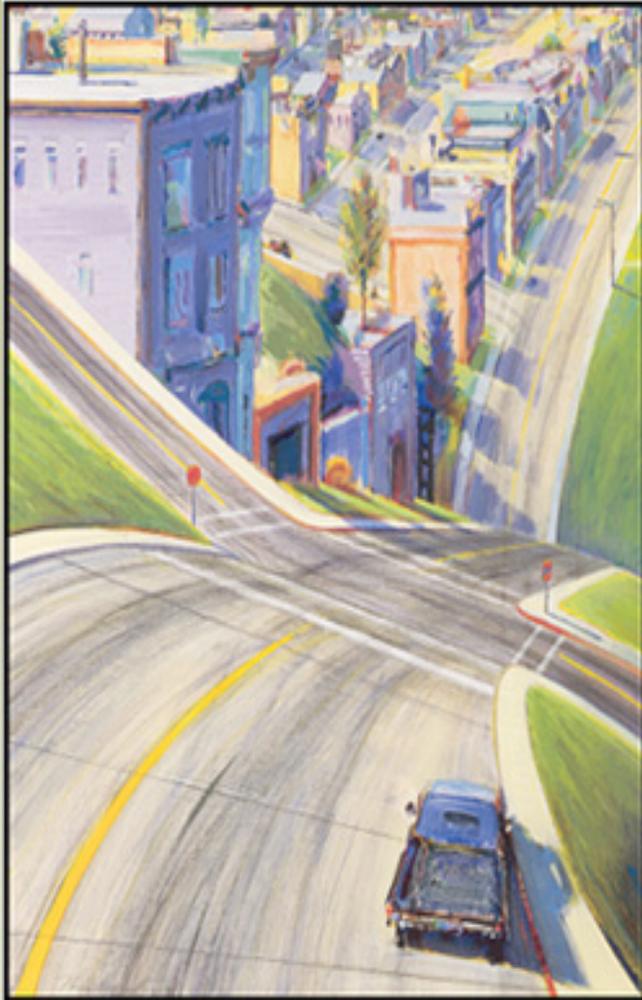


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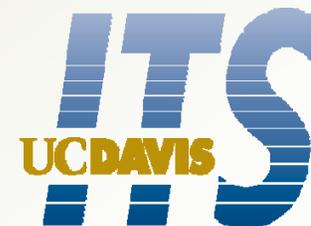


How Important are Gasoline Prices to Consumers?

Daniel Sperling

*and Jonathan Hughes and Prof Chris
Knittel*

January 23, 2007



My piggy bank after I bought gas this morning...



“In 2006, gasoline use grew just 0.8%, well below the 2% annual increases seen earlier in the decade.”

SF Chronicle, January 20, 2007, based on data released January 19, 2007 by American Petroleum Institute

Is 0.8% increase a lot or a little? Tipping point?

Theory of Gasoline Demand Elasticities

$$\frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \frac{\frac{-25 \text{ gallons}}{100 \text{ gallons}}}{\frac{+\$2/\text{gallon}}{\$4/\text{gallon}}} = \frac{-1/4}{1/2} = -0.50$$

- Demand is elastic when the elasticity is near 1.0. Demand for luxury goods is highly elastic. Poor people have more elastic demand.
- Short term elasticity is lower than long term elasticity.

Historical Gasoline Demand Elasticities

- **Studied extensively in the literature**
 - **Most studies conducted during previous periods of high gasoline prices in the 1970s and 1980s**
 - **Dahl and Sterner (1991) and Espey (1998) provide thorough reviews**

	Short-Run Price Elasticity	
Dahl and Sterner (1991)*	-0.26	
Espey (1998)+	-0.23	

* Mean values

+ Median values

Are Gasoline Demand Elasticities Different Today?

- **Apply the same models used in the past on a consistent dataset spanning the 1970s and 2000s**
- **We focused on two price run-ups: 1975-80 and 2001-2006**
 - **Aggregate U.S. Data 1974 - 2006**
 - **Monthly time series data**
 - Per capita gasoline consumption (EIA)
 - Average real retail price for regular gasoline (BLS)
 - Per capita disposable income (BEA)
 - GDP implicit price deflators, constant 2000 dollars (BEA)

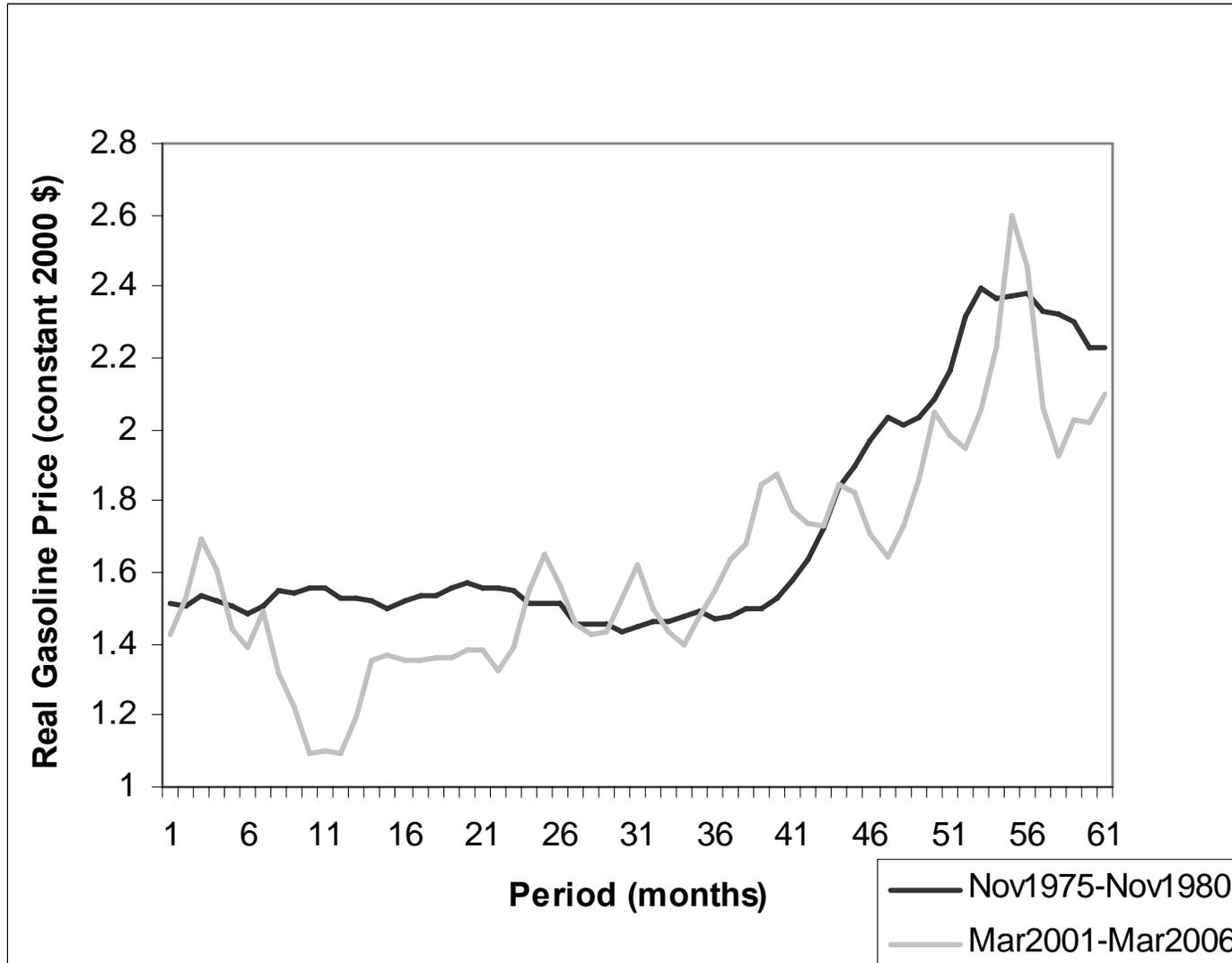
Basic Empirical Model

- **Double-Log specification**
 - Allows for direct comparison with previous results from the literature
 - Also model linear and semi-log for comparison

$$\ln G_{jt} = \beta_0 + \beta_1 \ln P_{jt} + \beta_2 \ln Y_{jt} + \varepsilon_j + \varepsilon_{jt}$$

- **Where:**
 - G_{jt} is per capita monthly gasoline consumption;
 - P_{jt} and Y_{jt} are real retail price and per capita income, respectively;
and
 - ε_j are month fixed effects to capture seasonality of gasoline demand
 - ε_{jt} is a mean zero error term

Real Gasoline Prices 1975-1980 & 2001-2006



Sources: U.S. Bureau of Labor Statistics, Bureau of Economic Analysis

Findings

- **We find that demand for gasoline is highly inelastic today (and significantly less elastic than 25 years ago)**
 - **Our estimates suggest the demand elasticity has gone down by at least 2/3 to about -0.04 today.**
 - **This decrease is corroborated by recent work by Small and Van Dender which documents a reduction in the rebound effect**

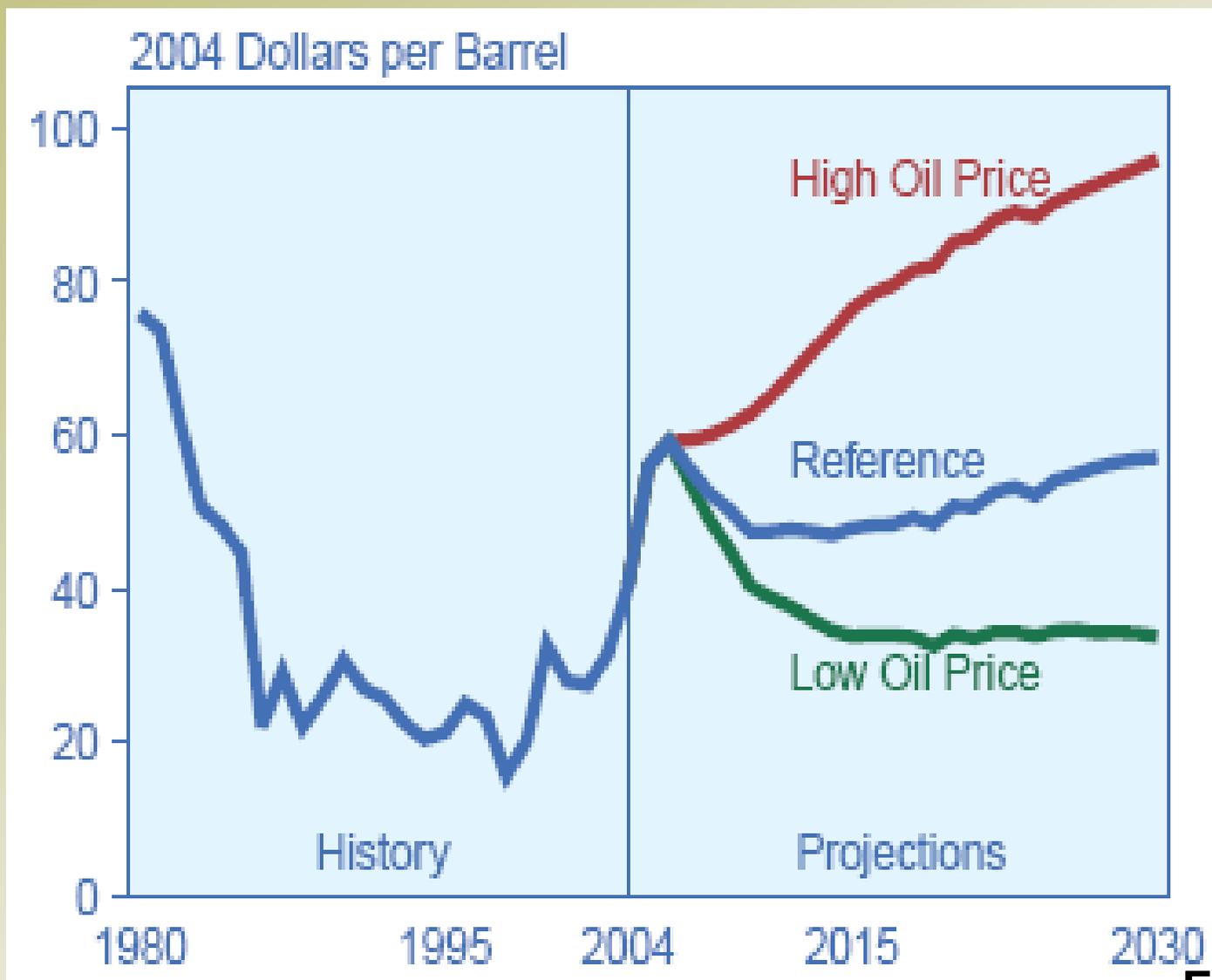
Why is Demand Less Elastic?

- **Land use sprawl**
 - Increase in suburbanization
- **Decrease in transit availability (related to sprawl)**
- **Changing household characteristics**
 - Multiple workers, discretionary versus non-discretionary trips
- **Improved vehicle fuel economy**
 - ~21 mpg today vs ~15 mpg in 1980
- **Higher incomes?**
 - But we found this had little influence

Will Long Run Elasticities be Larger? Possibly Not.

- A long-run change in prices would push U.S. drivers to fundamentally alter their behavior.
 - **Buy more fuel efficient cars**
 - **Move closer to work/school**
- But if gasoline prices are cyclical then elasticities may never increase

World Oil Prices Have Been and Will Be Volatile



EIA, 2006

Will Long Run Elasticities be Larger? Possibly Not.

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 - Buy more fuel efficient cars
 - Move closer to work/school
- But if gasoline prices are cyclical then elasticities may never increase
 - **If consumers do not expect oil prices to stay high (which will likely be confirmed by real-world experience), they may never exhibit long run behavior.**

Policy Implications ...

Getting the Prices Right Isn't Always Best Answer

- Gasoline and carbon taxes need to be very high (and permanent) to reduce fuel consumption and carbon emissions.
- Other regulatory and policy instruments more effective?
 - **Vehicle standards (for fuel economy and GHGs)**
 - **Low carbon fuel standards**
 - **Feebates**
- On the other hand, fuel and carbon taxes ...
 - **Makes it easier to introduce alternative fuels**
 - **If permanent, might induce long term changes in behavior**

And we certainly have not reached a tipping point in gasoline prices!

Thank You