SECTOR-BY-SECTOR APPROACHES

Four Proposals to Improve the Design of Fuel Economy Standards

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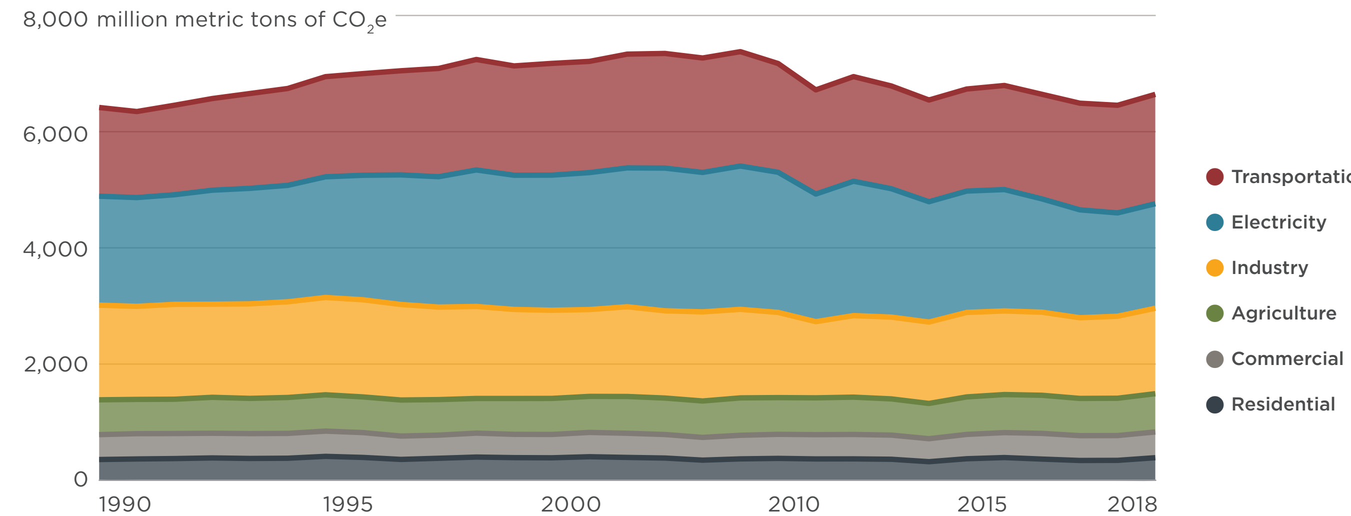
The United States is a nation of drivers. From the road trip to the school run, cars and trucks play an outsized role in American culture and daily life. All this driving, however, makes transportation one of the country's most important sources of air pollution and greenhouse gas emissions. Fuel efficiency and tailpipe emissions standards are well-known tools intended to reduce the environmental impact of U.S. vehicles. While they have had a significant effect on emissions since the first standards were promulgated in the 1970s, they have not achieved the level of emissions reductions expected. Consumer trends have favored light trucks, especially SUVs, and larger cars in general—vehicles that get lower fuel efficiency overall—undermining the effectiveness of the standards. Moreover, the fuel efficiency gains achieved have come at a higher price than could have been achieved through other policies.

FIGURE 1 - CHAPTER IN A CHART

Transportation is the Largest Source of GHG in the U.S.



Source: U.S. EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2018.

To meet the challenge of climate change, U.S. transportation emissions will need to fall significantly. Policymakers can take several steps to address structural flaws in the standards and increase their effectiveness. These include eliminating footprint-based standards and the distinction between cars and light trucks, both of which tend to incentivize larger vehicles; easing trading for compliance credits, which will make the compliance market more attractive and efficient; and making it more difficult for auto companies to manipulate vehicle performance data.

Heart of the Problem

The transportation sector is the largest source of energy-related greenhouse gas (GHG) emissions in the United States.[1] Indeed, while the United States has made significant progress in reducing emissions from the electric power sector, transportation emissions, which were 37 percent of the U.S. energy-related total in 2019, remain near their all-time high.[2]

If the United States is to make significant progress in reducing its overall carbon emissions, it must finally address transportation in a meaningful way. To do this, it must implement policies capable of sharply reducing GHG emissions from passenger cars and light trucks, which account for nearly 60 percent of U.S. transportation emissions, as well as medium- and heavy-duty trucks, which account for an additional 23 percent of transportation's total.[3]

To date, the single most important U.S. policy regulating fuel consumption and GHG emissions in the transportation sector has been fuel economy standards. Created by Congress in 1975 and modified a number of times in the decades since, these standards regulate the amount of fuel that cars and light trucks sold in the United States consume per mile of travel. As the standards tighten periodically (reducing the targeted amount of fuel consumed per mile of travel), the goal is that overall fuel consumption—and therefore emissions—will also be reduced.

Yet, despite some important progress, it is difficult to argue that the current approach matches the challenge of climate change. A major programmatic reform introduced in 2011 by President Barack Obama's administration sought to directly target GHG emissions from cars along with setting more stringent fuel economy targets, has delivered significantly lower fuel savings than hoped thus far due to low oil prices and surging sales of inefficient vehicles.

1 U.S. Energy Information Agency, *Monthly Energy Review*, Figure 11.2

2 U.S. EIA, *Monthly Energy Review*, Tables 11.1 and 11.5

3 EPA, 2020 *Greenhouse Gas Inventory*, Table 3-13

Real-world data illustrate the problem. First, annual sales of light trucks are far higher than the agencies expected when the rules were first written and fuel savings were calculated. Using a revised definition of light truck, regulators expected the market share of light trucks to fall from 38.9 percent in 2012 to 36.4 percent in 2018.[4] Instead, the truck share has actually risen every year since 2012, reaching 52.1 percent of the market in 2018.[5]

Second, in part as a result of this shift toward trucks and away from cars, vehicles have gotten larger than agencies projected. The fleet-wide average footprint (defined as the rectangle formed where all four wheels touch the ground) increased over the course of the last several years, reaching 50.4 square feet in 2018. This trend was the opposite of what regulators expected; they projected that average footprint would decline from 48.6 square feet in 2012 to 47.9 square feet by 2018. It is worth noting that a portion of this increase was driven by an increase within the car category, which appears to support the academic literature tying footprint-based standards, such as those currently in place in the United States, to increased vehicle size.

Together, these trends have directly undermined efficiency and fuel savings. For example, according to the Environmental Protection Agency's (EPA) most recent evaluation of automakers' performance under the current standards, the model year 2018 fleet of passenger vehicles sold in the United States achieved efficiency of 35.1 miles per gallon (mpg) in GHG-equivalent terms, including all credits and bonuses.[6] While this reflects notable improvement from the 2012 level of 30.1 mpg, it is well short of the originally projected 2018 level of 38.3 mpg.[7] Critically, this variance is not the result of technological barriers. Rather, as EPA noted in one recent report, it was due to the fact that "the industry-wide truck fraction of the fleet is higher than projected in the rulemaking analyses."[8]

4 Note that the data here reference the agencies' revised, regulatory definition of light truck that classifies certain two-wheel drive SUVs as cars rather than light trucks. The commercial definition is used elsewhere in this chapter.

5 For original projections, see EPA and NHTSA, Joint Technical Support Document for 2012-2016 Standards and 2010-2025 Standards. For actual truck shares, see EPA Automotive Trends Report.

6 EPA *2020 Automotive Trends Report*, Table 5.5

7 See, e.g., EPA, *Manufacturer Performance Report for the 2016 Model Year*, Table A-4

8 Id., page 80.

Some recent research suggests that these shortfalls have caused the program to deliver fuel savings that are more than one-third smaller than originally projected in the most recent model years.[9] Despite more than four decades of regulation, aggregate transportation GHG emissions are not declining in any significant way. Instead, they have increased by 36 percent since 1980, and total, annual transportation emissions in 2018 and 2019 were among the highest in U.S. history.

In addition to these shortfalls, whatever fuel and emissions savings the standards do produce are expensive when compared to other policies. According to one analysis, for example, the cost per gallon saved through a fuel economy standard is three to six times higher than a gasoline tax.[10] Another study compared fuel economy standards to fuel taxes and confirmed that taxes were the lower-cost way to achieve the same fuel use reductions. This finding held even in light of the possibility that some consumers would not fully take fuel prices into account when purchasing new vehicles, and was actually bolstered after taking into account differences in vehicle longevity and on-road fuel economy.[11]

In practice, however, fuel economy standards are a more popular policy than a carbon tax or a gasoline tax. Ostensibly, this is because the cost of the fuel economy standard is difficult for a typical consumer to observe, whereas the costs of a tax are more transparent. The result is that political opposition to the tax is much higher. This is true even though the fuel economy standards are likely to impose higher costs—both on automakers and consumers—than fuel taxes.

The result is that these standards are likely to remain the primary option to regulate fuel consumption from cars and trucks for the foreseeable future. Only new legislation, signed into law, could completely change course, and the political barriers to such action are considerable. While replacing the standards is unlikely, however, there are steps that policymakers can take to make them more effective, affordable tools for reducing emissions.

9 Greenstone, Sunstein, and Ori, *The Next Generation of Transportation Policy*.

10 Jacobsen, "Evaluating U.S. Fuel Economy Standards."

11 Anderson and Sallee, "Designing Policies to Make Cars Greener."

How We Got Here

There have been three major milestones in U.S. fuel economy policy: (1) their introduction in 1975; (2) a set of major structural changes enacted into law in 2007; and (3) a major program overhaul in 2011 following Massachusetts vs. EPA. Each of these milestones resulted in consequential policy changes that will shape U.S. policy in the transportation sector over the coming decades and are, therefore, of high importance to the Biden administration.

The United States enacted its first fuel economy regime as part of the Energy Policy and Conservation Act of 1975 (EPCA). Implemented in the wake of the 1973-74 oil embargo, which rocked the global market as oil prices tripled, EPCA established Corporate Average Fuel Economy Standards (CAFE) for all cars sold in the United States.[12]

At its core, EPCA requires the Department of Transportation (DOT) to establish one national fuel economy standard for passenger automobiles (passenger cars) and another for non-passenger automobiles (light trucks) at the maximum feasible level for each vehicle type in each model year. The National Highway Transportation Safety Administration (NHTSA) was tasked with administrating the program, and the EPA was tasked with assessing whether a company's average fuel economy—the sales-weighted harmonic mean of fuel economy for vehicles sold by the company—met the required national average fuel economy standard for passenger cars and light trucks. Companies that failed to meet the standard in any year would face financial penalties.

The original statute's distinction between cars and light trucks has become more problematic over time. Light trucks were considered "non-passenger cars" in the 1970s. Subjecting them to laxer standards than cars had only a modest impact at the time, when such vehicles accounted for just 20 percent of new vehicles sold. Today, however, the light truck category includes SUVs and covers more than 72 percent of the U.S. light-duty vehicle market.[13]

12 U.S. Library of Congress, Congressional Research Service, *Vehicle Fuel Economy*.

13 BEA Motor Vehicle Unit Retail Sales, Table 6. Note that in order to provide an up-to-date picture, these figures use the commercial definition of light truck, which is different than the regulatory definition. Regardless of the definition used, the share of light trucks in the U.S. fleet has risen considerably over the past eight years.

Nonetheless, this overall approach—separate standards for cars and light trucks—has remained the core fuel economy policy in the United States for the last forty years.

In 2007, amid a historic run-up in oil prices, Congress passed and President George W. Bush signed the Energy Independence and Security Act (EISA), the only major legislative update to EPCA. EISA introduced a number of new and important features. First, it instructed NHTSA to establish a credit trading scheme. This program allowed automakers to earn credits for outperforming fuel economy requirements in one or more vehicle categories. If a company performed better than required on, for example, passenger cars, but did not meet standards on light trucks, it could transfer the credits it earned on cars to the light truck category. It could also sell credits to other manufacturers, or to financial institutions and other entities. As discussed below, this feature was a significant improvement that reduced the costs of meeting the standards.

Second, EISA reformed the system of "corporate averaging" that was core to CAFE. Rather than holding all automakers to a single, national corporate average fuel economy target, NHTSA began producing annual targets for each vehicle footprint (and with separate targets for cars and light trucks). Vehicles with smaller footprints had more stringent fuel economy standards, and larger vehicles received looser targets. Those targets were combined into an overall standard for each company. In other words, each automaker had its own annual target based on the fleet of vehicles it sold—those that sold larger vehicles had a lower target, those that sold smaller vehicles had a higher target, but both targets became more stringent over time, requiring manufacturers of both large and small vehicles to become more efficient.

Finally, in 2011, following the Supreme Court's decision in *Massachusetts vs. EPA*, which ruled that EPA had authority to regulate greenhouse gas emissions under the Clean Air Act, the Obama administration announced a new set of major reforms to fuel economy standards. The centerpiece of these changes was the creation of a new set of tailpipe greenhouse gas emissions standards, implemented by EPA, for cars and light trucks sold in the United States. Together, the new regime administered by EPA and NHTSA is

FURTHER READING

Fuel Economy Standards

The Economics of Attribute-Based Regulation: Theory and Evidence from Fuel Economy Standards

The Review of Economics and Statistics, Volume 100 , No. 2

Attribute-based standards incentivize automakers to increase the size weight of their vehicles. And, while the attribute-based standards are more efficient than a flat standard alone, they are twice as costly as a flat standard accompanied by credit trading.

referred to as the National Program, and its initial set of standards covered model years 2012-25.[14]

Fuel economy regulation has by any measure produced important economic, energy, and environmental benefits in the United States. Indeed, the benefits in the form of reduction in criteria pollutants, GHG emissions, and petroleum use are estimated to be in the billions of dollars.[15] The efficiency of the entire, on-road U.S. passenger car fleet stood at just 14 mpg in 1977, the year before the first U.S. standards came into effect; in 2018 it stood at 27.7 mpg.[16] Light truck fleet efficiency increased from 11.2 mpg to 20 mpg over the same period.[17] Though technological development and competition played important roles, it is difficult to deny that policies targeting fossil fuel consumption in transportation have been central to the per-vehicle reductions in fuel use and GHG emissions in today's fleet.

At the same time, the current approach to vehicle regulation—attribute-based efficiency standards with separate schedules for cars and light trucks—is highly inefficient and unnecessarily costly. It is therefore also unlikely to be adequate as a means to achieve the substantial reductions in transportation-related GHG emissions needed to reduce the odds of disruptive climate change. Redesigning key elements of the standards can increase the net benefits of the policy and better achieve the goals of reducing fuel usage and GHG emissions.

What To Do

There are appealing opportunities to help CAFE get more bang for the buck by redesigning the regulation. Policymakers should begin by tackling four critical priorities.

14 In March 2020, the Trump administration finalized the Safer Affordable Fuel-Efficient Vehicles Rule (SAFE), which established weaker fuel efficiency and emissions standards for model years 2021-2026. As of this writing the SAFE Rule is being challenged in court.

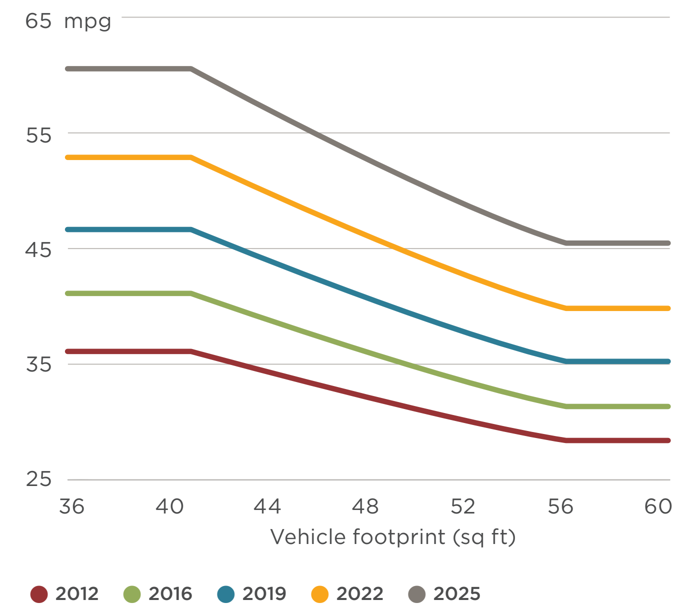
15 Chay and Greenstone, "The Impact of Air Pollution on Infant Mortality;" Chen, Ebenstein, Greenstone, and Hongbin, "Evidence on the Impact of Sustained Exposure;" Dominici, Greenstone, and Sunstein, "Particulate Matter Matters;" Ebenstein, Fan, Greenstone, He, and Maigeng, "New Evidence on the Impact of Sustained Exposure;" Greenstone, Kopits, and Wolverton, "Developing a Social Cost of Carbon."

16 ORNL, *Transportation Energy Data Book*.

17 Id.

FIGURE 2

Fuel Economy Standards in the U.S.

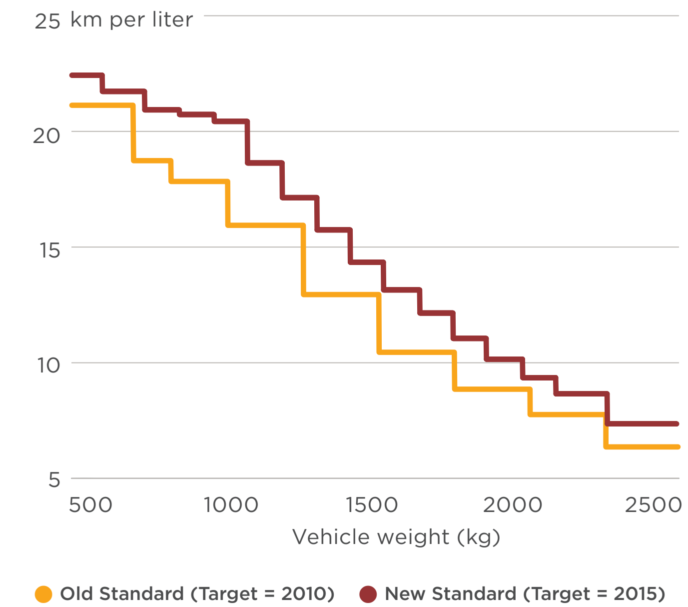


Note: Figure shows the latest standards for cars from the Obama administration. The Trump administration's proposed standards are currently under legal review.

Source: U.S. Department of Energy.

FIGURE 3

Fuel Economy Standards in Japan



Source: Ito and Sallee (2018).

POLICY

Eliminate "footprint-based" regulations.

A key feature in the current U.S. fuel economy standards is its "footprint-based" fuel economy targets. Vehicle footprint is defined by the rectangle formed by a car's wheelbase and track width. As shown in Figure 2, the CAFE standards allow larger cars to have lower fuel economy targets and require smaller cars to have more stringent fuel economy targets.

For example, to meet the 2012 targets, the smallest vehicles needed to achieve an average fuel economy of about 36 mpg, while the largest vehicles were required to average just 28 mpg. By 2025, the smallest vehicles would need to reach nearly 62 mpg. The largest cars, in contrast, would only need to reach 46 mpg.

Automakers need to meet the fuel economy targets by fleet average. Therefore, under this regulation, automakers that sell larger cars are faced with less stringent fuel economy targets, while automakers that sell smaller cars are faced with more stringent fuel economy targets.

This type of regulation is called "attribute-based regulation" because the stringency of the regulation (in this case, the fuel economy targets) depends on an attribute of products (in this case, the vehicle footprint of a car).

These enormous differences in the fuel economy target create a perverse incentive for automakers, encouraging them to increase the manufacture and sales of larger vehicles in order to make the environmental regulation easier to meet. This is an unintended consequence for a policy designed to reduce fuel consumption because making cars bigger leads to poorer fuel economy.

U.S. policymakers can draw lessons from Japan's long-running experiment with attribute-based standards. Japan began using this kind of fuel efficiency regulation in the 1970s (forty years before the United States) so there is much more data to draw on than in the United States.

Like the U.S. footprint regulation, the Japanese fuel economy regulation is based on vehicle size (Figure 3). A minor difference is that the Japanese regulation is based on car weight rather than the size of its footprint, but the principle and function of the regulation are the same. Another interesting feature of the Japanese regulation is

FIGURE 4
Fuel Economy Standard and Histogram of Vehicles, 2001–2008 (Old Standard)

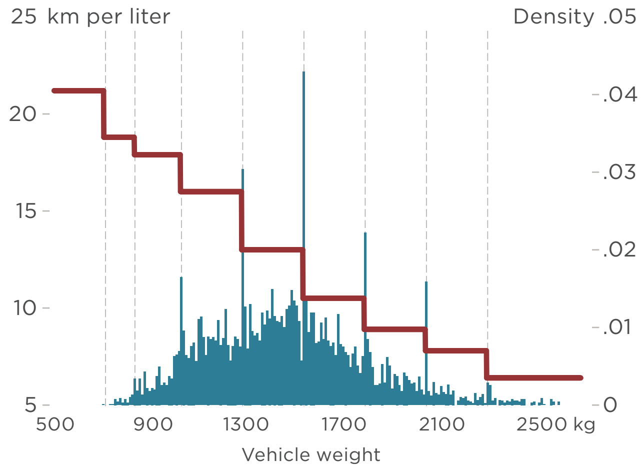
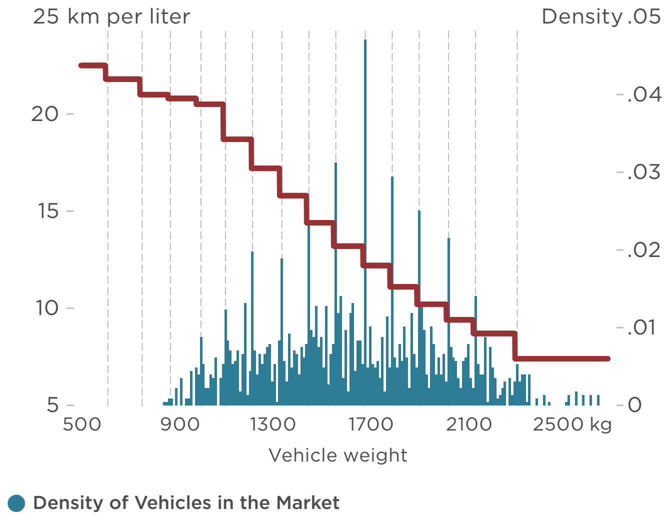


FIGURE 5
Fuel Economy Standard and Histogram of Vehicles, 2009–2013 (New Standard)



Source: Ito and Sallee (2018).

that the fuel economy target has declining "steps." When a vehicle reaches a certain weight threshold, the required fuel efficiency drops.

The figure shows that automakers have strong incentives near the edge of each step to increase car weight to move up to the next weight category. Moving up to the next weight category substantially lowers the fuel economy target. This implies that automakers can comply with the fuel economy regulation without making costly investments to actually improve the fuel economy of their cars.

Figure 4 shows that Japanese automakers did indeed respond to that incentive. The tall spikes in the figure show that many more cars than one would otherwise expect cluster at the low end of each step, indicating that car companies increased the weight of those models to be able to reach the next weight category with a lower fuel economy target.

Figure 5 shows the same analysis over a second time period, in which Japanese regulators raised fuel efficiency standards while maintaining a step-wise reduction in standards as vehicle weight rose. Sure enough, automakers responded to the implicit incentive exactly the same way they had previously done, clustering cars around the low end of each weight class. This behavior resulted in poorer fleet-average fuel economy than it would have been in the absence of the upsizing incentive created by the attribute-based regulation.

Incentivizing larger vehicles has consequences beyond fuel economy. One of the most consequential is an increase in mortality from traffic accidents. In the event of a traffic accident, heavier automobiles are safer for the occupants of the vehicle but more dangerous for pedestrians or the occupants of other vehicles. An increase in vehicle weight of 1,000 pounds is associated with a 0.09 percentage point increase in the probability that the vehicle is associated with a fatality, compared to a mean probability of 0.19 percent.[18] Overall, researchers estimate that this policy-induced weight increase resulted in a 3.4 percent increase in fatality in traffic accidents.[19]

In addition to the social costs of higher fatality rates, this research also calculates the economic cost of this attribute-based fuel economy regulation. The attribute-based fuel economy regulation was 3.5 times more costly than an efficient fuel economy regulation without attribute basing to produce the same amount of fuel economy improvement in the society.

EISA currently requires fuel economy standards to be based on one or more vehicle attributes. The Biden administration should therefore work with Congress to amend the law, eliminating the requirement for standards to be based on vehicle attributes.

18 Anderson and Auffhammer, "Pounds That Kill"

19 Ito and Sallee, "The Economics of Attribute-Based Regulation"

POLICY

Eliminate the distinction between cars and light trucks.

A second important form of attribute-based regulation in U.S. fuel economy policy is the substantially different fuel economy targets for passenger vehicles and light trucks. For example, the fuel economy targets in 2012 were 32.7 mpg for passenger cars and 25.3 mpg for light trucks.

The light truck category has existed since 1979. Figure 6 shows that the rise in the market share of light trucks, which includes SUVs, coincides with this timing. The light truck share was approximately 20 percent in 1979 but was more than 72 percent in 2019 in the U.S. auto market. Like Japanese automakers, which made heavier vehicles in response to the implicit incentives of the standards there, companies selling in the United States took advantage of the attribute-based regulation in this country to shift sales from passenger cars to light trucks.

Based on data from NHTSA, the fleet-average mpg in 1979 were 18 mpg for light trucks and 19 mpg for domestic passenger cars.[20] In 2019, these numbers were 29 mpg for light trucks and 41 mpg for domestic passenger cars.[21] That is, although both vehicle categories experienced increases in fuel economy over the last forty years, fuel economy for light trucks did not improve as it did in passenger cars.

20 NHTSA, "Summary of Fuel Economy Performance," 2014.

21 NHTSA, "Manufacturer Projected Fuel Economy," 2019.

There is no economic rationale that can justify less stringent fuel economy regulation for SUVs than other passenger cars. The Biden administration should therefore seek to eliminate the distinction between the two vehicle types for the purposes of setting fuel efficiency standards.

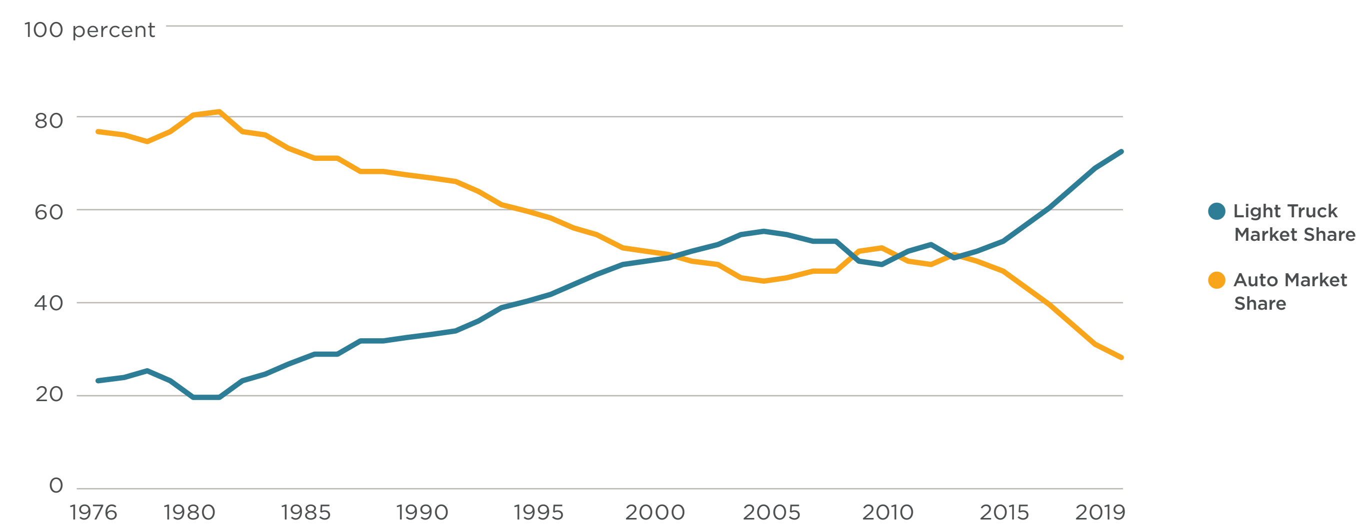
The Energy Policy and Conservation Act (EPCA), which first established fuel economy standards, empowered NHTSA to set separate standards for passenger cars and light trucks. The law is less clear, however, on whether the standards need to be different. The Biden administration therefore has two options. First, it can work with Congress to amend EPCA to eliminate the distinction between the two vehicle types under the law and create a single standard for all passenger vehicles. Or, second, the Department of Transportation can take advantage of the existing ambiguity in the law to establish separate but identical fuel economy standards for both vehicle types, de facto eliminating the distinction between them.

POLICY

Stimulate trading of compliance credits.

The National Program included a notable innovation: compliance trading. Each year, automakers are assessed on whether their fleet efficiency (GHG or fuel economy) has met its target based on the mix of vehicles it sells. If fleet efficiency outperforms the target, then the

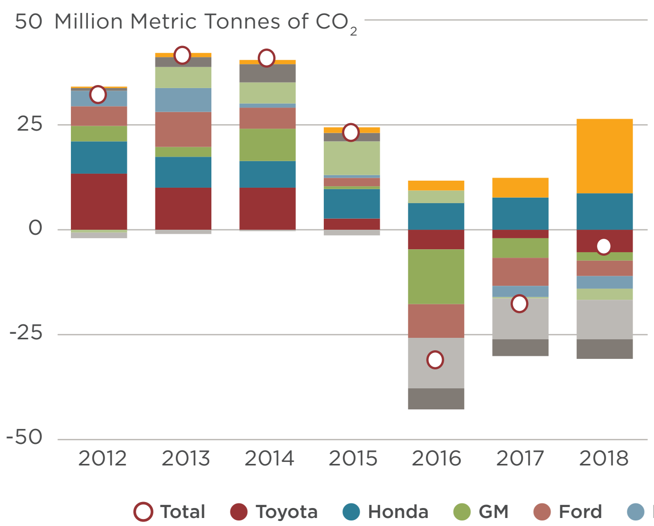
FIGURE 6
Market Share of Cars and Light Trucks, 1976-2019



Source: Bureau of Economic Analysis.

FIGURE 7

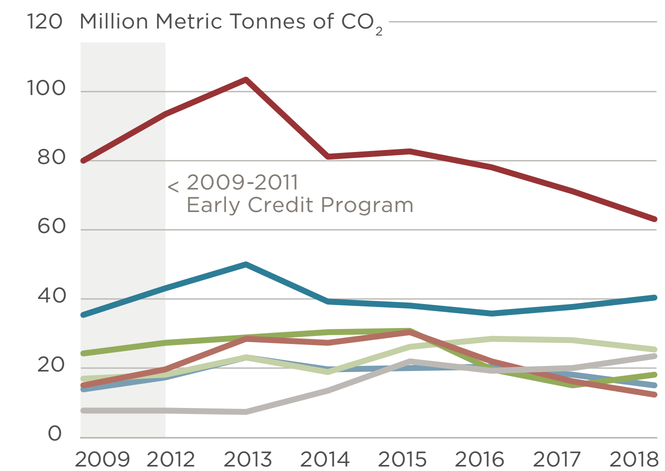
Annual Earned Fuel Economy Credits by Automaker (Gross)



Source: EPA. Figures current through 2018 and reflect credit status for a model year's vehicles regardless of sale year.

FIGURE 8

Cumulative Earned EPA Credits, Selected Manufacturers, 2009-18



Source: EPA. Figures reflect total credits held at the end of 2018 for each vintage credit.

automaker receives credits for the surplus. If instead its fleet efficiency does not meet the target, then the automaker must either buy credits or rely on prior year surpluses to fill the requirement. The credits and trading for GHG emissions are managed by EPA. NHTSA manages fuel economy credit trading.

The balance of this discussion focuses on the EPA credit system, as it is the more important regulation under the current rules.

Under the current regulations, EPA credits can be traded across manufacturers. Trading improves the market by allowing each automaker to specialize in what it's best at without compromising on the overall fuel standards for the fleet. The costs of improving fuel economy vary widely across automakers. Some automakers have relative expertise in producing and marketing fuel-efficient vehicles, whereas for other automakers it can be much harder. With compliance trading, investments are made where the cost of improvement is lowest, achieving the targeted aggregate level of fuel economy at lowest total cost.

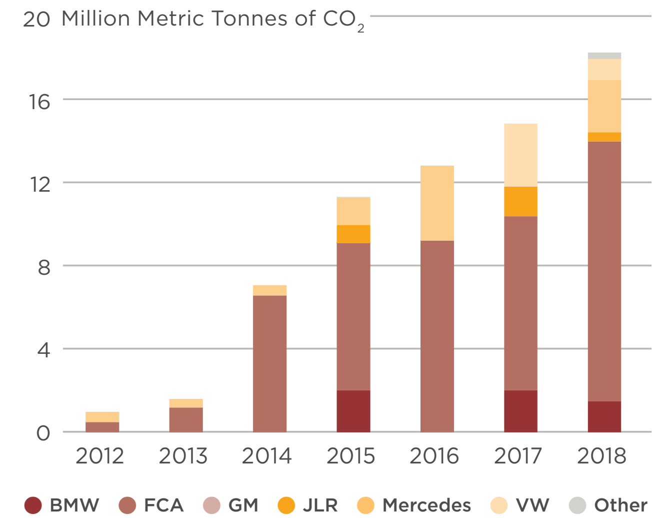
Similarly, the current standards allow automakers to bank and borrow credits across years. This compliance trading across years creates a similar benefit to compliance trading across firms. Automakers can smooth year-to-year fluctuations in demand driven by macroeconomic shocks, changes in gasoline prices, and other factors. The banking and borrowing also provides stability for the permit market, helping to avoid permit price spikes and crashes, and mitigating concerns about market power in permit markets.

Figures 7 and 8 illustrate how a trading system can help smooth differences between firms and over time. Figure 7 shows that many automakers generated large surpluses from 2012-15—that is, they easily met the fleet-wide fuel economy standards, earning credits for coming in well under the requirement. In 2016, however, many automakers fell short of the standard, requiring them to apply their own credits from the past or buy credits from other automakers. This shows an example of why the credit trading system is important. Because automakers can trade their credits between the past and future, and between firms, they were able to smooth the marginal compliance cost across years and across firms. If the compliance trading did not exist, the marginal compliance costs would have been much higher in 2016.

Figure 8 shows the total annual stock of credits by company at the end of each year. Toyota, which has long specialized in smaller, more fuel-efficient vehicles, consistently has a large stock of credits. Ford and GM,

FIGURE 9

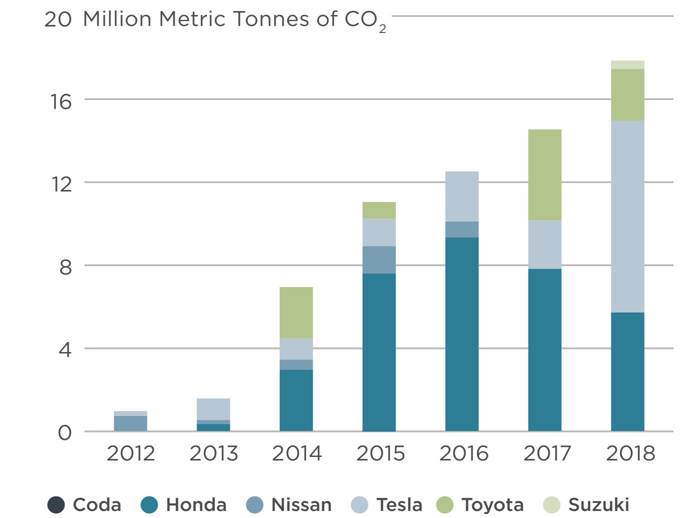
Historical Compliance Credits, Annual Purchases



Source: Greenstone, Sunstein, Ori (2018).

FIGURE 10

Historical Compliance Credits, Annual Sales



Source: Greenstone, Sunstein, Ori (2018).

which are more reliant on trucks, have relatively fewer credits. In theory, the differences between automakers should create the perfect conditions for trading to begin to sprout up in a major way. Rather than seek expensive emissions reductions in their truck fleets, automakers with deficits could seek out more efficient firms and buy their credits to comply.

However, to date, trading between firms has been held back partly because there is no real platform for trades or transparent price discovery. Trades occur on a one-to-one basis, and the transaction details are kept secret. As a result, trading has been relatively modest, equal to just 7 percent of available credits in model year 2018.

Classic economic theory implies that it is important to reduce transaction costs to make compliance trading practical. To make it easier for companies to trade their credits, Congress should work with regulators, industry leadership, and environmental groups to create a transparent auction market mechanism, similar to the ones being used in wholesale electricity markets. Automakers would use the market to submit their selling and purchasing bids on compliance credits, making compliance trading more transparent and efficient. For example, EPA does not currently disclose information about the credit prices of traded credits, which makes it difficult for automakers to decide to use the compliance trading. More transparent information about the market outcomes should stimulate the use of this important market.

POLICY

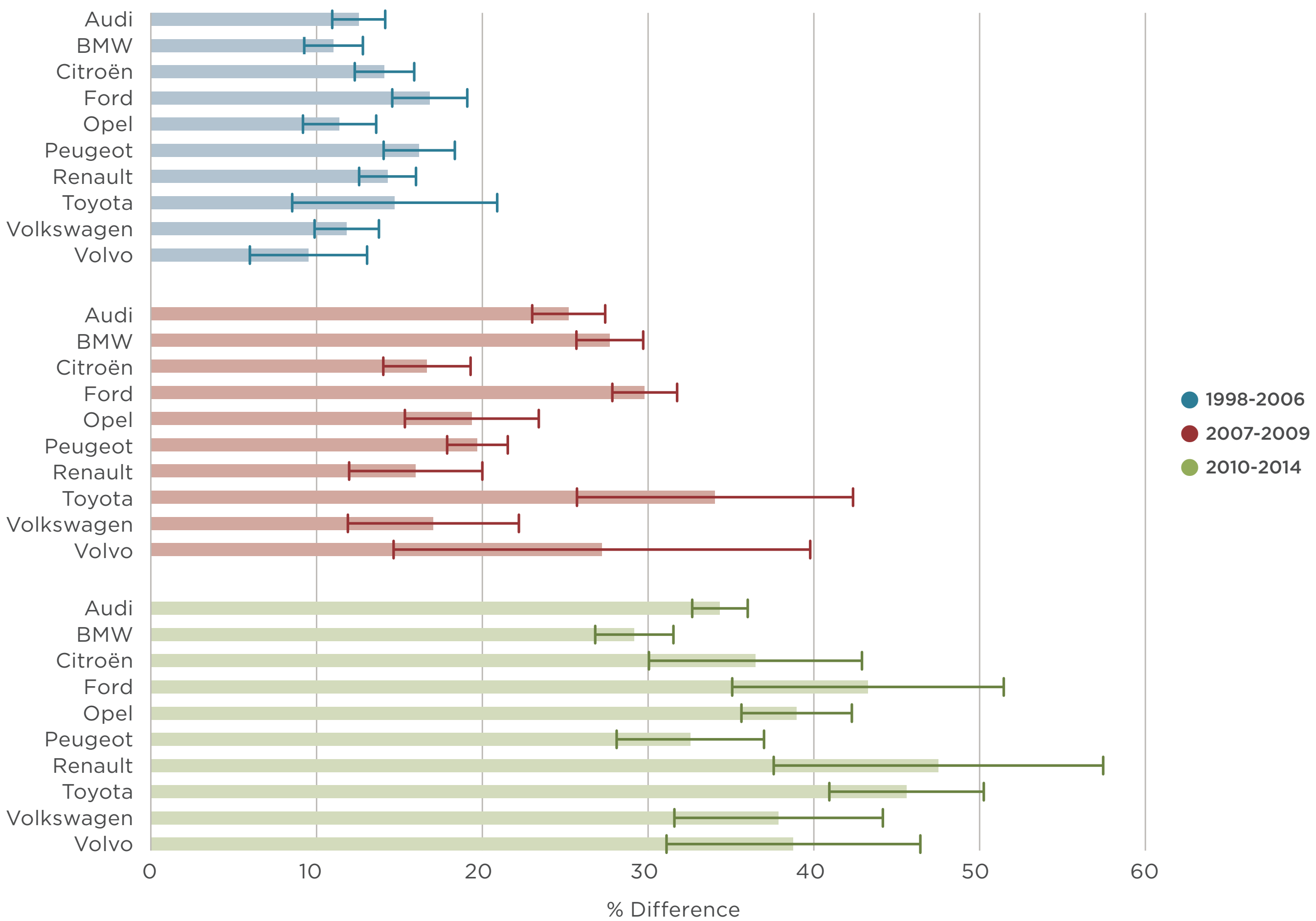
Prevent automakers from manipulating their fuel economy ratings.

For fuel economy regulations to be effective, the fuel economy data reported by automakers must be accurate. A series of recent scandals revealed, however, that automakers often manipulate their fuel economy data to meet fuel economy standards. Recent studies show that on-road fuel economy ratings are in fact significantly worse than official ratings. One study found that official fuel economy ratings were overstated by 30 percent to 50 percent compared to actual, on-road fuel economy ratings in recent years, and such mis-reporting is both common across automakers and getting worse over time.

The Biden administration can take three critical steps to prevent automakers from manipulating their fuel economy ratings. First, DOT should work with EPA and automakers to design a fuel efficiency test cycle that better reflects real-world driving conditions. Doing so

FIGURE 11

Gap between On-Road and Official Fuel Consumption per Firm



Source: Reynaert and Sallee (2020).

would not only ameliorate the wide and growing disparity illustrated in Figure 11, but also make it easier to attribute any remaining disparities to causes other than simple misalignment between the test and the real world.

Second, the administration should work with Congress to amend the law governing fuel efficiency standards to require either EPA or DOT to oversee fuel economy testing directly. Currently, automakers test fuel economy by themselves, and while their results are subject to audit by EPA they are not all verified each year. Finally, it should direct EPA and DOT to create a financial penalty for the deviation between the official fuel economy ratings and on-road performance. This penalty would be in addition to existing penalties automakers must pay for failing to meet their fleetwide fuel economy standards. The penalty should be significant enough to create an incentive for automakers not to manipulate their ratings.

Closing Argument

Fuel efficiency regulations are not perfect policies for reducing emissions, but there are steps that policymakers can and should take to make them more effective. Decoupling standards from vehicle size and type will eliminate implicit incentives for automakers to build bigger vehicles. Establishing a formal, transparent market to trade emissions credits will help the industry reduce emissions at the lowest possible cost. And, promulgating new rules to bring emissions testing under the direct supervision of regulators rather than car companies themselves, and imposing tough penalties for violations, will deter cheating and increase trust in the system. Short of imposing a carbon tax, these are the next-best steps that policymakers can pursue to cut vehicle emissions without imposing undue hardship on automakers and consumers.

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