles. By 2030, the increased vehicle cost will be \$16 billion per year. Thus the stricter CAFE standards prove to be a good bargain, not only in 2030 but throughout the lifetime of the model. And, if gasoline prices are higher than we assumed (as they currently are), consumers will save even more.

The story for the advanced scenario is a little different. There would be a little more pain at first for American consumers, because the CAFE standards do not start paying for themselves until roughly the year 2020. However, by 2030, consumers are comfortably in the black: They would save \$75 billion to

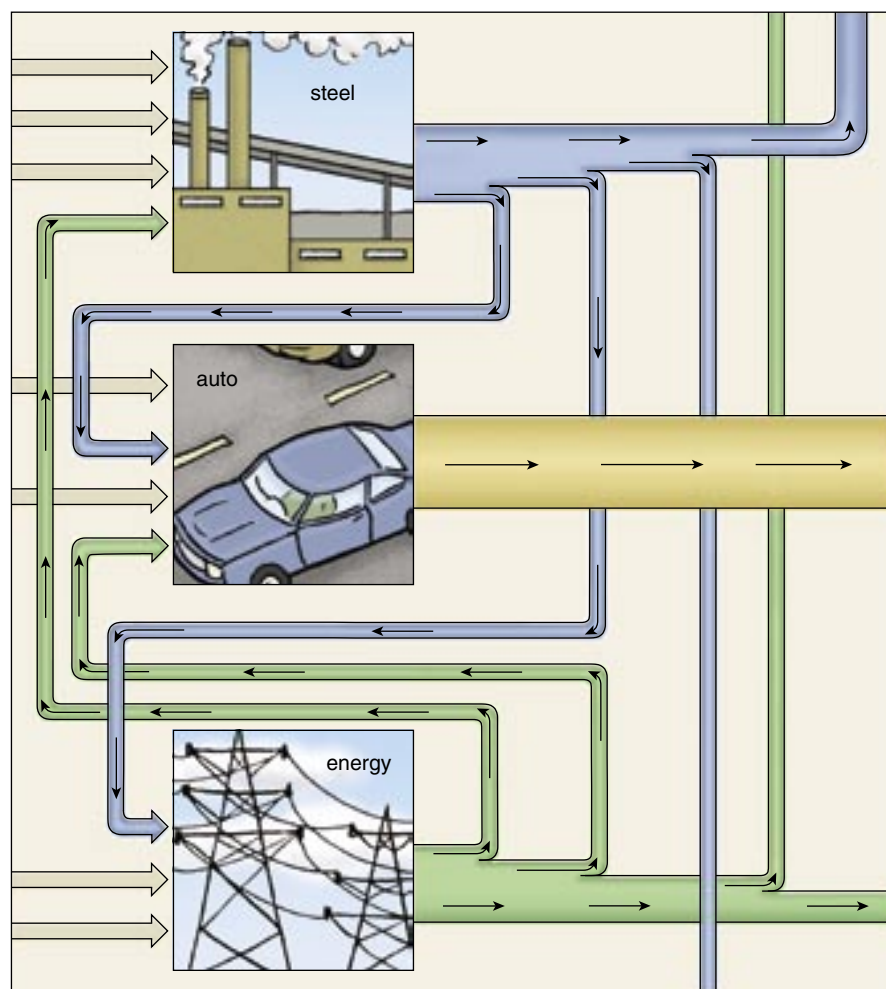


Figure 5. Input-output models track numerous connections between different sectors of the economy. In this schematic representation, only three out of the 85 sectors actually modeled are shown. Here an increased demand for automobiles (*center*) will generate increased production requirements for steel (*top*). To fill this demand, steel plants will require more electricity (*bottom*). To meet this capacity, the electric-power sector will require more steel to build turbines and power lines, thus setting up a feedback loop. Input-output analysis allows economists to calculate the effect of such complicated feedback loops.

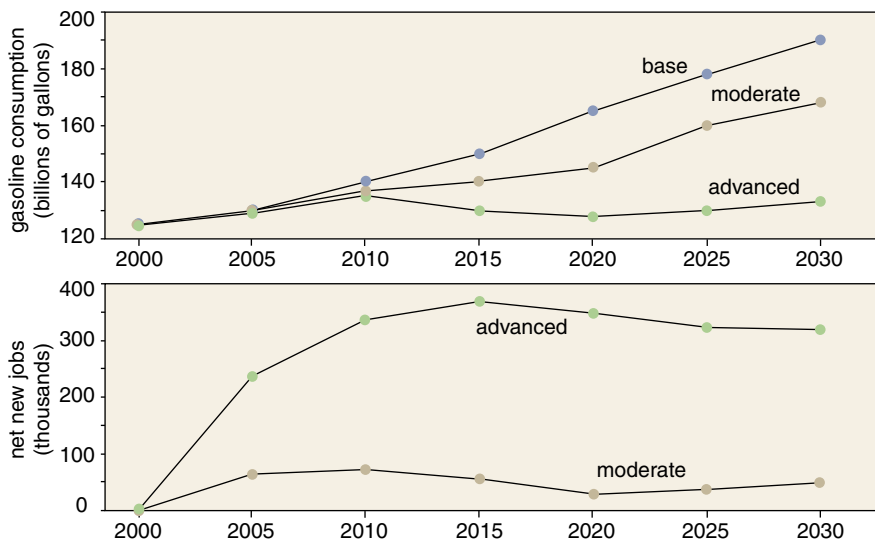


Figure 6. Authors' input-output model predicts the effect of enhanced CAFE standards on the economy. As shown in the top graph, annual gasoline consumption continues to increase under the moderate scenario, though not as fast as in the base scenario (no change to CAFE regulations). Only the advanced scenario brings the annual increases to a halt. Both the moderate and advanced scenarios lead to a net creation of new jobs (bottom), with the effect peaking at more than 350,000 new jobs in the advanced scenario in 2015.

\$100 billion per year on gasoline, while spending about \$55 billion more per year on vehicles.

Besides tracking the effect of the CAFE standard on gasoline consumption, we also wanted to estimate its effect on jobs. Clearly, substantial job shifting and displacement would occur. For example, in 2020, under the moderate scenario, 101,000 jobs are created but 72,000 jobs are displaced, creating a net employment increase of 29,000. Under the advanced scenario, 433,000 new jobs are created by that year and 86,000 are displaced, resulting in a net gain of 347,000. While significant, these gains must be put into perspective: In 2010, U.S. employment will total 142 million, and in 2030 it will total 166 million. So the increases amount to only a fraction of a percent of the national workforce.

Will It Play in Peoria?

We felt that the overall numbers for the country did not convey in sufficient detail what would happen to the economy as a result of the proposed CAFE changes. The senators who were debating the changes in 2002 needed to know what would happen in their own states, though of course they also needed to be mindful of the national picture. And the arguments of auto manufacturers and organized labor could best be addressed if we knew what happened to employment on an industry-by-industry basis.

We found that the motor-vehicle and related industries would be major winners (quite the opposite of the dire predictions of auto manufacturers), while employment in the petroleum industry would suffer. For example, in the advanced scenario in 2020 (compared, as always, with the business-as-usual case), jobs in the "motor vehicle and equipment" sector would increase by 155,000; jobs in the "rubber" sector would increase by 22,000; and jobs in the "electronic component" sector would increase by 9,500. But jobs in "crude petroleum and natural gas" would decrease by 32,000 and "petroleum refining" would lose 17,000 jobs.

Our model also allows us to break down the employment trends by occupation as well as industry. In 2020, under the advanced scenario, jobs would be created for 700 computer programmers, 900 mechanical engineers, 1,500 computer-controlled machine tool operators and 2,700 machinists. On the downside, petroleum engineering jobs would decrease by 700 and petroleum-pump operators would decrease by 6,100. All of these are net figures; for example, the net gain of 700 computer programming jobs results from 1,100 new positions created and 400 displaced.

Consistent with the above industry-by-industry results, the places that benefit the most from the enhanced CAFE regulations are the auto-producing states of the upper Midwest. Michigan gains 54,500 jobs, Ohio adds 29,300,

and Indiana receives 22,300. California also scores an impressive increase of 28,400 jobs, albeit on a much larger base. Only four states—Louisiana, Wyoming, Alaska and New Mexico—suffer net job losses, with Louisiana losing the most (1,100). Texas, a state one might expect to be hard-hit by the loss of petroleum-refining jobs, actually experiences a modest gain of 2,500 jobs. Its losses in sectors such as "crude petroleum and natural gas" and "construction" are more than offset by jobs created in "motor vehicles and equipment," "fabricated metal products," "services" and other industries.

Our results are consistent with similar studies that have been conducted over the past three decades. For example, in 1980, Douglas Dacy, Robert Kuenne and Paul McCoy of the University of Texas and Princeton estimated the impact of the original CAFE standards and projected a net increase in employment of 140,000 jobs by 1985, with the jobs projected in various service industries, plastics, metal stampings and oth-

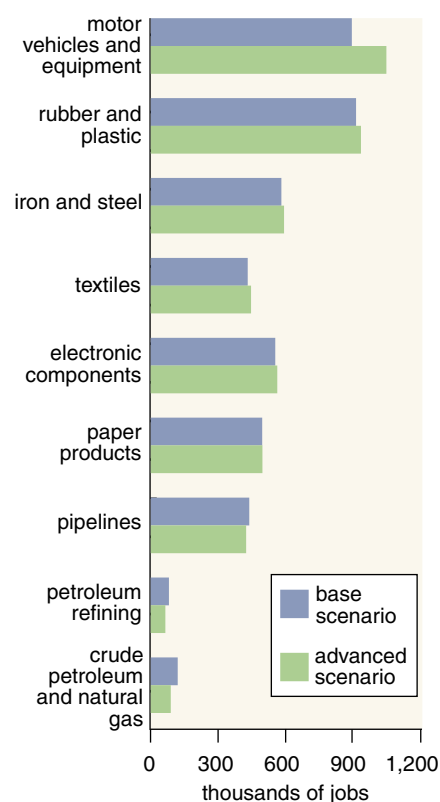


Figure 7. Authors' model generates sector-by-sector predictions of total employment. In the advanced scenario, most sectors experience a small amount of growth by 2020. The "motor vehicles and equipment" sector grows the most rapidly. Job losses in "petroleum refining" and "crude petroleum and natural gas" are smaller in absolute numbers but larger in percentage terms.

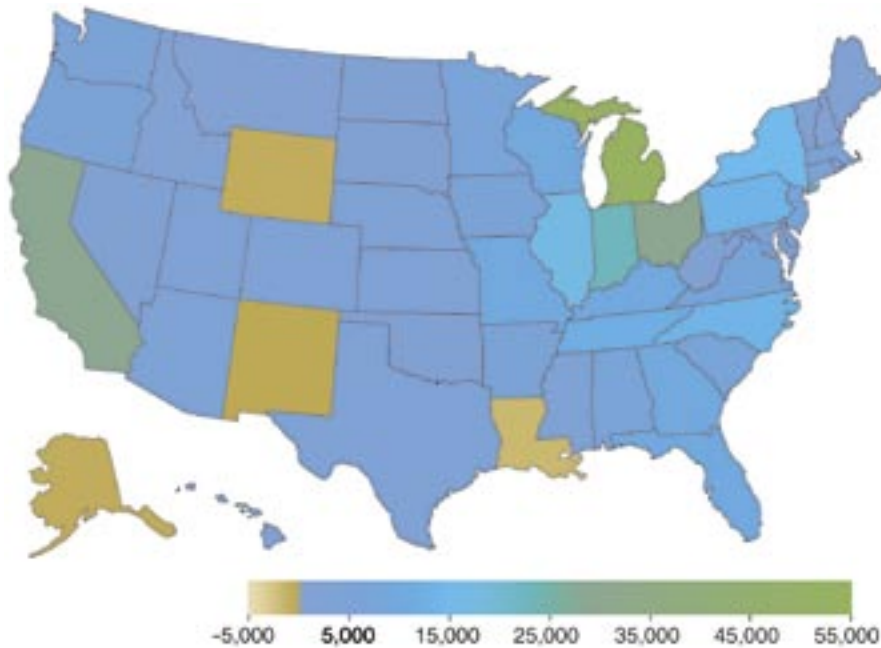


Figure 8. In a state-by-state breakdown, job increases in the advanced scenario are greatest in the upper Midwest and California (light green). Only four states (tan) experience net decreases in employment, and the decreases are much smaller than the increases elsewhere.

er sectors outweighing projected losses in steel, petroleum and gas, and wholesale and retail trade. In 1989, Arvind Teotia and his associates at Argonne National Laboratory estimated the impacts of the use of clean diesel engine technology in light trucks to comply with CAFE standards and found that between 70,000 and 110,000 jobs would be created. In 1992, the American Council for an Energy-Efficient Economy estimated that by increasing the fuel efficiency of passenger cars from 28 mpg in 1990 to 40 mpg in 2000 and 50 mpg in 2010, 244,000 additional jobs would be created by 2010. A 2001 Union of Concerned Scientists study analyzed the economic effects of increasing CAFE standards to 40 mpg by 2012 and to 55 mpg by 2020, and projected an increase of 104,000 jobs by 2020.

Our analysis shows that enhanced CAFE standards would increase overall employment in the United States, but it is still conceivable that there could be a net decrease in union jobs. Indeed, labor unions such as the United Auto Workers are concerned that the new standards would exacerbate the shift in production toward imports and vehicles produced in U.S. factories owned by foreign companies (“transplant” facilities, which are rarely unionized). They might be right. Nevertheless, there are reasons to question the presumed inverse correlation between union jobs and CAFE standards.

First, union representation in the motor-vehicle industry has been declining for two decades, even during the 1990s, which was one of the most robust and profitable decades in history for domestic vehicle manufacturers, whereas CAFE standards have not changed since 1985. Organized labor’s problems in the industry thus appear to be deep-seated and cannot be attributed to CAFE. Second, foreign manufacturers are rapidly improving their technology, largely because their main markets are in countries with high fuel prices or high fuel-economy standards. To the extent that stricter standards force domestic manufacturers to adopt new technology, enhanced CAFE could actually improve their competitiveness—and thus preserve and expand union jobs.

Although we are not in a position to offer any firm answers about this particular issue, our I-O modeling recognizes that a substantial portion of U.S. vehicle expenditures are made on imports and create sales and jobs internationally. Imports will continue to be sold in the United States, and those countries that cater to our markets can expect positive economic gains, including additional jobs. Of course, U.S. vehicles and parts sold in Europe and Asia also create jobs—both union and nonunion—here at home.

In summary, our modeling leads us to an unambiguous conclusion: An increase in CAFE standards would save

consumers money in the long run, would not harm the U.S. economy and would in fact lead to a significant net increase in jobs, mostly within the first five or ten years. A moderate improvement in vehicle mileage will *not* reduce America’s consumption of oil, although it will slow down the rate of increase. To actually reduce consumption, the government would have to institute considerably stricter—though still feasible—standards, amounting to a 50-percent improvement in mileage by 2015. Finally, whereas the overall economic impact on the national scale is positive, the benefits would not be uniformly distributed. A few industries and states would see net losses in employment, and job shifts would occur even within industries, occupations and states that added jobs.

It’s time we put CAFE reform back on the national agenda. We believe that the results of models like ours can influence the country’s decisions about fuel efficiency, jobs and the economy, thus moving the debate beyond rhetoric and political posturing. The nation’s transportation system, petroleum needs and the jobs of hundreds of thousands of Americans are at stake. Reliable information and objective analysis are required. One would hope that the work we’ve summarized here will improve the rigor and quality of this critically important debate.

Acknowledgments

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