Institute *for* Policy Integrity

NEW YORK UNIVERSITY SCHOOL OF LAW

October 5, 2017

Elaine L. Chao, Secretary, Department of Transportation
E. Scott Pruitt, Administrator, Environmental Protection Agency

Attn.: Docket ID No. EPA-HQ-OAR-2015-0827 & NHTSA-2016-0068

Subject: Comments on the Request for Comment on Reconsideration of the Final Determination of the Mid-Term Evaluation of Greenhouse Gas Emissions Standards for Model Year 2022-2025 Light-Duty Vehicles

EPA and NHTSA have announced their intentions to reconsider greenhouse gas and fuel economy standards for light-duty vehicles for model years 2022-2025, as well as possibly for model year 2021. Those standards, finalized by EPA and proposed as "augural" by NHTSA in 2012, were found at the time to be massively benefit-cost justified, to the tune of $326-$451 billion in net benefits (for the lifetime of model year 2017-2025 vehicles).[1] These benefits included cost savings for consumers at the gasoline pump as well as avoided climate damages. At the same time, the agencies estimated that if national employment rates returned to normal levels, the standards "will have small, if any, effect on aggregate employment."[2]

The agencies now question whether those previously established standards are "appropriate," based on factors such as "the impact of the standards on the automobile industry," "the impact of the standards on reduction of emissions, oil conservation, energy security, and fuel savings by consumers," and consumers' preferences and behaviors.[3] To justify any weakening of the standards adopted in 2012, the agencies would need to marshal considerable evidence of changed circumstances since 2012, and since January 2017 when EPA last finalized a mid-term evaluation of the standards. Yet after a thorough review of the evidence, the only rational conclusion is that the standards are still appropriate, and any changed circumstances, such as the continued diffusion of technologies, would support even more stringent standards.

The agencies reference several studies being prepared by stakeholders that "were not ready for submission during the previous Mid-term Evaluation comment periods."[4] Likely they have in mind the studies recently published that criticize the vehicle greenhouse gas and fuel economy standards by emphasizing potential employment effects on the automobile industry. The Institute for Policy

[1] 77 Fed. Reg. 62,623, 62,769 (Oct. 15, 2012). *See also* EPA, Final Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation, 24 (2017) ("net benefits totaling nearly $100 billion over the lifetime of MY2022-2025 vehicles (3 percent discount rate)").
[2] EPA, Regulatory Impact Analysis: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, at 8-25 (2012). *See also* EPA, Final Determination (2017), *supra* note 1, at 26 ("small enough that it will be unable to be distinguished from other factors affecting employment").
[3] 82 Fed. Reg. 39,551, 39,553 (Aug. 21, 2017).
[4] *Id.*

Integrity at NYU School of Law[5] submits these comments to show that the employment effects from the standards are likely to be small and that current analyses of such effects suffer from a number of short-comings that limit their applicability. In contrast, the standards will likely result in large welfare gains for consumers, in addition to valuable environmental benefits.[6] These comments also explain why, because automobiles are positional goods, fuel economy standards will reduce externalities on consumers and therefore generate substantial consumer welfare.

I. Vehicle standards will likely have at most a relatively small impact on employment in the automobile industry.

Any prediction that the vehicle standards might decrease employment in the automobile industry would have to rest, in part, on the assumption that the standards will reduce consumer demand for automobiles. Such a conclusion requires a further assumption that the increase in automobile price due to compliance costs would exceed the consumer's valuation of the associated fuel savings.[7] Such a prediction might further assume decreased employment not only in the automobile manufacturing sector but also in the related businesses—mainly automobile dealerships and automotive suppliers.

Basic economic theory and evidence, however, indicate that any such dire predictions about potential job losses are very likely wrong. Instead, any effects on employment in the automobile sector should be relatively modest—and, as further detailed in the next section of these comments, would also be largely offset by other employment effects in the broader job market.

First, there is substantial flexibility in how automobile manufacturers can adjust to fuel efficiency and emissions standards. Manufacturers have many options for what fuel saving technology they can apply to their vehicles, and they can also choose to make greater fuel economy improvements in one part of their fleet rather than another if it is cheaper or more profitable to do so. CAFE footprint requirements likely limit the degree to which emissions improvements occur through changes in vehicle attributes like size, weight, and power.[8] If manufacturers choose to make fuel economy improvements through attribute changes, manufacturer flexibility will be further increased.[9] Additionally, manufacturers may use compliance credits, either purchasing credits from over-compliant manufacturers or banking credits for use in future years.[10]

With such flexibilities, the automotive firms will be able to take into account the properties of demand for individual vehicle models when deciding how to meet the standards. They have the

[5] This document does not purport to present New York University School of Law's views, if any.
[6] Together with a coalition of organizations, we separately submit additional comments on the social cost of greenhouse gases and the climate benefits of these standards.
[7] Most studies forecast the net present value of fuel savings to be higher than the upfront increase in the automobile price. On how consumers value those two financial aspects in their purchase decision, see the discussion below.
[8] Environmental Protection Agency, FINAL DETERMINATION ON THE APPROPRIATENESS OF THE MODEL YEAR 2022-2025 LIGHT-DUTY VEHICLE GREENHOUSE GAS EMISSIONS STANDARDS UNDER THE MIDTERM EVALUATION, EPA-420-R-17-001, (2017).
[9] Reducing the vehicle's weight or horsepower translates into lower fuel usage. For additional information on the trade-offs between fuel-economy and other vehicle attributes *see* Chris Busch et al., GEARING UP: SMART STANDARDS CREATE GOOD JOBS BUILDING CLEANER CARS (2012) or Christopher R. Knittel, *Automobiles on steroids: Product attribute trade-offs and technological progress in the automobile sector*, 101 AM. ECON. REV. 3368–3399 (2011). The latter study shows the numerous ways in which 2025 fuel economy targets can be met.
[10] EPA reports that the majority of manufacturers, representing more than 99 percent of 2015 model year U.S. sales, had a non-negative credit balance going into the 2016 model year. In total, 285,523,672 credits were transferred to 2016. See EPA, Greenhouse Gas Emission Standards for Light-Duty Vehicles: Manufacturer Performance Report for the 2015 Model Year (2016).

possibility to adjust the prices across their fleet to optimally attract customers toward more fuel-efficient vehicles—a practice called *mix-shifting*.[11] Automakers can also roll out more fuel efficiency and emissions control improvements in luxury vehicles, a segment of the market where consumers are relatively less price-sensitive. In their pursuit of profits, the automobile manufacturers will ensure the optimal adjustments, partly preventing sales losses and thus counteracting any potential employment effects.

Second, research shows that individuals derive value from many attributes of their vehicles based on the relation to attributes of other consumers' vehicles. For attributes like size, interior, and engine capacity, consumers prefer that their vehicle be relatively larger or nicer than the vehicles of other drivers on the road.[12] In economic terms, this means that an automobile is a so-called "positional good," or an item whose value depends on how it compares to similar items owned by others.[13] In contrast, non-positional goods are valued absolutely, and the benefit a consumer derives from the good is independent of the consumption of other consumers. For instance, while cars themselves are among the most visible consumer purchases, expenditures on fuel, vehicle maintenance, and vehicle insurance are substantially less visible and, therefore, are non-positional goods: individuals value their car insurance for its own sake and do not typically derive pleasure from owning more car insurance than their neighbors.[14] Fuel efficiency in vehicles is less positional than other vehicle attributes like engine power and size,[15] though there is growing potential for positionality, or at least an increased bandwagon effect, along this dimension as fuel efficiency becomes more visible.[16]

Consumers possess positional preferences for automobiles for a number of reasons. Heavier, larger vehicles may be safer, or perceived as safer, for occupants of the vehicle (but impose substantial health and safety externalities on passengers in other vehicles, as we discuss below).[17] More powerful automobiles allow drivers to out-accelerate others at traffic lights and on the highway. Automobiles are also important and highly visible status symbols for consumers.[18] If automakers choose to meet the standards via changes to vehicle attributes like size and weight, then the positional nature of automobile's value for consumers can mitigate the potential welfare effects of such a change (as explained in section IV below, which details how positional goods inflict an externality on consumers and how a cooperative solution—like national regulatory standards for vehicles—to decrease societal investment in positional goods can lead to welfare gains for consumers).

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[11] Jason M. Luk, Bradley A. Saville & Heather L. MacLean, *Vehicle attribute trade-offs to meet the 2025 CAFE fuel economy target*, 49 TRANSP. RES. PART D TRANSP. ENVIRON. 154–171 (2016); Pinelopi Koujianou Goldberg, *The Effects of the Corporate Average Fuel Efficiency Standards in the US*, 46 J. IND. ECON. 1–33 (1998); David Austin & Terry Dinan, *Clearing the air: The costs and consequences of higher CAFE standards and increased gasoline taxes*, 50 J. ENVIRON. ECON. MANAGE. 562–582 (2005).

[12] Anco Hoen & Karst T. Geurs, *The influence of positionality in car-purchasing behaviour on the downsizing of new cars*, 16 TRANSP. RES. PART D TRANSP. ENVIRON. 402–408 (2011).

[13] Robert H. Frank, *The Demand for Unobservable and Other Nonpositional Goods*, 75 AM. ECON. REV. 101–116 (1985).

[14] Ori Heffetz, *A Test of Conspicuous Consumption: Visibility and Income Elasticities*, 92 Rev. Econ. & Stat. 1101, 1106 (listing cars as the second-most visible expenditures, and car insurance as the fourth-least visible).

[15] Anco Hoen & Karst T. Geurs, (2011), *supra* note 12, at 407.

[16] Steven E. Sexton & Alison L. Sexton, *Conspicuous conservation: The Prius halo and willingness to pay for environmental bona fides*, 67 J. ENVIRON. ECON. MANAGE. 303–317 (2014).

[17] Michelle J. White, *The "Arms Race" on American Roads: The Effect of Sport Utility Vehicles and Pickup Trucks on Traffic Safety*, 47 J. LAW ECON. 333–355 (2004).

[18] E.T. Verhoef & van G.P. Wee, *Car Ownership and Status: implications for fuel efficiency policies from the viewpoint of theories of happiness and welfare economics*, 0 EUR. J. TRANSP. INFRASTRUCT. RES. 41 (2000).

Third, new technologies induced by fuel efficiency and emissions standards may differ from older technologies in terms the amount of labor needed to produce one automobile (the labor intensity) or the degree to which the technology relies on imports and thus fosters employment abroad instead of domestic jobs (import content). One could also anticipate a temporary surge in the number of engineering jobs required for research and development leading up to compliance deadlines for fuel efficiency and emissions standards.

Overall, the total employment effects for automotive sector are expected to be rather modest due to the flexibility of the standards, the relatively low costs per automobile compared to fuel savings, and the positional character of the vehicle attributes that might be lost with increased emissions standards. This prediction is congruent with general empirical evidence on the relationship between employment and environmental regulation within the regulated industry. For example, Gray et al.[19] examine the impact of the Cluster Rule on employment at plants in the U.S. pulp and paper industry. Their results suggest that the regulation did not lead to statistically significant job losses, and it also did not lower wages. Similar conclusions are reached by Ferris et al. (2014)[20] investigating how Phase I of the Title IV SO2 trading program affected electric utility employment; by Morgenstern et al. (2002)[21] for pulp and paper mills, plastic manufacturers, petroleum refiners, and iron and steel mills; and by Berman and Bui (2001)[22] for air quality regulation in Los Angeles. Walker (2013) estimates that the Clean Air Amendments caused $5.4 billion in foregone earnings—however, Walker emphasizes that those transitional costs are low compared to the magnitude of benefits of the regulation change.[23]

Employment effects in adjacent industries are likely to be mixed. For example, the number of gas station jobs may fall. On the other hand, if industry or the agencies argue that there will be a decline in new sales leading to lower scrappage rates, the agencies would also need to consider how that could contribute to the need for more labor-intensive repairs by mechanics.

II. The agencies must consider the general equilibrium employment effects of regulation and not focus on employment only in the automotive sector

In issuing emissions standards for vehicles, EPA is required to consider the "cost of compliance."[24] Similarly, NHTSA must weigh "economic practicability" in determining the maximum feasible fuel economy.[25] Though many employment effects are distributional in nature and not properly thought of as costs or benefits, there are some efficiency effects from changes in employment, such as effects

[19] Wayne B. Gray et al., *Do EPA regulations affect labor demand? Evidence from the pulp and paper industry*, 68 J. ENVIRON. ECON. MANAGE. 188–202 (2014).
[20] Ann E. Ferris, Ronald J. Shadbegian & Ann Wolverton, *The Effect of Environmental Regulation on Power Sector Employment: Phase I of the Title IV SO 2 Trading Program*, 1 J. ASSOC. ENVIRON. RESOUR. ECON. 521–553 (2014).
[21] Richard D. Morgenstern, William A. Pizer & Jhih-Shyang Shih, *Jobs Versus the Environment: An Industry-Level Perspective*, 43 J. ENVIRON. ECON. MANAGE. 412–436 (2002).
[22] Eli Berman & Linda T.M. Bui, *Environmental regulation and labor demand: Evidence from the South Coast Air Basin*, 79 J. PUBLIC ECON. 265–295 (2001).
[23] Studies that compare regulated with non-regulated industries (or regulated regions with non-regulated regions) tend to find higher employment effects, see, for example, Michael Greenstone, *The Impacts of Environmental Regulations on Industrial Activity: Evidence from the 1970 and 1977 Clean Air Act Amendments and the Census of Manufactures*, 110 J. POLIT. ECON. 1175–1219 (2002). This can be partly explained through their disregard of the shifts of from the regulated to non-regulated industries, contaminating the comparison.
[24] 42 U.S.C. § 7521.
[25] 49 U.S.C. § 32902(f).

on lifetime productivity and mental health.[26] The Office of Management and Budget's *Circular A-4* guidance on regulatory analysis specifically advises agencies that employment effects are important "secondary effects" of fuel economy standards, which must be considered.[27] Similarly, Executive Order 12,866 requires assessment of employment as part of a required cost analysis for significant regulations.[28] In their annual reports on the costs and benefits of federal regulations, OMB has repeatedly advised agencies not to fall into the "pitfall" of ignoring long-run and economy-wide effects: "a short-run, industry-specific job-counting model would give the impression that regulation reduces employment. . . . However, these apparent reductions or increases in employment often will, in the medium or long run, turn out to be shifts in employment among economic sectors."[29] In other words, agencies must not focus on only one sector, but rather must consider general equilibrium employment effects.

Furthermore, EPA is required by the Clean Air Act to analyze the economic effects of any vehicle emissions standard,[30] including "the potential inflationary or recessionary effects of the standard."[31] Consideration of inflationary effects necessarily entails consideration of general equilibrium employment effects,[32] not sector-specific employment effects.

Even if fuel efficiency and emissions standards lead to losses in the number of automotive jobs, such a hypothetical effect would not directly translate into higher unemployment rates for the economy as a whole. Workers laid off from the automobile sector and adjacent businesses may quickly be absorbed by other industries. Currently, the United States labor market is robust and near full employment.[33] Therefore, economists would expect the transition to a new employment to be relatively swift. Of course, involuntarily unemployment, even if temporary, creates economic costs in terms of wages lost during the unemployment spell, potential loss of human capital, relocation cost, and possible mental scarring.[34] Those effects need to be accounted for in a cost-benefit analysis, even though they will mostly be temporary and may be dwarfed by the net benefits of the standards.[35] Regardless, focusing on a single industry and failing to include general equilibrium employment effects will greatly overestimate job losses and hence lead to exaggerated welfare costs.[36] Economic studies suggest that even substantial job losses in the regulated industry

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[26] Michael A. Livermore & Jason A. Schwartz, *Analysis to Inform Public Discourse on Jobs and Regulation*, *in* Does Regulation Kill Jobs? (Cary Coglianese, Adam Finkel & Christopher Carrigan 1 ed. 2013).
[27] *Circular A-4* at 26 (2003).
[28] § 6(a)(3)(C)(ii).
[29] *See*, *e.g.*, OMB, 2015 Report to Congress on the Benefits and Costs of Federal Regulations at 42 (2015), https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/2015_cb/2015-cost-benefit-report.pdf.
[30] 42 U.S.C. § 7617(a)(5).
[31] 42 U.S.C. § 7617(c)(2).
[32] *See*, *e.g.* PIERRE CAHUC & ANDRE ZYLBERBERG, LABOR ECONOMICS (1 ed. 2004) *at* 444.
[33] See comments made by Federal Reserve, e.g., http://fortune.com/2017/01/18/janet-yellen-federal-reserve-full-us-employment/.
[34] See Timothy J. Bartik, *The social value of job loss and its effect on the costs of U.S. environmental regulations*, 9 REV. ENVIRON. ECON. POLICY 179–197 (2015) for a short review of the effects.
[35] Livermore & Schwartz, *supra* note 26.
[36] Other potential general equilibrium effects would be of second order importance: the decline in gasoline prices leading to higher spending on other goods and the impact on other sectors through changes in the input cost in form of vehicle prices.

can be offset by increased employment in the unregulated (clean) sector, leading to very small net effects of the regulation.[37]

As outlined above, the importance of economy-wide analysis has been broadly acknowledged. EPA singled out computable general equilibrium (CGE) modeling to be "particularly effective in assessing resource allocation and welfare effects. These effects include the allocation of resources across sectors (e.g., employment by sector), the distribution of output by sector, the distribution of income among factors, and the distribution of welfare across different consumer groups, regions and countries."[38] CGE models have already been used in a number of applications in EPA's analysis of environmental regulation. EPA's Science Advisory Board finds that CGE models could provide several important benefits as a supplement to the EPA's current set of analytical tools for the analysis of air regulations.[39]

While the distributional employment effects specifically in the automotive sector are also of interest to stakeholders, the agencies are required by statute, executive order, White House guidance, and best economic practices to focus on the general equilibrium modeling of welfare and the total economy-wide employment effects. In particular, a reliable general equilibrium model with short to medium-run analysis could yield valuable insights into the overall effect of efficiency standards on the labor market.

Confining the attention to employment changes in the regulated sector without determining job effects in other sectors distorts the evaluation of the regulation and contradicts the agencies obligation to look at all relevant factors under the Administrative Procedure Act.[40] In most cases, especially in times of economic upturn, the economy-wide consideration is bound to show a lower aggregate level of job impacts than the sector-specific analysis, both for job losses and gains.

III. The agencies need to account for the uncertainties associated with forecasts of employment effects. Any quantitative predictions should be accompanied by comprehensive sensitivity analyses.

The reliability of current attempts to model job impacts may be limited. Some of the most important parameters that will affect employment outcomes have widely divergent estimates in the literature. Therefore, conclusions concerning the job impacts of the vehicle standards may change substantially depending on which parameter values are used in the analysis. Moreover, analysis using only a single parameter will drastically understate the degree of uncertainty present in the academic literature.[41]

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[37] Nicholas Rivers, *Renewable energy and unemployment: A general equilibrium analysis*, 35 RESOUR. ENERGY ECON. 467–485 (2013); Marc A. C. Hafstead & Roberton C. Williams III, *Unemployment and Environmental Regulation in General Equilibrium*, 22269 NBER WORK. PAP. (2016).

[38] GUIDELINES FOR PREPARING ECONOMIC ANALYSES, (2010), National Center for Environmental Economics Office of Policy U.S. Environmental Protection Agency.

[39] SAB Advice on the Use of Economy-Wide Models in Evaluating the Social Costs, Benefits, and Economic Impacts of Air Regulations, Environmental Protection Agency Science Advisory Board Economy-Wide Modeling Panel (2017).

[40] 5 U.S.C. § 706; *see* Motor Vehicle Manufacturers Assoc. v. State Farm Mutual Auto. Ins. Co., 463 U.S. 29, 41-42 (1983).

[41] OMB guidelines requires that agencies consider a range of scenarios when faced with uncertainty, particularly if that uncertainty is due to fundamental disagreement in the scientific literature, as appears to be the case for consumer valuation of fuel efficiency, discussed below. OMB *Circular A-4* at 18 states "If fundamental scientific disagreement or lack

The forecasted employment effects will be driven to a large extent by a few modeling assumptions: the consumer perception of the adjusted car fleet, development of gasoline prices, and costs of fuel-efficient technologies. Consumers will tend to buy fewer automobiles if the increase in automobile prices due to compliance costs exceed the value of fuel savings, which in turn depends on the anticipated gasoline prices and the way that consumers perceive future savings as opposed to the upfront costs. The economy-wide unemployment rate will, on the other hand, be important for how swiftly workers can find a new job in case the standards lead to some job losses.

Disagreement about consumer valuation of fuel efficiency

For one example of the uncertainty around job impacts, consider consumer valuation of fuel efficiency. When purchasing a vehicle, an individual pays the upfront cost of the vehicle, and the consumer will also need to pay for fuel for the vehicle over time. Some studies have claimed that consumers undervalue these fuel payments when making their purchase decision. For instance, if the consumer is choosing between two vehicles—one that is more fuel efficient than the other—the "correct" valuation of the fuel savings from the more fuel-efficient automobile is the present discounted value of the difference in fuel costs between the two vehicles over the period of time that the individual expects to own the vehicle. If consumers are relatively inattentive to fuel prices or do not fully value fuel savings, then they will have a revealed value for fuel savings that is smaller than the full valuation described above. In contrast, if the consumer values fuel efficiency intrinsically, then he or she might have a revealed value for fuel savings that is greater than the value described above.

The degree to which consumers value fuel economy relative to the objective, present discounted value of fuel savings, generally expressed as a ratio or a percentage of full valuation, is a key parameter for assessing how automobile sales will react to fuel efficiency standards. If consumers have a valuation of less than 100%, that suggests that consumers undervalue fuel efficiency, implying that increases in fuel efficiency will not lead to as large of an increase in automobile demand as a standard economic model would suggest.[42] Research showing that consumers have greater than 100% valuation would suggest that fuel efficiency standards would increase demand for more fuel efficient vehicles by *more* than a standard model would predict.[43] Despite the centrality of this parameter to accurate estimation of the demand response to fuel efficiency regulations, research on consumer valuation of fuel efficiency has produced widely varying results, with estimates ranging from less than 1% to more than 1000% valuation.[44]

Overall, studies—particularly recent estimates using the most advanced estimation methods—suggest that consumers likely either fully value or slightly undervalue fuel savings. The central estimate of valuation from the most credible, recent studies is that consumers value fuel efficiency at about 75 to 100 cents on the dollar.[45] A valuation that is nearly indistinguishable from 100%

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of knowledge prevents construction of a scientifically defensible probability distribution, you should describe benefits or costs under plausible scenarios and characterize the evidence and assumptions underlying each alternative scenario."

[42] Steven Berry, James Levinsohn & Ariel Pakes, *Automobile Prices in Market Equilibrium*, 63 ECONOMETRICA 841 (1995).

[43] *See, e.g.* Meghan R Busse, Christopher R Knittel & Florian Zettelmeyer, *Are Consumers Myopic? Evidence from New and Used Car Purchases*, 103 AM. ECON. REV. 220–256 (2013).

[44] D Greene, HOW CONSUMERS VALUE FUEL ECONOMY: A LITERATURE REVIEW 64 (2010) at 50-51 shows that the range of estimates of consumer valuation in the literature is wide. Therefore, any attempt to use a single number of assess consumer valuation of fuel efficiency masks considerable variation.

[45] *Id*. Additional, recent, high quality estimates of fuel efficiency valuation can be found in Hunt Allcott & Nathan Wozny, *Gasoline Prices, Fuel Economy, and the Energy Paradox*, 96 REV. ECON. STAT. 779–795 (2013); James M. Sallee, Sarah E. West

suggests that consumers have an accurate notion of how valuable fuel savings will be and that they will respond to fuel efficiency increases. To the extent that consumers undervalue fuel savings, emissions standards will lead to welfare gains because it will lead to more fuel savings than consumers expect. On the other hand, undervaluation could lead to lower demand for fuel efficient vehicles. Given that recent estimates suggest that individuals have relatively accurate valuation for fuel efficiency, the demand effect of fuel efficiency increases should be small.

Difficulties predicting compliance costs

Another decisive element for new automobile sales is the cost of the fuel-saving technologies. The lower it is, the better the welfare impact of emissions standards will be. Economic studies show that the costs of compliance may be surprisingly low. For instance, Anderson and Sallee[46] analyze a regulatory loophole that credited vehicles capable of burning both gasoline and ethanol (flexible-fuel vehicles) with about two-thirds better mileage than they actually achieved, to learn about those compliance costs. Their estimates suggest that, in 2011, tightening standards by one mile per gallon would have cost automakers only $9-$27 per vehicle.

The information from past events gives only weak guidance for the future development of the costs in presence of increasing stringency of regulation. Innovations, which are the main drivers of cost decreases, are difficult to predict. Even if we were to assume that no new technologies will be introduced to meet the 2025 requirements but rather already existing technologies would be used, there remains the uncertainty on the cost path for the existing technologies. In particular, learning-by-doing and economies of scale have been known to push down the costs as the technology matures. For example, research and development investment for energy storage projects have decreased the cost of a lithium-ion battery from $10,000 per kilowatt-hour in the early 1990s to an expected $100 per kilowatt-hour in 2018.[47] Evidence on substantial learning in both quality-based and unit cost–based productivity terms in automobile sector has been provided by Levitt et al.[48]

Those uncertainties about future costs developments may partly drive the striking discrepancies in the compliance costs used by various studies to analyze the effects of vehicle standards. For example, for an average vehicle for model year 2025, Comings and Allison[49] implicitly use a compliance cost of zero, EPA[50] assumes an $875 increase in car price due to vehicle standards, CAR[51] uses price increases of $2000, $4000 and $6000, whereas NADA[52] has the following price rise scenarios: $2,937, $4,803 and $12,349. While obtaining the proper estimate is inherently difficult, many of the numbers, especially the extreme ones, can be easily refuted (see the critique below of individual studies). In particular, the automobile producers have an interest in starkly

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& Wei Fan, *Do consumers recognize the value of fuel economy? Evidence from used car prices and gasoline price fluctuations*, 135 J. PUBLIC ECON. 61–73 (2016); *and* Busse, Knittel & Zettelmeyer, *supra* note 43.

[46] Soren T. Anderson & James M. Sallee, *Using loopholes to reveal the marginal cost of regulation: The case of fuel-economy standards*, 101 AM. ECON. REV. 1375–1409 (2011).

[47] Noah Kittner, Felix Lill & Daniel M. Kammen, *Energy storage deployment and innovation for the clean energy transition*, 2 NAT. ENERGY 1–6 (2017).

[48] Steven D. Levitt, John A. List & Chad Syverson, *Toward an Understanding of Learning by Doing: Evidence from an Automobile Assembly Plant*, 121 J. POLIT. ECON. 643–681 (2013).

[49] Tyler Comings & Avi Allison, MORE MILEAGE FOR YOUR MONEY: FUEL ECONOMY INCREASES WHILE VEHICLE PRICES REMAIN STABLE. REPORT PREPARED FOR CONSUMERS UNION (2017).

[50] EPA (2017), *supra* note 8.

[51] Sean P. Mcalinden et al., THE POTENTIAL EFFECTS OF THE 2017-2025 EPA/NHTSA GHG/FUEL ECONOMY MANDATES ON THE U.S. ECONOMY, Center for Automotive Research (2016).

[52] David Wagner, Paulina Nusinovich & Esteban Plaza-Jennings, THE EFFECT OF PROPOSED MY 2017-2025 CORPORATE AVERAGE FUEL ECONOMY (CAFE) STANDARDS ON THE NEW VEHICLE MARKET POPULATION (2012).

overstating the costs to make potential regulation look costlier or to obtain some compensation for the costs borne.[53] The wide ranges of the cost prognoses used partly illustrates the uncertainties associated with the compliance costs. It also shows how different assumptions on the technology side may be used to affect the result of the analysis.

Given the industry's vested interests in overstating costs, EPA's[54] use of peer-reviewed "tear-down" cost studies rather than surveys of manufacturers is a preferable approach. For its innovation predictions, EPA has chosen a conservative approach in past regulatory analyses, using only the existing technologies for its costs estimate.[55] If EPA's information on available technologies is correct, one can expect the actual costs to be lower or equal to the estimates provided in the January 2017 Midterm Review. As for learning effects, EPA has used learning factors to deflate the costs over time. However, it has not taken into the account that factors are endogenous themselves: they depend on the market penetration of a particular technology and the intensity of its usage. Given the size of the automotive market, the learning effects may be stronger than predicted.

It is important to acknowledge that with sufficiently low compliance costs and relatively high consumer valuation of fuel efficiency, there actually may be an increase in automobile sales leading to an increase in the number of automotive jobs.

Modeling challenges

The choice of modeling will also affect the evaluation of vehicle standards. The automotive market has a very complex structure, and a simplification in its representation in the analysis—for example, by assuming away market power—may lead to biased results. The market structure is important, as it affects the manufacturers' optimal response to regulation (e.g., the adjustments in technology used versus changes in vehicle attributes, the amount of mix-shifting). It also affects the degree to which the costs of compliance are passed to consumers through increased prices (pass-through rate).[56] With few major producers[57] and many small ones selling multiple differentiated vehicle-types each, the automobile supply is typically characterized as oligopoly with differentiated products.[58] If EPA intends to qualify the impact of vehicle standards, it needs to obtain reliable

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[53] There is a long history of such a behavior. One of the most striking examples comes from 1971 when Ford executive Lee Iacocca told Richard Nixon that a federal law mandating airbags would represent a possible $4 billion annual cost to Ford adding "and you can see that safety has really killed all of our business." As a result Nixon delayed federal laws mandating airbags. See Robert A. G. Monks & Nell Minow, Corporate Governance, John Wiley & Sons (2008), *at* 422.

[54] Environmental Protection Agency, DRAFT TECHNICAL ASSESSMENT REPORT: MIDTERM EVALUATION OF LIGHT-DUTY VEHICLE GREENHOUSE GAS EMISSION STANDARDS AND CORPORATE AVERAGE FUEL ECONOMY STANDARDS FOR MODEL YEARS 2022-2025, EPA-420-D-16-900, (2016).

[55] "The Administrator concludes that the MY 2022-2025 standards could be largely met simply by implementation of these technologies, but we recognize that we are at the mid-point of these standards phasing-in and it would be unreasonable, in light of past developments, ongoing investment by the industry, and EPA's extensive review of the literature on future technologies and improvements to existing technologies, to expect that no further technology development would occur that could be implemented for MY 2022-2025 vehicles. (…) the EPA did not consider several technologies that we know are under active development and may potentially provide additional cost-effective technology pathway options for meeting the MY 2025 standards", EPA 2017, *supra* note 8.

"It is clear that the automotive industry is innovating and bringing new technology to market at a rapid pace and neither of the respective agency analyses reflects all of the latest and emerging technologies that may be available in the 2022-2025 time frame" (EPA 2016 *at*).

[56] See Gee Hee Hong & Nicholas Li, *Market Structure and Cost Pass-through in Retail*, 99 REV. ECON. STAT. 151–166 (2017).

[57] In August 2017, the top three manufacturers had a market share of 48% and top five – 69% according to market sales data provided by Autodata Corporation http://www.motorintelligence.com.

[58] See Steven Berry, James Levinsohn & Ariel Pakes, *Automobile Prices in Market Equilibrium*, 63 ECONOMETRICA 841–890 (1995); and David Austin & Terry Dinan, *Clearing the air: The costs and consequences of higher CAFE standards and increased gasoline taxes*, 50 J. ENVIRON. ECON. MANAGE. 562–582 (2005). Recently, Jonathan Rubin, Paul N. Leiby & David L.

estimates of substitution patterns between the brands and vehicle attributes to learn about those aspects and make out-of-sample predictions about the market outcomes. Assuming the competitiveness of the automobile sector and full pass-through rates, as well disregarding the different behavior of producers in different automobile segments, is bound to overestimate the potential sales loss. For example, it excludes the possibility of mix-shifting, which is a natural way for producers to lower their costs of compliance.[59]

Modeling such an oligopolistic market with differentiated products requires a significant amount of good-quality data.[60] For the analysis of the total employment effects, the modeling also needs to include linkages between the automotive sector and the rest of the economy, as well as proper representation of other sectors. The final product that could allow a thorough and reliable analysis of employment effects would be a very complex and difficult-to-reproduce model. Therefore, it is crucial that the agencies use non-proprietary tools for their forecasts and make the model available for independent scholars and researchers for critical review.

Once the job effect of the vehicle standards is estimated within the automotive industry, it remains to be shown how it translates to economy-wide employment. Here, the main driving forces are the general macroeconomic conditions, in particular the unemployment rate. With a booming economy, any potential lay-offs within a sector could just result in the workers transferring to new jobs, potentially suffering temporary relocation costs and some short loss of wages.[61] Forecasts of macroeconomic developments are therefore needed for an assessment of total employment effects of the standards.

The proper evaluation of welfare effects of vehicle standards should encompass a long-horizon perspective, going beyond the year 2025. The regulation could have a long-lasting effect on the automotive sector through composition of automobile fleet but also through its impact on development of new technologies. Transitory fluctuations in the automotive jobs in the years prior to 2025 will have different welfare implications than a permanent shift in the employment level. Obviously, with increasing time-horizon, the forecasting uncertainties increase, accentuating the problems described above.

A way forward for the agencies

Job effects are primarily distributional in nature, implying that they create only secondary efficiency effects. Therefore, the changes in employment or total wages do not constitute a measure of welfare in themselves and cannot be directly compared with other costs and benefits of the regulation. Simply adding them up to other costs leads to double counting and overestimation of the costs. Consequently, they should not be accounted for directly; associated measures, like changes in reservation wage,[62] should be used instead to assess the net benefits of the rule.

Greene, *Tradable fuel economy credits: Competition and oligopoly*, 58 J. ENVIRON. ECON. MANAGE. 315–328 (2009) model the market as oligopolistic with competitive fringe to reflect the increasing market share of small producers.

[59] Austin and Dinan, *supra* note 60; Goldberg, *supra* note

[60] For introduction to the methodology see Steven Berry, James Levinsohn & Ariel Pakes, *supra* note 60; *and* Steven Berry, James Levinsohn & Ariel Pakes, *Differentiated Products Demand Systems from a Combination of Micro and Macro Data: The New Car Market*, 112 J. POLIT. ECON. 68–105 (2004).

[61] For studies on the effect of unemployment rate on the duration of unemployment spell, see e.g. Timothy J. Bartik, (2015), *supra* note 34.

[62] Timothy J. Bartik, *Including Jobs in Benefit-Cost Analysis*, 4 ANNU. REV. RESOUR. ECON. 55–73 (2012).

While negative employment effects of vehicle standards are possible, there are reasons to believe they will not be substantial (as shown in previous sections). Their welfare impact will be, consequently, limited, compared to the other elements of the cost-benefit analysis, for example the tremendous fuel savings for consumers and significant environmental benefits. Job impacts may thus affect the regulatory decision when the net benefits of regulatory alternatives are relatively small. However, here the agencies found that benefits will widely surpass the costs for the vehicle standards.[63]

At the same time, a comprehensive and reliable evaluation of employment effects would require complex whole-economy modeling and the availability of robust data for the parametrization of the forecasts. As EPA's Science Advisory Board recently concluded, “CGE modeling imposes formidable data requirements,” and most current CGE models are not designed for employment: “Time and resources will be required to improve the ability of CGE models to capture these [employment] impacts.” Furthermore, “the use of CGE models for regulatory purposes will need to be accompanied by significant efforts to make the key drivers behind modeling results clear for both policymakers and the public.” As such, “to overcome these barriers,” before EPA can rely on CGE models for employment analysis, the SAB recommends several necessary and costly research steps, including initiating a third-party open-source program to assemble high-quality databases, improving the modeling of labor market impacts and of improvements in air quality, and “more work” to quantify the inconsistencies that arise when an aggregate CGE model is linked to a detailed sectoral model.[64]

Employment changes create mostly distributional issues, which do not constitute a part of cost-benefit analysis and are best captured by distributional impacts on income. Given that and given EPA’s Science Advisory Board’s assessment, EPA’s prior decisions to discuss the employment effects qualitatively rather than provide numerical results in the midterm evaluation[65] is reasonable for now.

Nevertheless, quantification of job ramifications may be of interest to general public or policy-makers. If the federal government chooses to move forward with quantitative employment analysis, it should assemble an Interagency Working Group on CGE employment models and the measurement of distributional impacts in general. This IWG would develop a methodology for analytical work based on high-quality peer-reviewed literature. It would also prepare guidance for treatment of uncertainty in the model, possibly as scenario analysis or other form of sensitivity analysis. With the ongoing economic research on the key parameters of the modeling, one may expect the predictions to improve in quality over time. However, until the values of parameters have more consistent support in the literature, the reliability of any single estimate of the employments effects of vehicle standards will underestimate the importance of uncertainty. Besides, knowledge of the upper- and lower-bounds of the effects (with the associated probabilities) may be very informative and complement the information gained from simple expected value.

The predictions generated by the models should be verified against the econometric findings in the relevant peer-reviewed empirical literature. If the predictions differ strongly from the hitherto

[63] EPA 2017, *supra* note 8.
[64] SAB Advice on the Use of Economy-Wide Models in Evaluating the Social Costs, Benefits, and Economic Impacts of Air Regulations, *supra* note 39.
[65] EPA 2017, *supra* note 8.

found effects for similar regulation, the assumptions behind the modeling may need to be questioned.

IV. The vehicle standards help to internalize three important externalities, leading to substantial welfare improvements for consumers and society

Fuel efficiency and emissions standards help address three externalities: positional goods, health and safety, and pollution emissions. Internalizing these externalities provides substantial welfare improvements for individuals and society. First, the primary motivation for the vehicle emission standards is to internalize environmental externalities associated with air pollution. As discussed above, central estimates suggest that consumers slightly undervalue fuel efficiency.[66] Recent experimental evidence has shown that this undervaluation is not due to a lack of information or due to misinformation by consumers,[67] and therefore cannot be corrected simply by an informational policy. Rather, fuel efficiency and emissions standards can be an effective policy to get agents to internalize fuel savings, leading to improvements in air pollution emissions with relatively little cost to consumer welfare.[68] (Together with a coalition of organizations, we separately submit additional comments on the social cost of greenhouse gases and the climate benefits of these standards.)

Second, positional goods impose large externalities on other individuals.[69] When a consumer purchases a larger or more powerful vehicle, that purchase makes vehicles owned by other consumers less valuable. This leads to a direct welfare loss for the other consumers and also motivates them to buy larger vehicles, in turn, to maintain their level of relative consumption. Therefore, the consumers become stuck in a vicious cycle of spending progressively more to upgrade the size and power of their vehicles. This type of consumption does not result in higher welfare for consumers, but without outside policy, a consumer cannot avoid engaging in this type of upgrading behavior without suffering substantial welfare loss.[70]

Vehicle emissions standards can help break the "positional goods treadmill," leading to improvements in consumer welfare. Individual consumers would prefer to coordinate and avoid the vicious cycle of positional spending. If automakers choose to meet emissions standards by changing vehicle attributes, then that can help reduce the positional externality that individuals face. By dampening positional goods concerns, emissions standards can also achieve better fuel efficiency outcomes. One of the important channels through which positional goods reduce welfare is that when consumers are stuck competing over positional goods, they under-consume non-positional goods.[71] Because fuel efficiency does not have the same visibility as vehicle size or power, it is not as positional as these other vehicle attributes.[72] Therefore, by preventing positional consumption, vehicle standards can also lead to a higher value for fuel efficiency, raising welfare and lowering costs for consumers.

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[66] D GREENE, (2010), *supra* note 44.
[67] Hunt Allcott & Christopher Knittel, *Are Consumers Poorly Informed about Fuel Economy? Evidence from Two Experiments*, No. 23076 NBER WORK. PAP. 62 (2017).
[68] James M Sallee, *Rational inattention and energy efficiency*, 57 J. LAW ECON. 781–820 (2014).
[69] Frank (2005), *supra* note 13.
[70] *Id*.
[71] Robert H. Frank & Cass R. Sunstein, *Cost-Benefit Analysis and Relative Position*, 68 UNIV. OF CHICAGO LAW REV. 323, 326 (2001).
[72] Hoen and Geurs, *supra* note 12.

Third, emissions standards can potentially reduce the mortality and injury externalities that result from heavier vehicles. Individual safety is one of the reasons for positionality in vehicle preferences. Consumers want larger, heavier automobiles because those vehicles can be relatively safer in accidents than smaller, lighter vehicles. Buying a larger vehicle, therefore, improves the safety of the driver and passengers of that vehicle, but the purchase imposes a significant externality on others by reducing the safety of other vehicles on the road. Much like the general discussion of positional goods above, this dynamic leads to an "arms race" on the road, with consumers continually forced to increase the size of their vehicles to compete with other drivers.[73]

In the case of vehicle weight, this arms race can lead to especially dangerous consequences. Recent research shows that heavier vehicles are substantially more dangerous to other drivers. A 1,000-pound heavier vehicle makes it 40-50% more likely that an automobile crash will result in a fatality.[74] Safety concerns have also motivated the increase in purchase of light trucks like sports utility vehicles.[75] Light trucks are particularly dangerous for pedestrians: a collision involving a light truck and a pedestrian is almost twice as likely to kill the pedestrian as a collision between a pedestrian and another type of vehicle.[76]

If emissions standards lead to a lighter fleet overall, then such a change unambiguously improves health- and mortality-related welfare for pedestrians, cyclists, and motorcycle riders.[77] For vehicle drivers and passengers, reduced vehicle weight benefits drivers of smaller vehicles but might increase the mortality rates of individuals who previously had a larger vehicle. Analysis of these competing effects shows that overall, fuel efficiency and emissions standards will likely reduce mortality of automobile riders or leave overall rider mortality unchanged.[78]

V. The existing modeling of the vehicle standards often exhibits serious analytical flaws that EPA needs to avoid in its own analysis

Proper modeling is key to understanding how standards affect economic outcomes. Several studies recently completed by stakeholders and submitted into the rulemaking record feature serious analytical flaws.

For its main contribution, the study by Furth and Kreutzer[79] uses a simple comparison of automobile price evolution across countries to estimate the effect of U.S. emissions standards on automobile prices (through compliance costs). This approach disregards diverging development between countries—in particular any changes in the market structure or demand. Implicitly, it also

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[73] Heffetz, *supra* note 14.
[74] Michael L. Anderson & Maximilian Auffhammer, *Pounds that kill: The external costs of vehicle weight*, 81 REV. ECON. STUD. 535–571 (2013).
[75] Keith Bradsher, *High and mighty: SUVs-the world's most dangerous vehicles and how they got that way*, PUB. AFFAIRS. (2002).
[76] The size of the effect on pedestrians might be small. Michael Anderson, *Safety for whom? The effects of light trucks on traffic fatalities*, 27 J. HEALTH ECON. 973–989 (2008) shows that heavier vehicles are only slightly more likely to cause pedestrian mortality as light vehicles.
[77] Anderson and Auffhammer, *supra* note 81.
[78] Mark R. Jacobsen, *Fuel Economy and Safety: The Influences of Vehicle Class and Driver Behavior*, 5 AM. ECON. J. APPL. ECON. 1–26 (2013), at 2 states "I consider a 'footprint' type [CAFE] rule and show that it, too has a near-zero effect on fatalities." More recently, Antonio Bento, Kenneth Gillingham & Kevin Roth, *The Effect of Fuel Economy Standards on Vehicle Weight Dispersion and Accident Fatalities*, No. 23340 NBER WORK. PAP. 39 (2017) find that CAFE standards substantially reduction in overall vehicle-related mortality.
[79] SALIM FURTH & DAVID W. KREUTZER, 3096 FUEL ECONOMY STANDARDS ARE A COSTLY MISTAKE, THE HERITAGE FOUNDATION (2016)

assumes that countries experience exactly parallel trends in their automobile markets and thus excludes the possibility of catching-up or convergence effects.

Using multivariate regressions to analyze the effects of regulation is a methodological improvement. However, attempts to gauge the effect of macroeconomic factors (fuel prices, income, unemployment) on the sales of fuel efficient vehicles or electric vehicle market share by simply regressing the variables are doomed to fail due to a number of econometric problems.[80] Such regressions also take the behavior of automobile companies as fixed, which is wrong for analyzing long-term consequences of the policies[81] and overestimates the welfare losses.[82] Simple regressions thus give information about correlations but do not provide the causal effects which are of crucial importance. Therefore, they are not fit for running policy counterfactuals. The CAR study[83] is based on this type of correlational analysis, using it to estimate lost sales which are then translated into jobs lost. Without a fully causal analysis, it is questionable whether this study's estimates provide evidence on the actual effects of policy.

The study also assumes a consumer valuation of fuel economy that is not supported by the literature. The study bases its value on 7 studies, all of which indicate that consumers have a relatively low value for fuel savings.[84] As noted above, a more thorough review of the literature reveals estimates of substantial over and under-estimation. The most recent estimates of how consumers value fuel efficiency, all of which show that consumers have a relatively accurate sense for the value of fuel savings, are all exclude from the CAR study.[85] Moreover, the study does not take into account the positional goods nature of automobiles, which is central to accurately predicting consumer responses to emissions standards. Their results cannot be relied on, and the sales changes predicted from such an estimation is most likely biased upwards.

When modeling the economic effect of the vehicle standards, studies generally disregard the market structure and assume that the industry is competitive. The resulting implication of full pass-through of compliance costs—which is present in CAR's study,[86] NADA's study,[87] and Indiana University's study[88]—may have a strong impact on the results obtained. NADA's usage of Retail Price Equivalent in one of its scenarios to scale up vehicle price increases by 1.65 compared to compliance cost has no economic underpinnings and will tend to grossly overestimate the sales

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[80] The results could be severely biased due to omitted variables, trends, changes in availability of technology, path dependence and disregard of market structure, to name just a few possible problems. The difficulty of these types of analyses has been widely studied in economics, with Berry, Levinsohn, and Pakes, *supra* note providing an important early reference.

[81] Automobile manufacturers can adjust the vehicle characteristics, shift their focus to different market segments, there may be substantial entry or exit from the industry leading to changes in market structure and, consequently, the exerted market power.

[82] Additionally, given that the standards are fixed 8 years in advance, the automobile manufacturers have the time to adjust so such analysis may be misguided even for short-term effects.

[83] Sean P. Mcalinden et al., THE POTENTIAL EFFECTS OF THE 2017-2025 EPA/NHTSA GHG/FUEL ECONOMY MANDATES ON THE U.S. ECONOMY (2016).

[84] *Id.* at 17.

[85] *Id.* does not cite Allcott and Wozny (2013), *supra* note 45; Busse *et al.* (2013), *supra* note 43; or Sallee *et al.* (2015), *supra* note 45. Notably, the CAR study cites a working paper version of Allcott and Wozny (2013) that contained a lower estimate of consumer valuation for fuel efficiency than was in the peer-reviewed, published version of the paper.

[86] *Id.*

[87] Wagner, Nusinovich, and Plaza-Jennings, *supra* note 54.

[88] SANYA CARLEY ET AL., A MACROECONOMIC STUDY OF FEDERAL AND STATE AUTOMOTIVE REGULATIONS, School of Public and Environmental Affairs Indiana University (2017).

effect.[89] Similarly, the three studies disregard the ability of producers to spread the adjustments among the automobile fleet (as different automobile segments may have different valuations of attributes) in the profit-maximizing way, which overstates the compliance costs.

Some studies that provided their own prognosis of the compliance costs made strong assumptions on the technology side. Indiana University's study forecasts the path for battery cost to 2022 using DOE's target battery cost of $125/kWh for 2022, but assumes that afterwards the cost will remain constant.[90] This clashes with the well-known effects of learning-by-doing and of scale typically found in new industries. It has also potentially very strong implications given that the welfare simulations are run up to year 2035. When Indiana University discusses the import contents, it uses the static perspective that assumes that the pattern in world trades, for example for batteries, will remain constant.[91] This disregards the potential effects of production shift in response to increasing demand and growing know-how of American manufacturers. Higher R&D expenditures induced by fuel standards could lead to higher number of patents obtained by U.S. companies in technologies concentrated around fuel-savings leading to additional growth in the sector.[92]

Even if jobs are lost in the automobile sector, the unemployment rates may remain unaffected through general equilibrium effects. Therefore, if an attempt is to be undertaken to quantify the full unemployment effects, an engineering or partial equilibrium approach is of no use for evaluations. Computable General Equilibrium Modeling, like in the Indiana University study, allows one to take the inter-connections between the sectors into account. It also enables learning about the interactions of the standards with other policies, such as gasoline taxation. Input-output modeling undertaken by BlueGreen Alliance[93] study provides new insights compared to purely focusing on the automobile sector, but has its own limitations.[94]

The studies evaluating the standards tend to point to reduced consumer benefits of the vehicle rules driven by the continued decrease in gasoline prices. This is only partly true. While the value of current fuel savings does depend on the current oil prices, the stock of the automobiles cannot be adjusted flexibly as the prices change. Every year, only a fraction of the automobile fleet is replaced, so if price unexpectedly rise, the associated consumer losses will depend on the purchasing decisions made in previous years. Given the risk-averseness of the consumers, the standards act as an insurance policy against future fluctuations and so not only the expected values of gasoline prices should be look at but rather the distribution of future prices.

On the other hand, as Ceres[95] appropriately concluded, higher fuel efficiency hedges automobile manufacturers from sudden drops in demand for vehicles in case of gasoline price increases.

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[89] While economic studies found isolated cases of firms passing taxes to consumers at rates above 100%, the evidence for such behavior is rare. It is not clear why this would apply in the context of vehicle standards given that the producers would not be affected symmetrically by the costs and a 165% pass-through seems like a blunt overstatement.
[90] Carley et al., *supra* note 92, at 157.
[91] *Id.* at 58-63.
[92] While this effect is not to be taken for granted, evidence is mounting for similar patterns observed in other countries. The policy-induced energy transformation has contributed to Germany's strong position in wind-technologies (global market share of 21.5% according to Kevin Smead, Top 10 Wind Turbine Suppliers, Energy Digital, Nov 2014, . 41-17) despite the country having virtually no experience with wind-energy in the 1990's.
[93] Chris Busch et al., GEARING UP: SMART STANDARDS CREATE GOOD JOBS BUILDING CLEANER CARS, BlueGreen Alliance (2012).
[94] See THE REGULATORY RED HERRING. THE ROLE OF JOB IMPACT ANALYSES IN ENVIRONMENTAL POLICY DEBATES, Institute for Policy Integrity (2012).
[95] Alan Baum & Dan Luria, ECONOMIC IMPLICATIONS OF THE CURRENT NATIONAL PROGRAM V. A WEAKENED NATIONAL PROGRAM IN 2022-2025 FOR DETROIT THREE AUTOMAKERS AND TIER ONE SUPPLIERS, Ceres Analyst Brief (2016), p. 4-5.

The results of Indiana University[96] serve as a reminder that the welfare effects of the standard are bound to be changing over time. Though in certain transitory periods the costs might prevail over the benefits, in the long term, however, as the technologies improve, the annual net impact are expected to turn sharply positive. Performing calculation for chosen years only and assuming that they also represent future years, like done by Heritage Foundation,[97] NADA,[98] CAR,[99] and others, is a misguided approach.

When the agencies consider these or other similar studies submitted to the docket, they need to be alert to the individual shortcomings discussed above and realize how those might be affecting the conclusions from the studies. Moving forward with a quantitative employment analysis would require EPA to address the issues raised by its Science Advisory Board. Creating an Interagency Working Group on CGE employment would be a way to help the agencies create a methodology that avoid the problems flagged in these comments.

Conclusion

For the foregoing reasons, the positive net welfare effects of the current vehicle standards for model years 2022-2025, as well as for model year 2021, should remain quite significant, while any employment effects will likely be small and offset partly in the broader economy. As such, the current vehicle standards for model years 2021-2025 remain appropriate and should be maintained. If anything, the evidence for even more stringent standards has only grown more robust.

Sincerely,

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96 Carley et al., *supra* note 92.
97 SALIM FURTH & DAVID W. KREUTZER, 3096 FUEL ECONOMY STANDARDS ARE A COSTLY MISTAKE, THE HERITAGE FOUNDATION (2016)
98 Wagner, Nusinovich, and Plaza-Jennings, *supra* note 54.
99 Mcalinden et al., *supra* note 87.