Research Priorities for CAFE Mid-Term Review: NHTSA/Volpe Views

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Resources for the Future
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Research Priorities

• Improving the evaluation framework
• Predicting the market response
• How do car buyers value fuel economy?
• Learning effects on hardware costs
• Accounting for indirect costs
• Rebound effect
• Energy security premium
• Valuing reductions in criteria pollutants
• Clarity in reporting costs and benefits
• Plausibility checks on the overall results
Evaluation Framework

• Establishing the correct counterfactual or baseline
  – How much will demand for MPG increase, given our forecast of fuel prices?
  – Are there credible reasons why producers might not supply what buyers want?
• Incorporating opportunity costs of foregone improvements in other attributes (e.g., performance)
• Better measurement of benefits to buyers
  – Measuring savings against the correct baseline
  – What if we believe buyers value fuel savings incorrectly?
  – Recognize lost tax revenues if we value savings at retail
• Acknowledging uncertainty: should we stop focusing on point estimates, and rely exclusively on Monte Carlo analysis?
Predicting the Market Response

• We simulate manufacturers’ cost-minimizing strategies to increase MPG, but assume no market response
• An empirical model of how producers select MPG jointly with other attributes would be useful
  – How do they decide whether to change other attributes as part of their compliance strategies?
  – How do they price to recover compliance costs and manage compliance?
  – Will manufacturers “game” the footprint system?
• We have reasonable models of buyers’ choices
  – Are they still useful if we don’t predict changes in attributes other than MPG?
  – What should we assume about pricing?
• Should we incorporate changes in turnover, usage, and fuel consumption of the used vehicle fleet?
How Do Buyers Value Fuel Economy?

- Many reasons why buyers *might* undervalue fuel costs, but how strong is the evidence that they *do*?
- If we think they do, it would be helpful to know how much in order to partition benefits
  - Anticipated fuel savings (“decision utility”)
  - Unanticipated savings (“internality” component)
- We also need an empirical estimate to predict demand for fuel economy in the counterfactual case
- Are we *sure* we’re not just observing heterogeneity in vehicle use, ignoring changes in related attributes, underestimating buyers’ discount rates, etc.?
- Which identification approach and data produce the most reliable measures? Choices? Price adjustment?
- Are recent estimates converging?
Learning Effects on Hardware Costs

• Is it scale (current production) or learning (cumulative production) that matters? Both?
• Are learning effects a product of cumulative production volumes, or just of time?
• What volumes matter?
  – Manufacturer-specific vs. industry-wide
  – Does this differ among technologies, depending on sourcing?
• Are there credible estimates of learning rates for automobile-specific technologies?
Accounting for Indirect Costs

• Can we measure variation in indirect (overhead) costs for specific hardware?
• Is there any logical basis for estimating variation?
  – Individual technologies?
  – Component groups (e.g., engines, transmissions)?
  – Complexity levels?
• Should we just apply a uniform markup (“retail price equivalent”) instead?
• Do indirect costs erode as their fixed components are amortized? Over time, or with accumulated volume?
• Can we reconcile assumed behavior of marginal costs with observed stability of average costs?
Rebound Effect

• Estimates vary widely, so what features distinguish more reliable estimates?
• Choice of data affects empirical estimates: are different studies measuring the same parameter?
  – National or state time-series data measure effect of average fuel cost per mile on fleet-wide vehicle use
  – Estimates from household surveys capture effect of MPG differences on use of individual vehicles
  – Which one comes closer to what we want to know?
  – How do we use it consistently with the way it’s measured?
• Rising incomes increase both value of driving time and vehicle ownership, so what’s their net effect?
• Should we consider the “indirect” rebound effect?
Energy Security Premium

• Does it depend on consumption, or imports? If it’s calibrated to one, does it scale with the other?

• Why should it increase indefinitely?
  – Petroleum intensity of U.S. economy declining
  – Elasticity of non-OPEC supply increasing, global petroleum market becoming more fungible

• Should we include the “monopsony effect?”
  – Are we doing domestic or international analysis?
  – Some of it (~half) is a transfer to U.S. producers

• Are there marginal “military security” savings for incremental reductions in consumption?
Criteria Pollutant Benefits

• Concentrations down dramatically, so population exposure presumably declining
• NAAQS set at thresholds below which significant damages haven’t been identified
• So how reliable are anticipated benefits from further reductions?
• Why are they projected to rise so rapidly?
  – Per-ton values up ~50% over next 20 years
  – Can rising WTP explain this?
Clarity in Reporting

• How can reporting of benefits and costs be improved to more clearly convey motivations for regulating?
  – Distinguish private impacts (fuel savings, vehicle price increases) from social benefits (reductions in environmental and energy security externalities)
  – Is this environmental policy, or consumer protection?

• Report anticipated and realized savings separately
  – Clarify assumption about whether buyers value them
  – Is there a case for weighting them unequally?

• Include – or at least acknowledge – indirect impacts
  – Fuel consumption by used vehicles
  – Injuries and fatalities

• Should we make uncertainty the focal point? How?

• We need a consistent perspective for regulatory analysis; should it be domestic or international?
Plausibility Checks

• What “first principles” must hold?
  – Increasing marginal costs for successive unit increases in MPG?
  – Declining marginal benefits for successive increases?

• What plausibility checks can we apply to aggregate costs and benefits?

• How can we efficiently identify the problem if the analysis fails these checks?