How Much Do Consumers Value Fuel Economy and Performance?

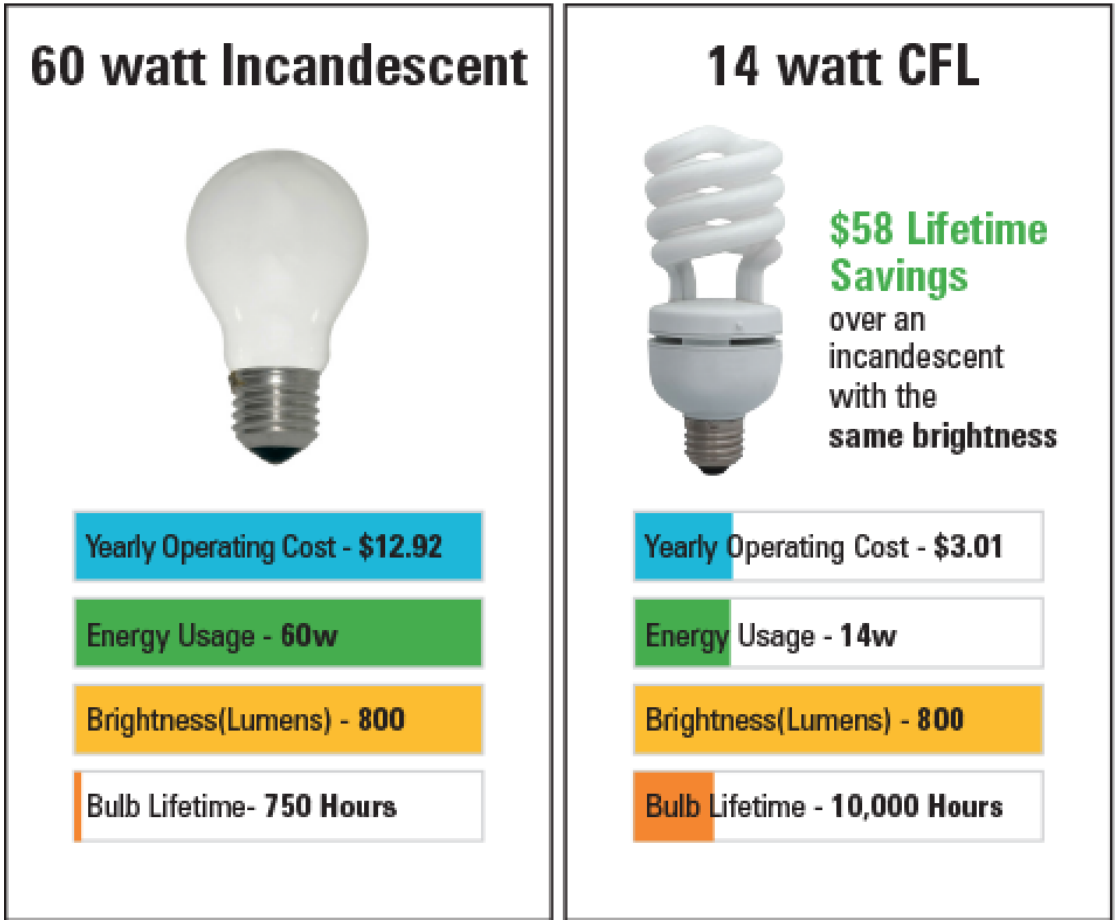
The Effect of Fuel Economy Standards on Vehicle Weight Dispersion and Accident Fatalities

Consumer Willingness to Pay for Vehicle Attributes: What Do We Know?

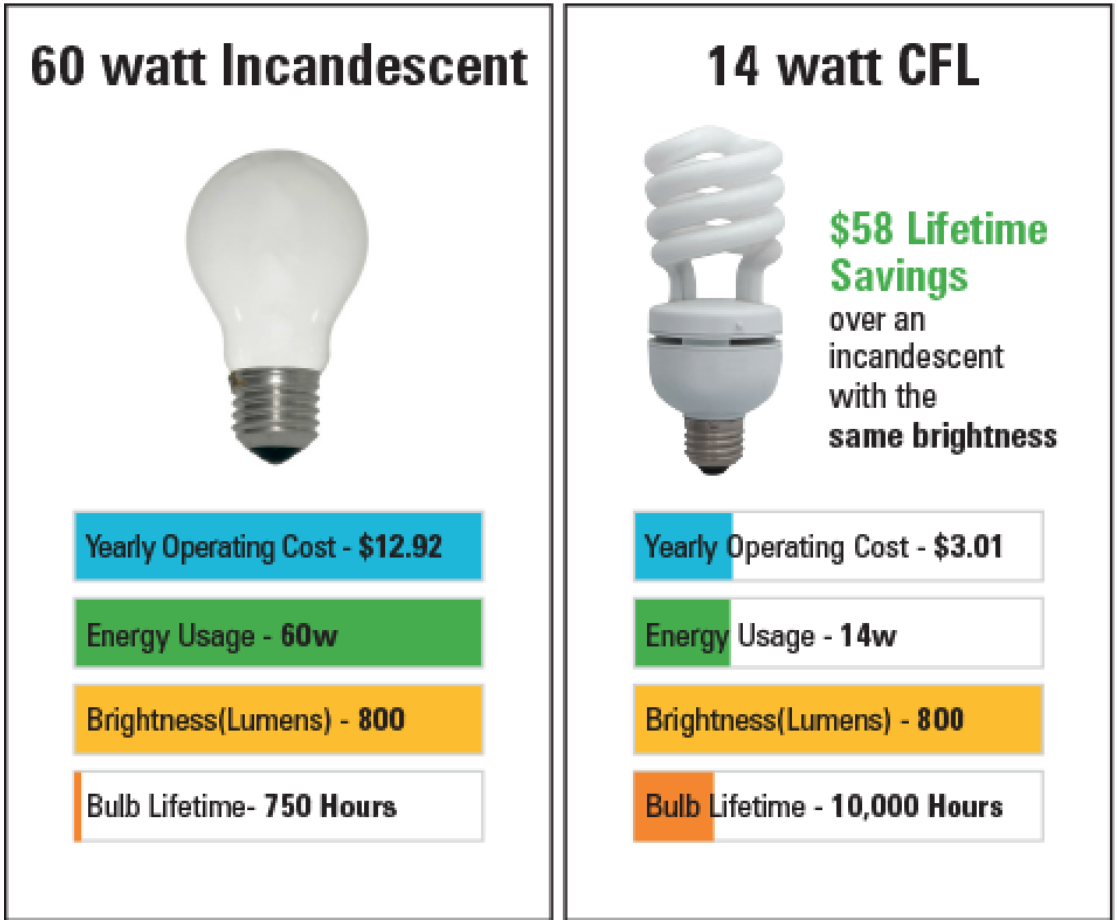
Discussion by James Sallee (UC Berkeley)

Conference on Transportation Economics, Energy, and the Environment
Ann Arbor

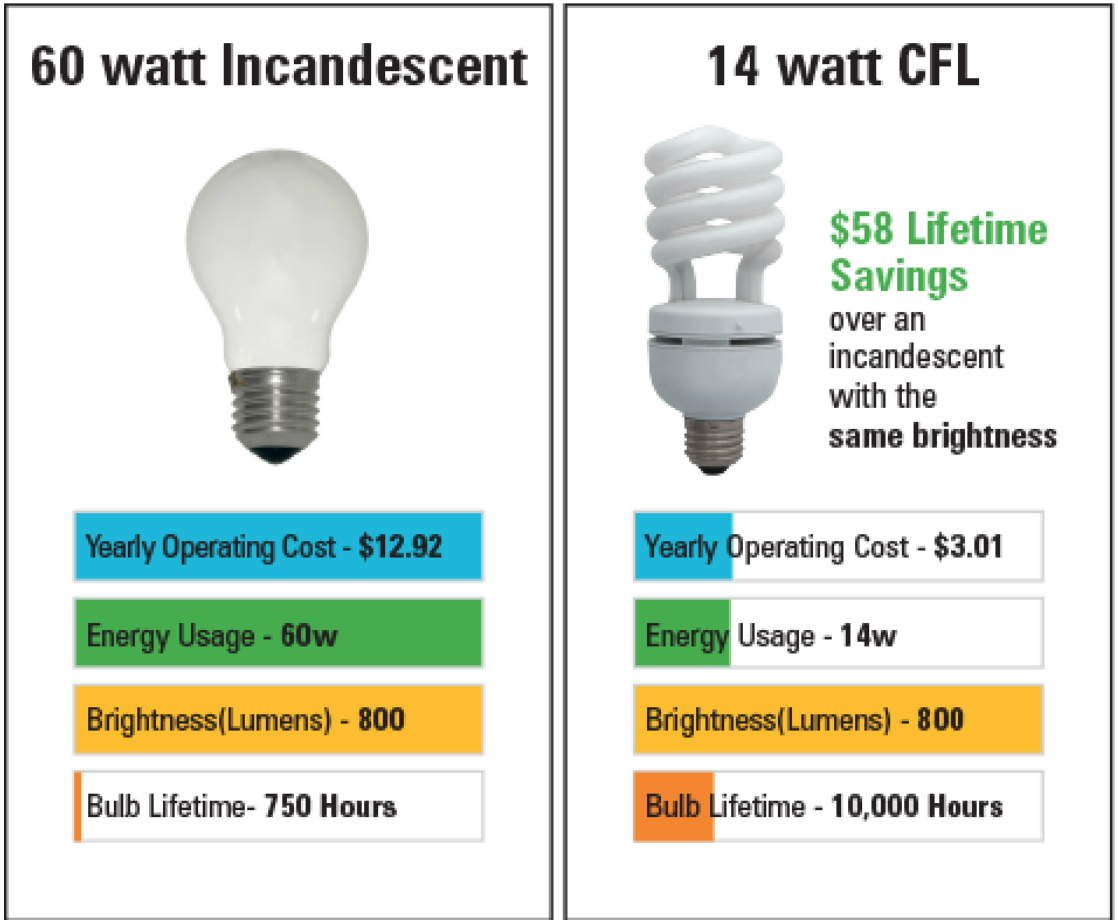
October 20, 2017



- Why did no one buy CFLs if they passed cost-benefit test?



- Why did no one buy CFLs if they passed cost-benefit test?
- Because **other attributes** of CFLs were worse: light quality, dimming, disposal, reliability



- Why did no one buy CFLs if they passed cost-benefit test?
- Because **other attributes** of CFLs were worse: light quality, dimming, disposal, reliability

- Fuel-economy analysis often makes the same mistake by comparing the cost of fuel-saving technologies to fuel savings, ignoring impact on other attributes which may be pivotal to evaluation

- **Theme 1: Accounting for other attributes (e.g., performance) when evaluating MPG/GHG regulations is essential**

- **Greene, Hossain, Hofmann, Helfand and Beach** directly confront the question "how do consumers value other attributes" via **meta-analysis**

- **Greene, Hossain, Hofmann, Helfand and Beach** directly confront the question "how do consumers value other attributes" via **meta-analysis**

- **Ideal experiment:** observe consumer willingness to pay for two vehicles that are identical in every way except for one attribute

- **Greene, Hossain, Hofmann, Helfand and Beach** directly confront the question "how do consumers value other attributes" via **meta-analysis**

- **Ideal experiment:** observe consumer willingness to pay for two vehicles that are identical in every way except for one attribute

- Identify **many** potentially important attributes
- Conclude that there is little clarity on valuation

- **Greene, Hossain, Hofmann, Helfand and Beach** directly confront the question "how do consumers value other attributes" via **meta-analysis**

- **Ideal experiment:** observe consumer willingness to pay for two vehicles that are identical in every way except for one attribute

- Identify **many** potentially important attributes
- Conclude that there is little clarity on valuation

- **Concern:** Should give more weight to estimates that have credible empirical research design—there is a lot of variance in research **quality**

- **Theme 1: Accounting for other attributes (e.g., performance) when evaluating MPG/GHG regulations is essential**

- **Theme 2: It is quite difficult to gather all of the information necessary for ideal evaluation**

- **Bento, Gillingham and Roth** consider one other attribute, **safety**

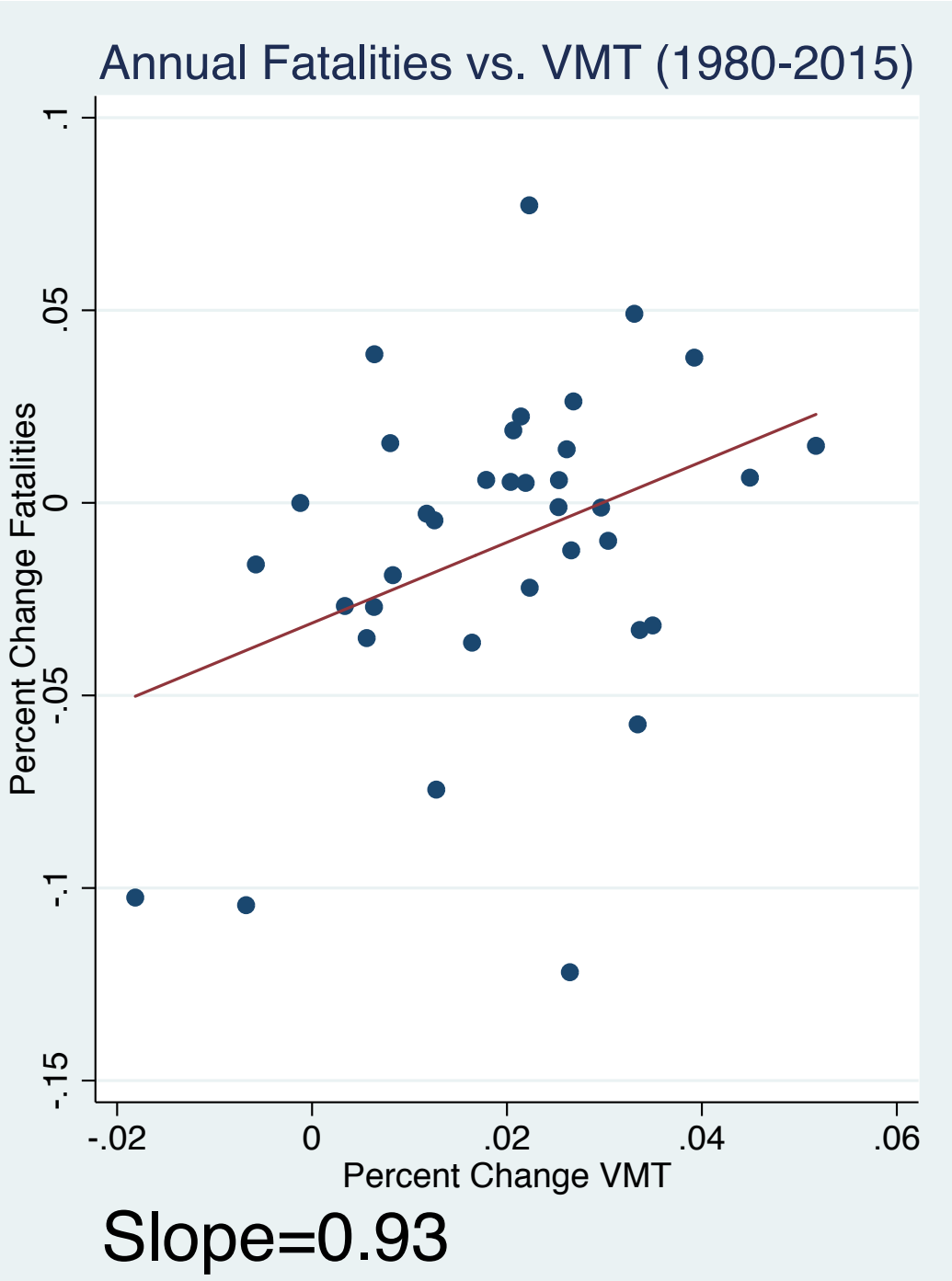
- **Bento, Gillingham and Roth** consider one other attribute, **safety**

- Understanding how CAFE impacts safety is not simple
  - Smaller cars are less safe for occupant, but more safe for other drivers
  - Collisions between more similar vehicles are safer $\Rightarrow$ size **distribution** matters

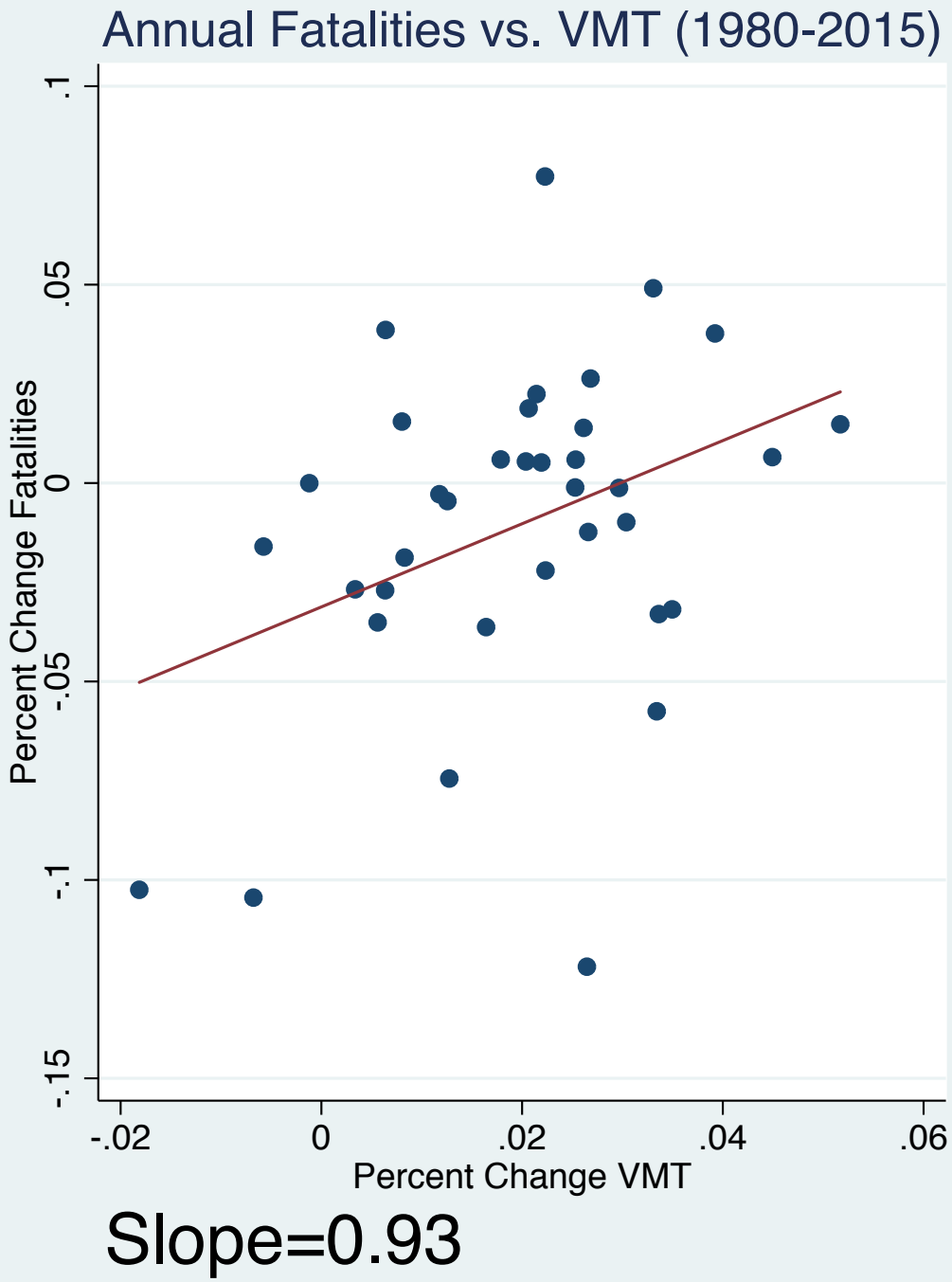
- **Bento, Gillingham and Roth** consider one other attribute, **safety**

- Understanding how CAFE impacts safety is not simple
  - Smaller cars are less safe for occupant, but more safe for other drivers
  - Collisions between more similar vehicles are safer $\Rightarrow$ size **distribution** matters

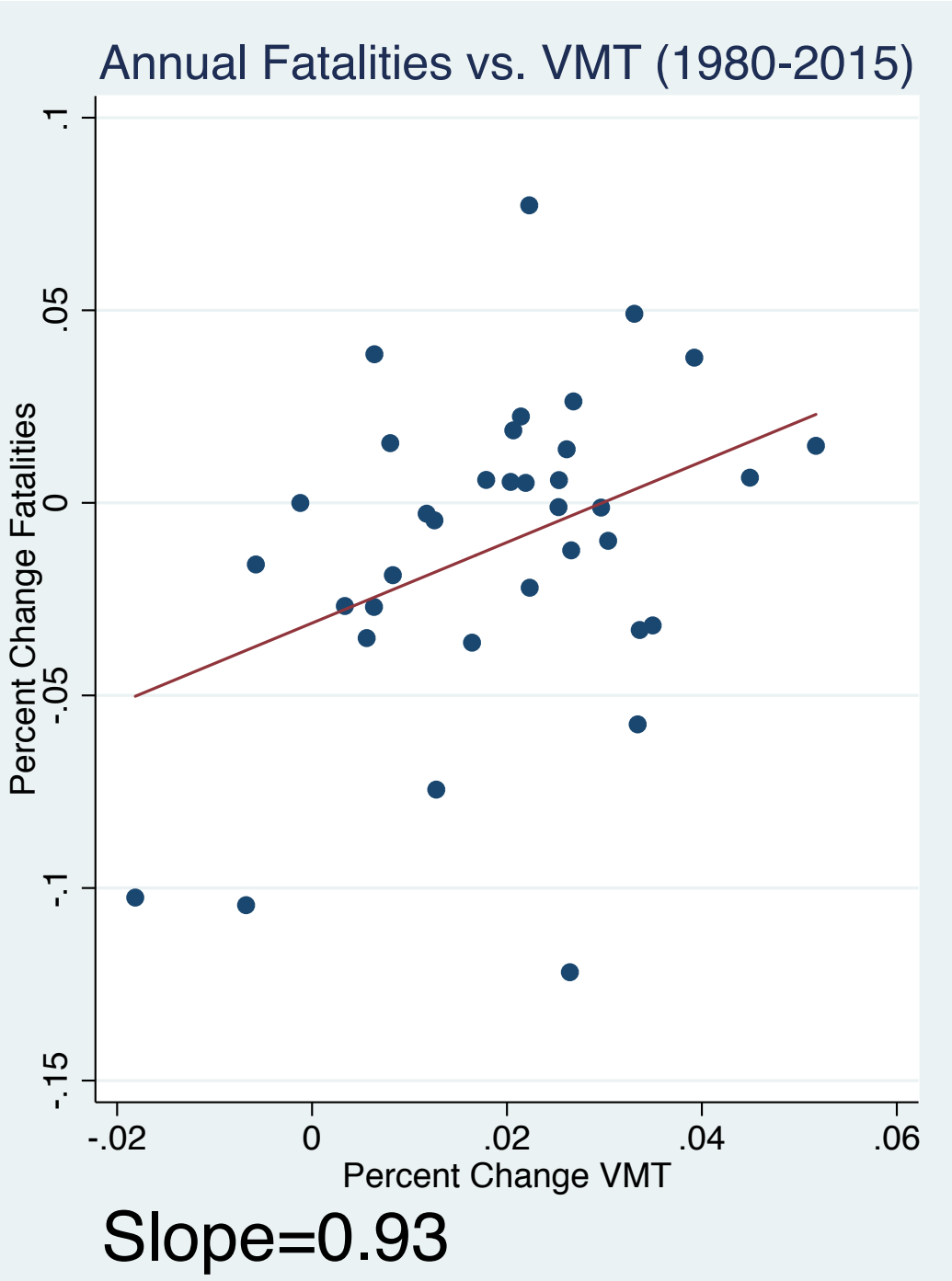
- **Concerns:** estimation excludes effects on pedestrians and accidents involving heavy trucks (28% of fatalities)
  - Transition critical: downsized vehicles today share road with yesterday's cars
  - Exercise uses historical data, but fleet has changed a lot



- Percent change in fatalities scales 1:1 with changes in VMT



- Percent change in fatalities scales 1:1 with changes in VMT
- Thus, **rebound effect** has bigger safety impact than size changes

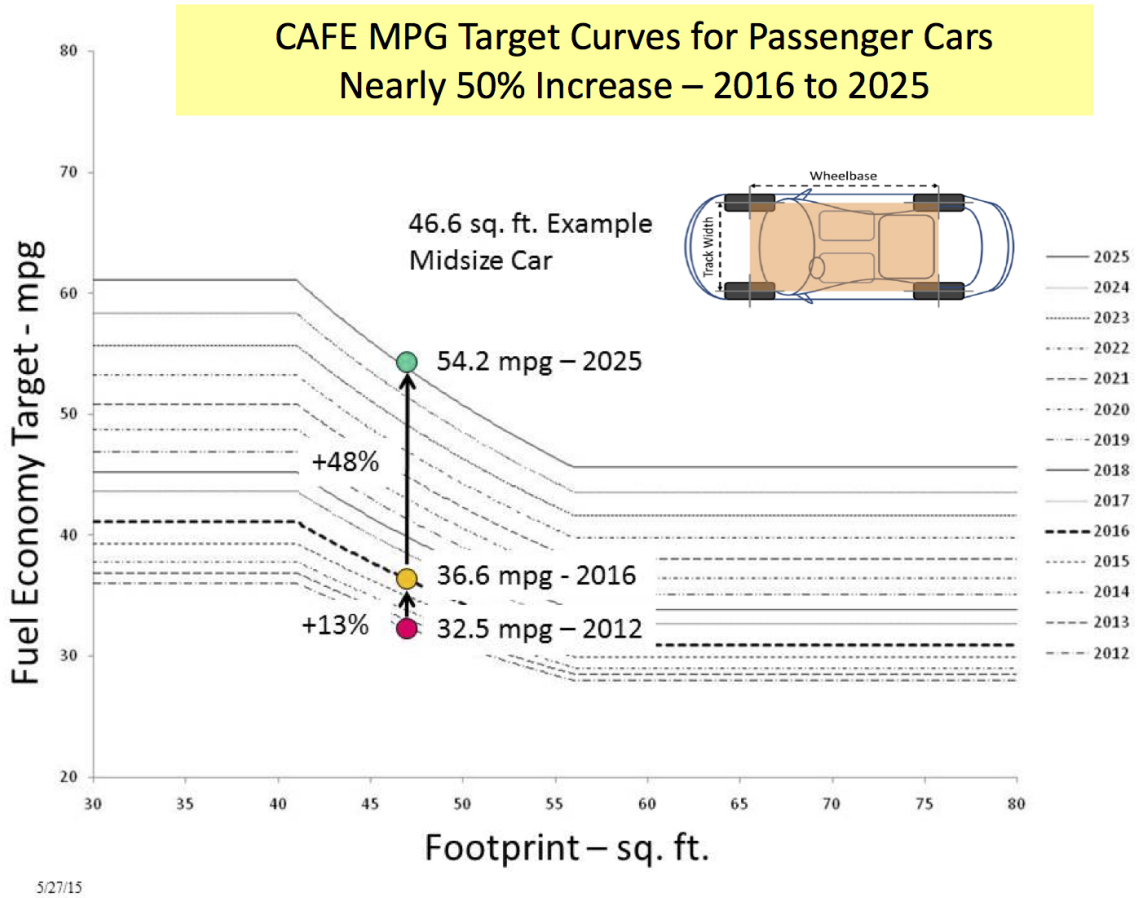


- Percent change in fatalities scales 1:1 with changes in VMT
- Thus, **rebound effect** has bigger safety impact than size changes

- Consider 50% improvement in MPG
- Long-run VMT elasticity of -0.2

$\Rightarrow$ VMT rises by 10%

$\Rightarrow$ $\approx$ 3,000 deaths from CAFE



Source: Wally (2015)

- Footprint-based regulation apparently aimed to preserve current distribution of size
- But, no reason to think this size distribution is optimal

- **Theme 1: Accounting for other attributes (e.g., performance) when evaluating MPG/GHG regulations is essential**
- **Theme 2: It is quite difficult to gather all of the information necessary for ideal evaluation**
- **Theme 3: But, even without knowing everything, we can still say something**

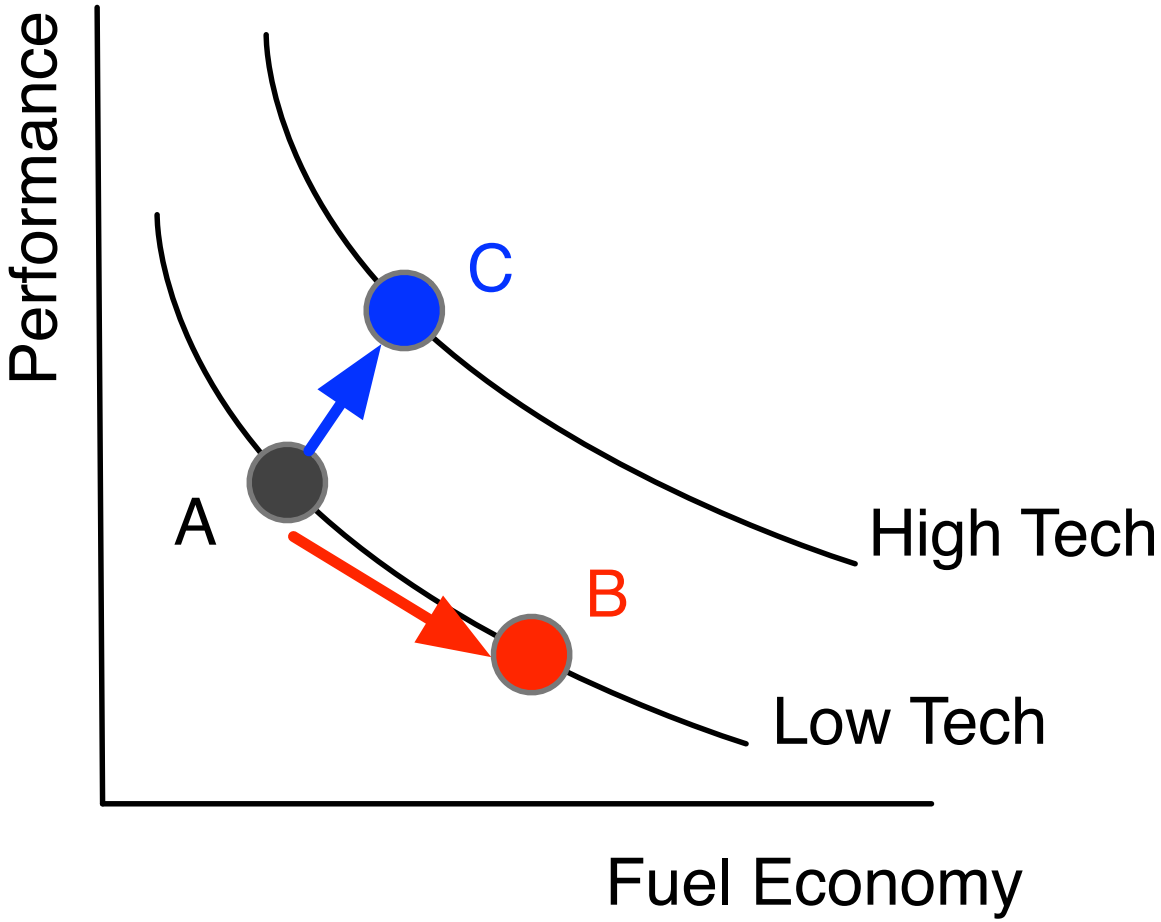
- **Leard, Linn and Zhou** considers one additional attribute, **horse power / weight**
- They focus on one other attribute, hope to hold constant the others
- Find "rational" WTP for performance

- **Leard, Linn and Zhou** considers one additional attribute, **horse power / weight**
  - They focus on one other attribute, hope to hold constant the others
  - Find "rational" WTP for performance

- **Concerns:** empirical implementation: what is variation in MPG/technology after controlling VIN fixed effects?
- Results differ from gasoline price literature. Explained by idea that consumer respond differently to changes in cost of driving due to numerator and denominator

$$\text{Dollars per mile} = \frac{\text{Price of gas}}{\text{Fuel economy}}$$

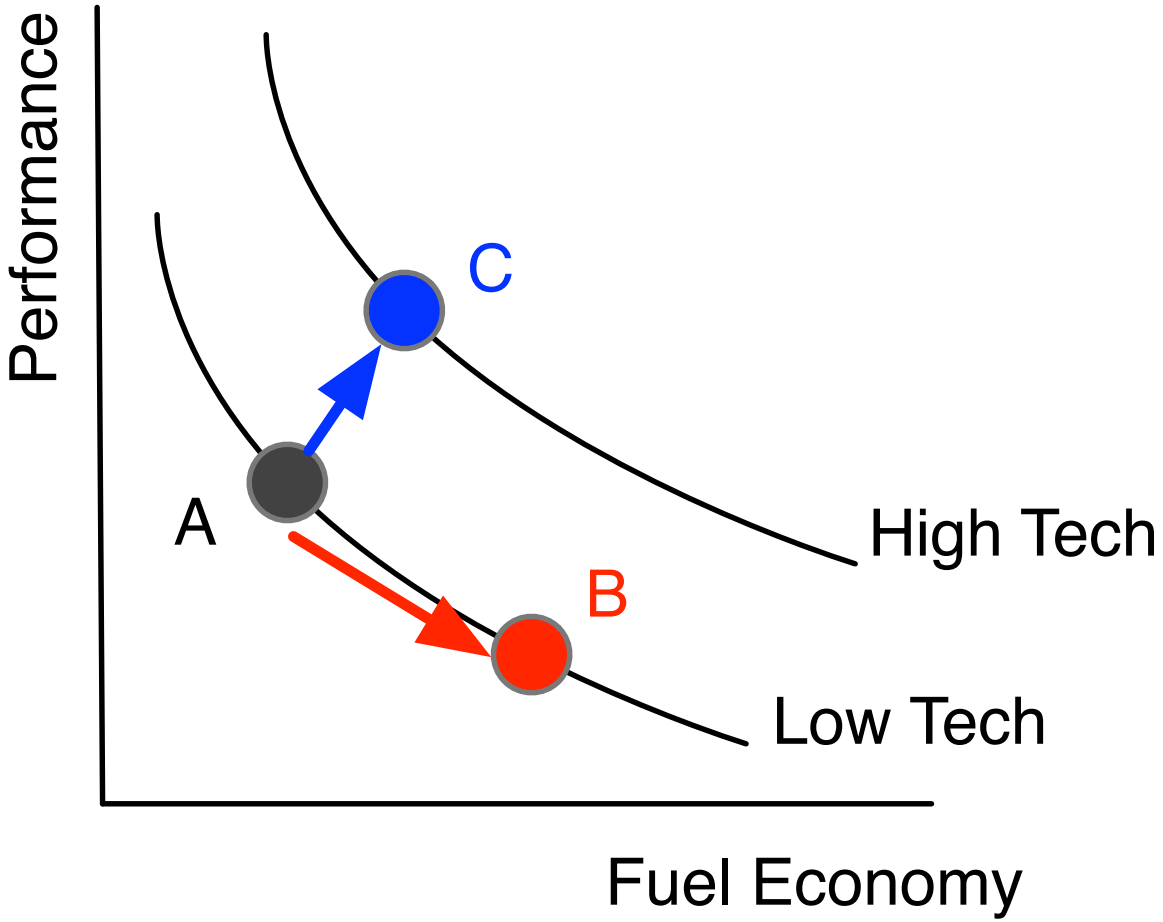
- Is there any support for this?



- Undervaluation does not imply too little technology

$\Rightarrow$ Too little technology does not imply undervaluation

- Undervaluation means wrong MPG choice for any given technology



- Undervaluation does not imply too little technology

$\Rightarrow$ Too little technology does not imply undervaluation

- Undervaluation means wrong MPG choice for any given technology

- Attribute-basing exacerbates mistargeting by forcing technology (Anderson and Sallee 2016)

Undervaluation and regulatory evaluation

- Substantial evidence casts doubt on presumption that consumers undervalue fuel economy
- Even if consumers undervalue fuel economy, it does not necessarily mean firms will underprovide technology
- **Leard, Linn and Zhou** find rational valuation of performance, implies technology diffusion not distorted

$\Rightarrow$ Aggressive policy / technology forcing not justified by undervaluation

- But there are other likely rationales for aggressive CAFE, and specifically technology forcing
  - Technology spillovers
  - Transformational change (e.g., EVs, hydrogen)
  - Follower advantages
  - Compliance via technology lowers profits (Reynaert 2015)

- **Theme 1: Accounting for other attributes (e.g., performance) when evaluating MPG/GHG regulations is essential**

- **Theme 2: It is quite difficult to gather all of the information necessary for ideal evaluation**

- **Theme 3: But, even without knowing everything, we can still say something**