Rebound and Transportation:
In search of the ultimate dataset

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Literature

- Greene 2010 in Energy Policy
- Hard to measure because of poor data?
- Elasticity of miles to fuel costs per mile
  - Elasticity of fuel economy = -Elasticity of fuel price
- Effects of increasing income and prices of new vehicles
- CAFÉ standards
- Model structure not all that important?

Data Used

- National or state level
  - Difficult to extract accurate VMT, fuel use, fuel economy
  - Long-term trends
  - List of assumptions
- Survey data
  - Household detail but limited in scope and time
  - Multiple vehicles per household
- Impact of limitations on analysis and model assumptions
  - Different results from different types of data, time scales, and geographic regions
- Empirical or theoretical analysis
  - Data mining vs. hypothesis testing

What Causes the Differences in Research Conclusions?

- Differences in data strengths and weaknesses
- Differences in model approach and sophistication
- Is it possible to reach agreement as to what the “ultimate” dataset would look like?
  - Detailed data that could be investigated from different approaches
  - Common data would remove one source of variability

Suppose We Could Get the Ultimate Data

- What would we want?
- Unit of analysis
  - Household
  - Census unit
  - State
  - National
- Time
  - Length: how many years?
  - Time step

Vehicle Data

- Vehicles identified by their VIN
  - VIN decoder to extract detail vehicle data
  - Make model, year
  - Weight, engine, fuel economy, horsepower
  - Safety rating
- Vehicle transaction data
  - Year/month of transaction
  - Purchased new/used
  - Sold/retired
- Odometer reading
- Vehicle maintenance
  - Emissions inspection
- Vehicle value
  - New car and used car

Household/Owner Data

- Demographics
  - Survey
  - Census unit
- Income
- Household size
- Vehicles per household (substitution)
- Population density (urban, suburban, rural)
- Commuting patterns

Economy-wide Data

- Fuel prices
  - Weekly, monthly, yearly
  - Geographic resolution
- Economic growth
  - Unemployment
  - Economic sector
- Car sales
  - Value of new cars purchased
  - Value of rolling stock

Data on Pennsylvania Vehicles

- Yearly emission inspection data
  - VIN
  - Odometer
  - Inspection test results
- 10 million vehicles per year
- 10 years of data (2000-2010)
  - Track individual vehicles over time and across locations
  - Includes significant economic and fuel price changes
- Sales transaction date
- Zip code census data
  - Not household level, missing substitution?
- County-level economic data
- Useful for this discussion on rebound?
  - Enough years?

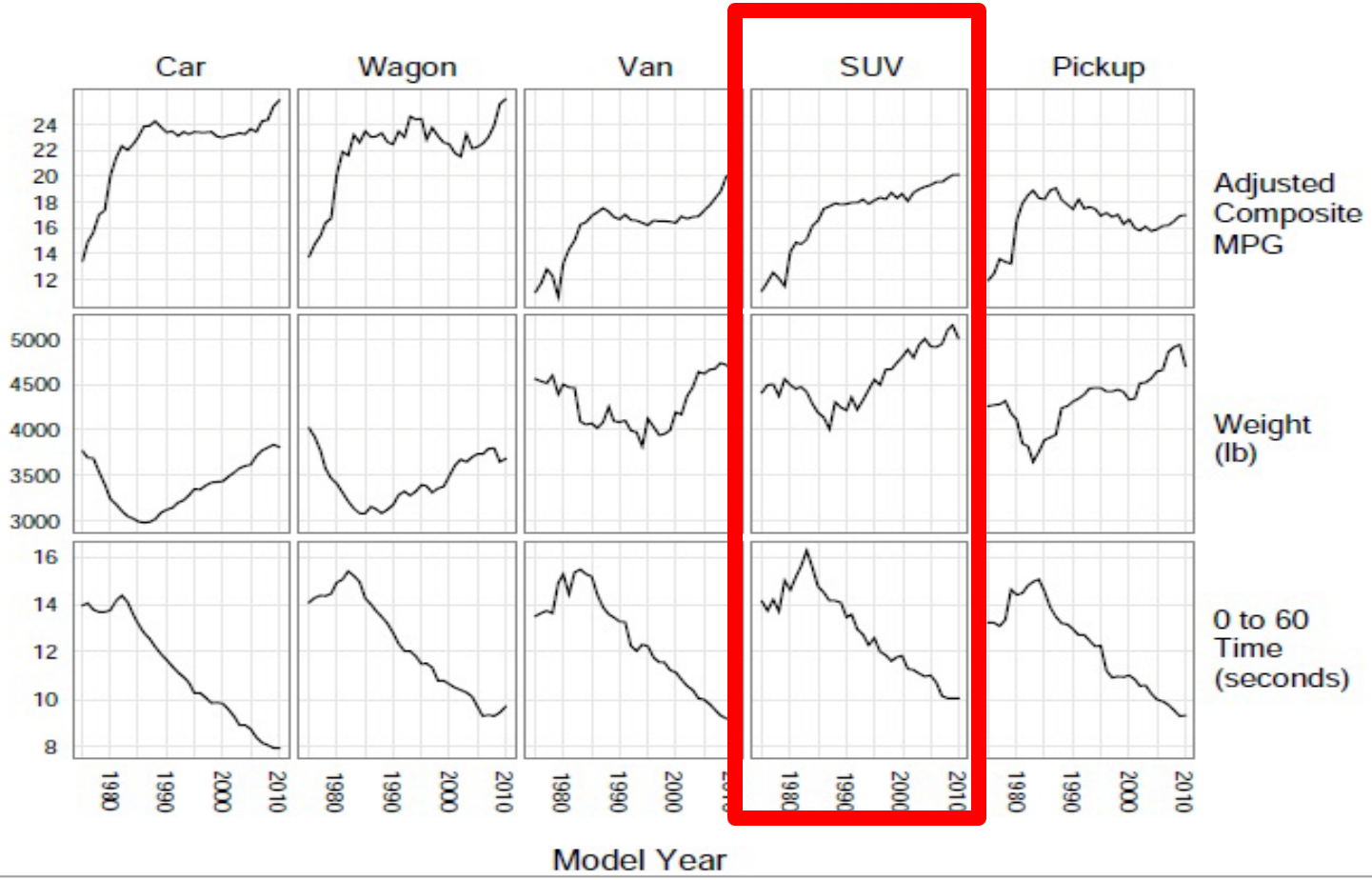
Predictions?

- What one analysis would best characterize the rebound effect?

EPA Analysis of Fuel Economy

Figure 10

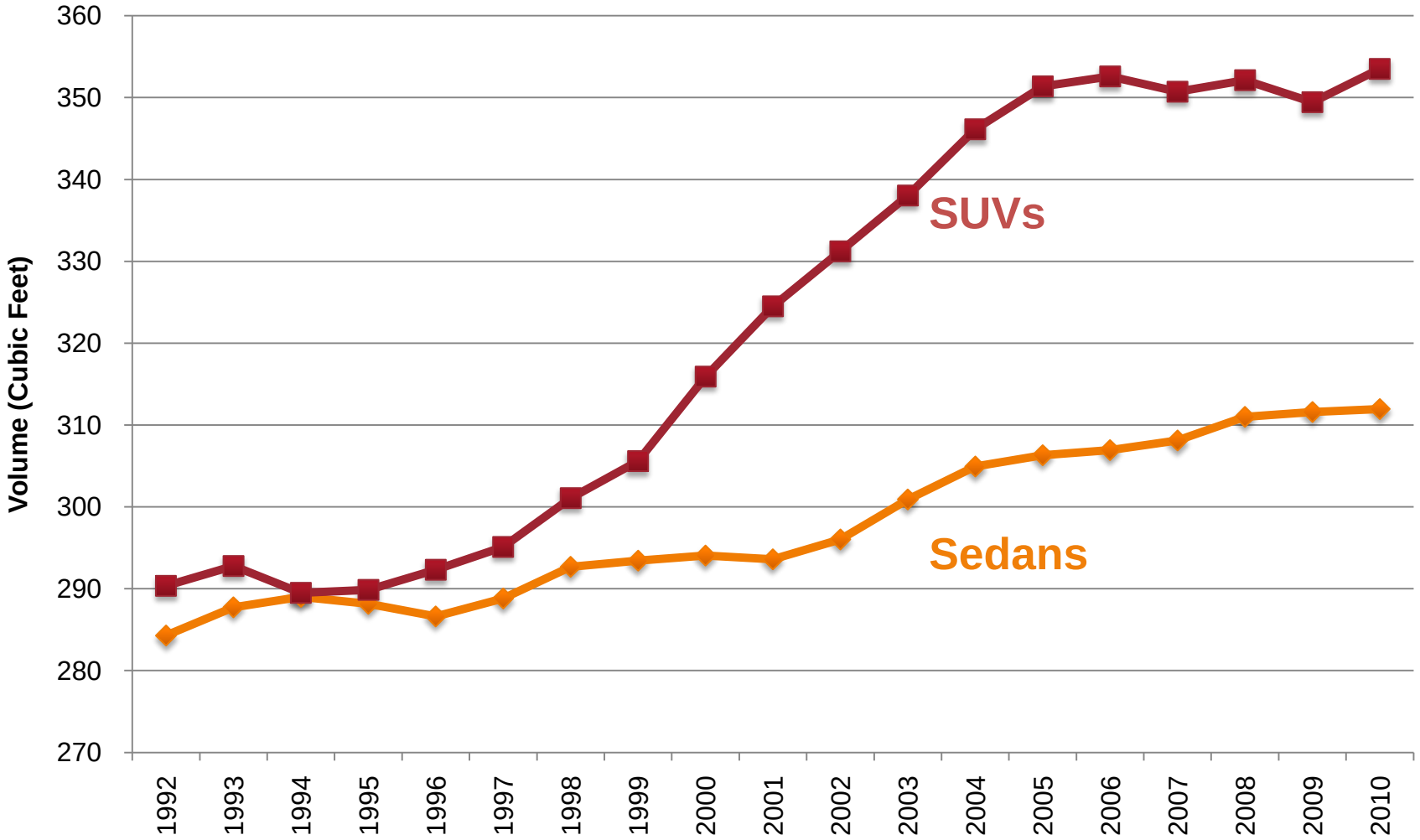
Fuel Economy and Performance by Vehicle Type



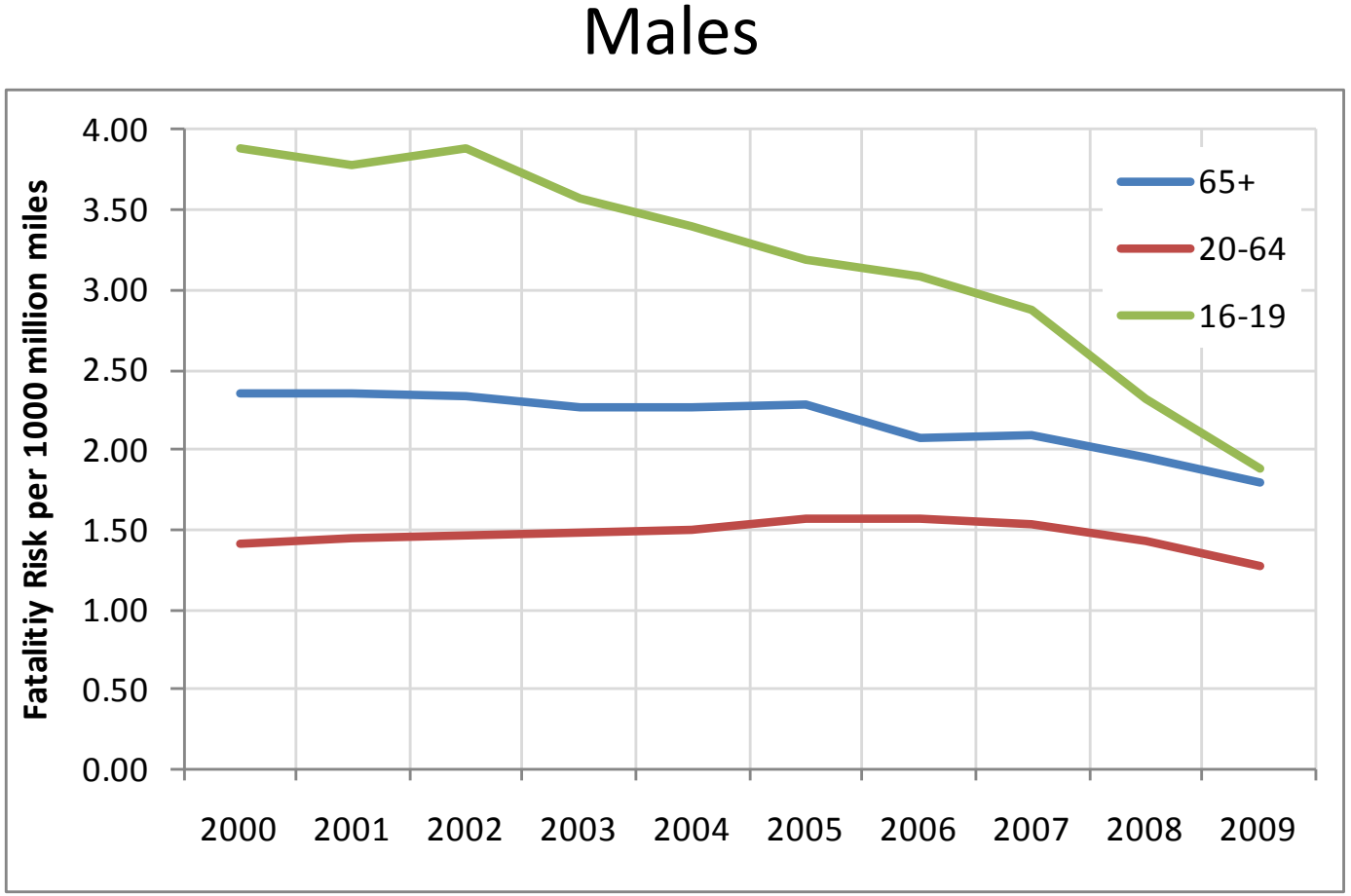
Source: EPA: Light-Duty Automotive Technology Trends 1975-2010

Vehicle Volume

(3-Year Moving Average)



Risk Reduction across Age and Gender



Predict General Trends

- Miles per year by make, model, year
  - Accounting for Zip code demographics
- Vehicles per capita, per net household income
  - Both increasing?
  - Related to economic growth?
- Miles per capita, per vehicle over time, per net household income
  - Rural more miles
  - Wealthier more miles
- Fuel consumption per capita, per vehicle, per net household income
- Age of vehicles
  - Rural older
- Fleet fuel economy by Zip code

Predict Vehicle Use

- New vehicles
  - More fuel efficient vehicles are driven more in their first year in 2000, second year in 2000, ….
  - Trends over time (2000 -2010)
  - Percent of miles from different fuel economy categories over time
  - Percent of fuel from different fuel economy categories
  - Decreasing miles per year as vehicle ages differs by fuel economy
  - Rural vehicles are driven more
- When fuel costs go up …
  - Fuel efficient vehicles decrease less
- When prices go down …

Predict Sales and Retirements

- Births
  - Fuel economy, fuel price, vehicle price, and other attributes (performance, safety, size, …)
  - Zip code demographics
- Deaths
  - Fuel economy, fuel price, vehicle price, and other attributes (performance, safety, size, …)

What's this Data Worth for Rebound Studies?

- Value for research
  - What would make it more valuable?
  - CarFAX tracking interstate movement
- Currently owned by Verizon
- Non-disclosure Agreement
- Adding new data every year
- Value of going back several more years?