

# Costs and Benefits of CAFE

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Mark Jacobsen  
UC San Diego and NBER

# Externalities

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- Related to gasoline use per mile
  - Climate change
  - Oil dependence, security
  
- Related to miles driven
  - Congestion
  - Accidents
  - Local air pollution

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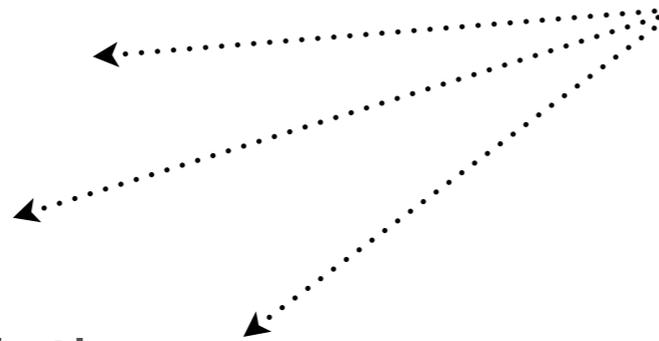
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Unintended  
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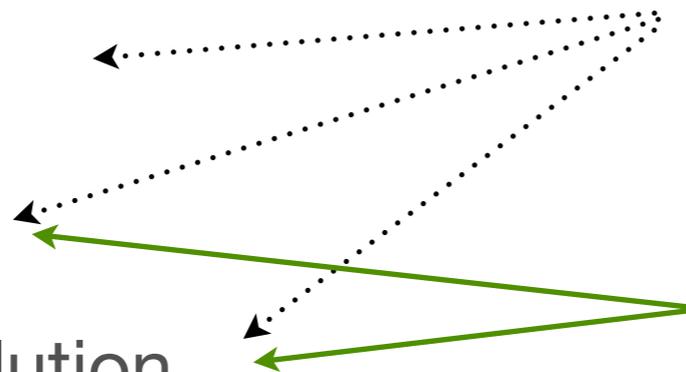
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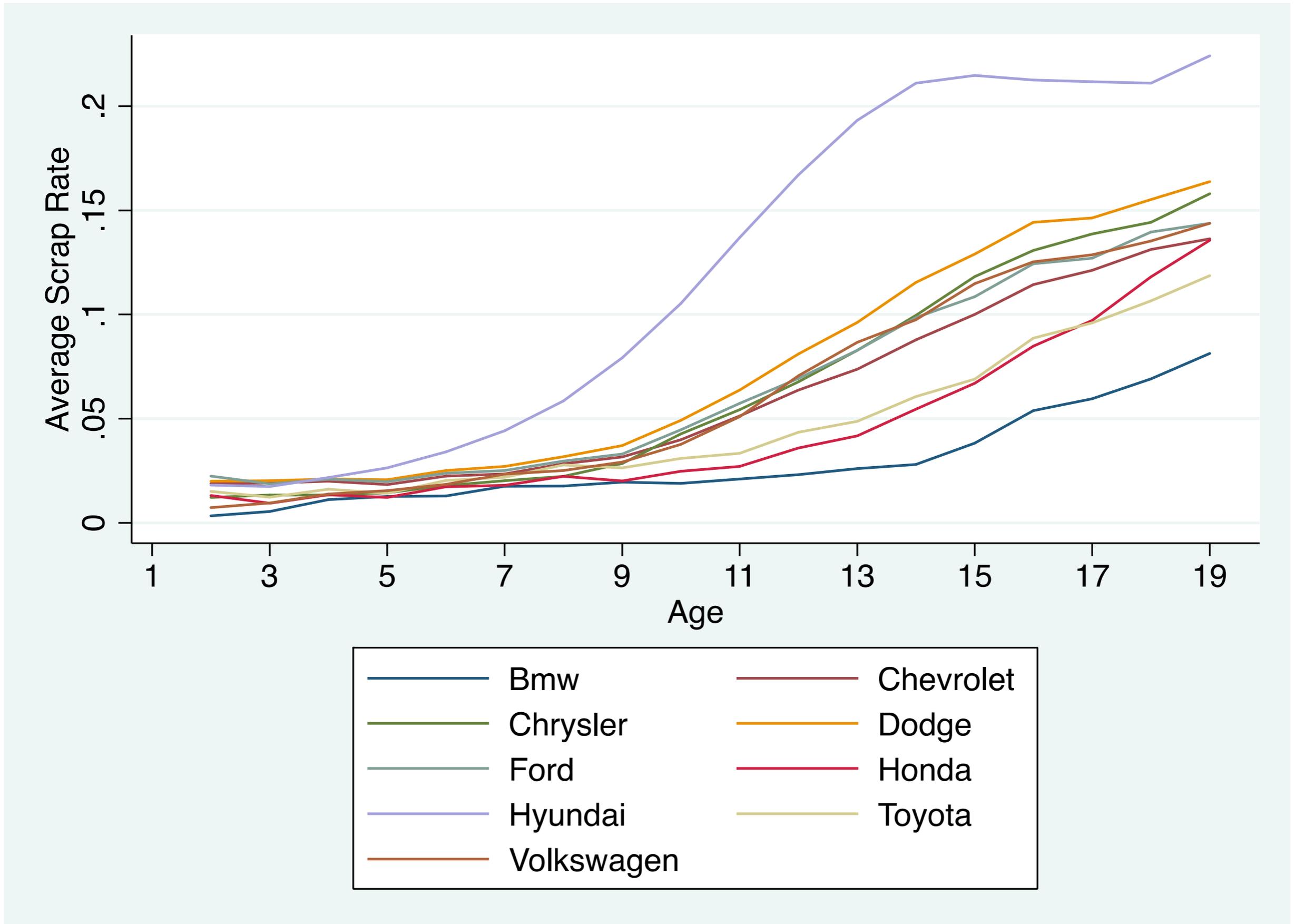
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- How does this margin, the “scrappage elasticity,” relate to CAFE?
  - Most vehicles become more expensive to replace under CAFE
    - Advanced technologies and materials
  - Heavy, powerful vehicles are affected even more
    - These include the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

# Scrap Rates by Age and Make

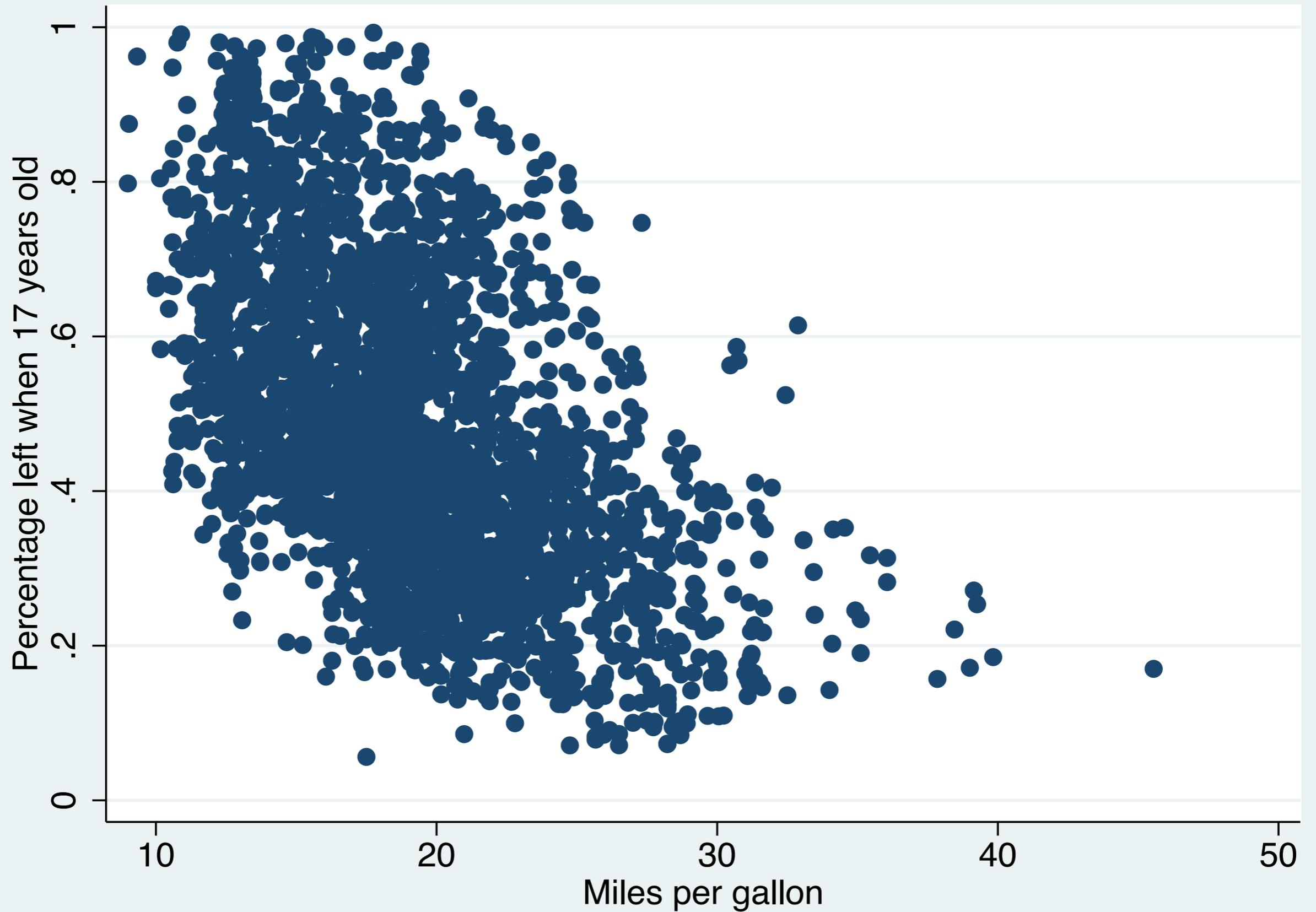


# The “Gruenspecht effect”

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- Like the rebound effect, its importance is an empirical question
- Jacobsen and van Benthem (working paper)
  - Scrap elasticity (% change in scrap / % change in price)  $\approx -0.7$
  - 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



# Safety and CAFE

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- Two countervailing effects emerge:
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- Two countervailing effects emerge:
  - Protection small vs. large vehicles offer their occupants
  - 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

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**Highest**

Effect on accident fatalities

**Fewer**  
(neutral on composition, with benefits through reduction in miles driven)

**Neutral**  
(cars become smaller, but effects on risk cancel each other out)

**Increased**  
(mismatched and single-car accident risks are worsened)

**Neutral**  
(new standards keep vehicle sizes about the same)

# Spillovers, leakage, unintended consequences, and co-benefits

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- 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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  - How are local air pollution and fuel economy related? Spatial distribution of vehicles before and after CAFE?
  - 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

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- 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

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- 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

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