The Effects of Energy Prices on Travel Behavior

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Price Response in Theory

- Theory tells us that consumers substitute away from expensive goods
- How much and how fast depends on the elasticity and on dynamic constraints (e.g. the timing of a new car purchase)

In Practice: Gasoline

- Short-run elasticity (small):
  - Combine trips, shop online, substitute across cars in the household, carpool/mass transit
- Long-run elasticity (larger, by definition):
  - Move closer to work or transit, buy a more efficient car, change ways of doing business

Relevance to Policy, I

- The overall elasticity tells us how difficult it is to change transportation gasoline use
- High elasticity means:
  - Small gasoline price increases will achieve large reductions in gasoline use
  - Careful direct regulation can achieve the same savings with similarly small costs to the economy
- The opposite is true if the elasticity is low

The Data

- (Very) long literature seeking to measure this elasticity
  - Short-run elasticities are small and getting smaller (Hughes, Knittel and Sperling 2007)
  - Long run elasticities more uncertain, ranging from -0.23 to -0.80 (Graham and Glaister 2002)

What's in an Elasticity

- All gasoline-saving behaviors are contained within the elasticity
- At least 50 and as much as 90 percent of the elasticity has been shown to come via miles traveled
  - Suggests it may be easier to get a reduction in miles than to create changes in the vehicle fleet
  - Why?

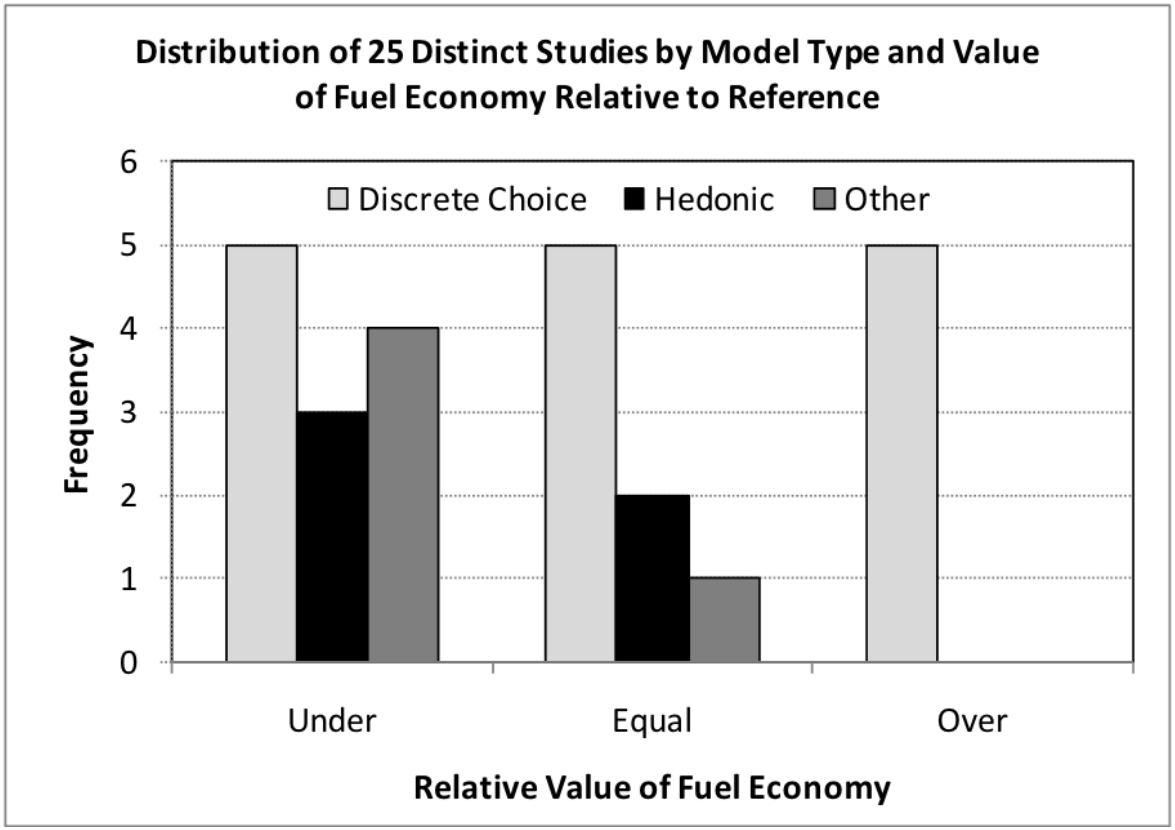
Relevance to Policy, II

- An efficient regulation requires consumers to save gasoline in all possible ways, emphasizing most the behaviors that are easiest to change
- How do a gasoline tax and fuel-economy mandates compare?
  - Gasoline taxes have the advantage of reducing miles driven (even more important if adding congestion and accidents to the equation)

Why CAFE?

- The presence of an “Energy Paradox” can lessen the advantage of a gasoline tax
  - Occurs if consumers systematically undervalue fuel economy in car purchase decisions

Empirical Work



Greene (2010) literature review

Recent Approaches

- Attack the question more directly with used-car price information
  - Transaction-level sales data allow direct tests as gasoline prices change:

    How do the relative values of used vehicles move with gasoline prices?

The Results

- Busse, Knittel and Zettelmeyer (working paper)
  - 100% of fuel cost changes translate to used-car values, implying rational consumers

Table 2: Gasoline price coefficients from used car price specification

Variable	Coefficient	SE
GasolinePrice*MPG Quart 1 (lowest fuel economy)	-1158**	(39)
GasolinePrice*MPG Quart 2	-948**	(55)
GasolinePrice*MPG Quart 3	215*	(53)
GasolinePrice*MPG Quart 4 (highest fuel economy)	1744**	(54)

Busse, Knittel and Zettelmeyer, May 2011

Questions Remain

- Allcott and Wozny (working paper)
  - Argues that people undervalue fuel economy by 20%
- EPA in regulatory impact studies for CAFE
  - Payback periods for gasoline-saving technologies are very short (less than 3 years)