Consumer Welfare and Automobile Fuel Economy

Kenneth Gillingham

Yale University

School of Forestry & Environmental Studies
Motivation: CAFE standards

• Just to be clear, we are really interested in the welfare effects of increased fuel economy standards

Source: Klier & Linn (2011)
Things to know about CAFE

• CAFE from 1978-2010
  – Each automaker must meet sales-weighted average MPG std
  – Separate standards for car and truck fleets
  – $55/MPG penalty for missing the standard (after 2007)
  – Banking and borrowing permitted

• Latest Standards 2011-2025
  – “Footprint”-based standards
    • No particular automaker or industry target
  – Tradable CAFE: across fleets and firms
  – Up to 54.5 mpg average by 2025
Chart A.1: CAFE Target Curve for Passenger Cars
Impacts of CAFE

• Before we get to welfare... what are the impacts?
  – In a simplified setting, CAFE acts much like a tax on low fuel economy vehicles and a subsidy to high fuel economy ones

• Firm response:
  – Change prices (on average increase)
  – Tweak vehicle designs
  – Change drivetrains and engines
Trade-offs: Fuel Economy & Horsepower

Source: Knittel (2011)
Impacts on CAFE on Consumers

• Consumer response:
  – Different offerings, so buy higher fuel economy vehicles
  – Lower cost of driving, so drive more (rebound effects)
  – Hold on to old vehicles longer
Some of My Research on this...

• My work quantifying the rebound effect from a similar policy – a feebate – indicates that it is small: less than 10% in the medium-run.

• Moreover, I find empirical evidence suggesting that the response to gasoline prices is greater than the response to changes in fuel economy
Welfare Effects of CAFE

• Automaker Welfare Effects
  – Reduced profits from not being able to optimize unconstrained (unless they are making mistakes...)
  – New vehicles more expensive -> reduced sales & profits

• Consumer Welfare Effects
  – Much more complicated...
Consumer Welfare Effects

• New vehicle market
  – Consumers forced to buy cars they wouldn’t have purchased otherwise = welfare loss
  – Less gasoline use/emissions = welfare gain
  – Vehicles driven more = welfare gain for drivers
  – Vehicles driven more = welfare loss from congestion/accidents
  – Perhaps ex post welfare gain if there is a behavioral bias in the purchase decision – an *undervaluation* of fuel economy
    • Hunt Allcott work and discussed by Jim Sallee
Welfare Effects on Entire Fleet

- All vehicles in the fleet
  - Holding on to old vehicles longer = welfare loss
  - More diversity in the fleet could have safety implications
    - Mark Jacobsen’s work
  - Positional effects/externalities reduced by CAFE standards?
Positional Effects/Externalities?

• Positional effects are essentially network effects
  – my utility from driving my car is influenced by others
• One question: Are they real?
  – Is utility ordinal or cardinal?
• Second question: Would CAFE standards help?
  – Claim is that fuel economy is not a positional attribute, whereas other attributes (e.g., horsepower, acceleration) are.
  – So the implication is that there wouldn’t be much welfare loss from decreasing horsepower/acceleration for all vehicles.
  – Would CAFE really reduce the diversity of vehicles?
What Do We Know?

• All current studies have to assume away at least some parts of the story...
• And have different numbers for the cost of CAFE...
  – All of which definitely depend on those assumptions!

But some of the evidence is quite clear:
• CAFE standards are most likely a more expensive way to reduce gasoline use/emissions from transportation than increasing the gasoline tax
• And it’s tough to find a case where they are not dominated by a preferred policy (e.g., targeting)
• Positive net benefits if you believe undervaluation though!
Thank you!

Kenneth Gillingham
Yale University
School of Forestry & Environmental Studies
kenneth.gillingham@yale.edu