Costs and Benefits of CAFE

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Externalities

• Related to gasoline use per mile
  • Climate change
  • Oil dependence, security

• Related to miles driven
  • Congestion
  • Accidents
  • Local air pollution
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Unintended consequences?

Co-benefits?
CAFE in the used fleet

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    • Advanced technologies and materials
CAFE in the used fleet

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• How does this margin, the “scrappage elasticity,” relate to CAFE?
  • Most vehicles become more expensive to replace under CAFE
    • Advanced technologies and materials
  • Heavy, powerful vehicles are affected even more
    • These include the most new technologies and materials
    • Their prices may also embed extra markups or fines
Scrap Rates by Age and Make

Average Scrap Rate

Age

Bmw
Chevrolet
Chrysler
Dodge
Ford
Honda
Hyundai
Toyota
Volkswagen
The “Gruenspecht effect”

• Like the rebound effect, its importance is an empirical question

• Jacobsen and van Benthem (working paper)
  • Scrap elasticity (% change in scrap / % change in price) ≈ -0.7
  • Lost gasoline savings: 12-17%

• These losses are in addition to the rebound effect
  • The two effects seem to be fairly separable (more work needed on potential interactions)

  • Influence on local air pollutants?
Vehicle lifetimes: survival to 17

Percentage left when 17 years old vs. Miles per gallon
Safety and CAFE

- Large engineering and economics literature on safety
- Two countervailing effects emerge:
  - Protection small vs. large vehicles offer their occupants
  - The arms race in vehicle choice
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- Two countervailing effects emerge:
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  - The arms race in vehicle choice
- Overarching empirical problem: selection
  - Urban-rural divide in vehicle choice correlated with highway safety
  - Other observable and unobservable effects (age, education, income, substance abuse, etc.) also correlated with car choice
## Safety and CAFE

<table>
<thead>
<tr>
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Summary of results in Jacobsen (2013)
Safety and CAFE

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<td>(neutral on composition, with benefits through reduction in miles driven)</td>
<td>(cars become smaller, but effects on risk cancel each other out)</td>
<td>(mismatched and single-car accident risks are worsened)</td>
<td>(new standards keep vehicle sizes about the same)</td>
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Summary of results in Jacobsen (2013)
Spillovers, leakage, unintended consequences, and co-benefits

- Much more work is needed to see how CAFE influences other externalities and markets
  - How are local air pollution and fuel economy related? Spatial distribution of vehicles before and after CAFE?
  - Transition effects?
Spillovers, leakage, unintended consequences, and co-benefits

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  • Transition effects?

• Endogenous, evolving regulation
  • Can we anticipate and prevent unintended consequences?
  • Strengthen per-mile pollution limits in tandem with CAFE
  • Increase tolling and mileage-based insurance charges
  • Etc.
Research on core effects of CAFE

• Divide the elasticity of gasoline use into two parts
  • Vehicle choice
  • VMT choice
• Both of these decisions have short and long run components
• Split of the total elasticity between parts is critical to understanding the efficiency of CAFE
  • 50-50? 10-90? 90-10?
• Knowing this is even more important for attempted parallel regulation (i.e. how strict should we make new incentives to limit VMT?)
Research on core effects of CAFE

• EVs and PEVs
  • Gaining ground rapidly
  • Large transfers across pollution types and locations
    • New frameworks for looking at co-benefits, life-cycle costs?
    • Possible to revisit the CAFE credits granted for EVs?
  • How best to tax EV VMT?
• An electric fleet as option value on climate?
  • Much easier to make a complete transition than if stuck with a long-lived gasoline fleet
Research on core effects of CAFE

• Incentives to innovate
  • Positive
    • Understanding the (shadow) price signal
    • Strength and consistency of signal?
  • Negative
    • Loopholes and footprints