Confronting Global Warming: Policies for the Reduction of Gasoline Consumption

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U.S. Carbon Dioxide by Sector (2005)
(Data Source: Energy Information Administration)

- Residential: 21%
- Transport: 33%
- Commercial: 17%
- Industrial: 29%
Outline

- Gasoline, miles driven, fuel efficiency
- Justifications for regulation
- A few policy options
  - Gasoline tax
  - Carbon tax or tradable carbon permits
  - Fuel economy standards
- New research directions
Gasoline Prices

Source: Energy Information Administration, Short Term Energy Outlook, January 2007
Components of the price of gasoline

Source: Energy Information Administration
Gasoline and Gasohol Consumption 1990-2004
(Source: FWHA Highway Statistics 2005)

[Graph showing the consumption of gasoline, gasohol, and total consumption from 1990 to 2004.]

- **1990:** Gasoline: 7.5, Gasohol: 110.2, Total: 117.7
- **2004:** Gasoline: 44, Gasohol: 136.5, Total: 180.5
Vehicle miles traveled: 1990-2005
(Source: FWHA Highway Statistics)

Vehicle Miles Traveled (per capita)

Year
1990: 8,590
1991: 8,586
1992: 8,589
1993: 8,610
1994: 8,661
1995: 8,711
1996: 8,760
1997: 8,810
1998: 8,860
1999: 8,910
2000: 8,960
2001: 9,010
2002: 9,060
2003: 9,110
2004: 9,160
2005: 9,210

2005: 10,087

Vehicle miles traveled: 1990-2005
(Source: FWHA Highway Statistics)
Vehicle miles traveled: 2006-2008

(Source: FWHA Traffic Volume Trends)
Changes in the vehicle market
(Data Sources: Ward's Automotive Yearbook, Transportation Energy Data Book)

Share of Total Vehicle Sales

<table>
<thead>
<tr>
<th>Year</th>
<th>Cars</th>
<th>Pickups</th>
<th>Vans</th>
<th>SUVs</th>
</tr>
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<tbody>
<tr>
<td>1984</td>
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Falling fuel economy
(Source: Transportation Energy Data Book)
Justifications for regulation

- Per mile externalities
  - Congestion
  - Accidents
  - Local Pollution

- Per gallon externalities
  - Global warming
  - Oil dependence

- Interaction with labor market

- Possible failures in market for fuel economy
External costs of vehicle use

Source: Parry et al. (*JEL* 2007))

- Per mile externalities: $2.10
- Per mile externalities: $0.06
- Global Warming: $0.12
- Oil dependency
Per mile externalities
(Source: Parry et al. (JEL 2007))

- Accidents: $0.63
- Local Pollution: $0.42
- Congestion: $1.05
Taxes on labor are inefficient because they reduce work.

If a gasoline tax:
- Reduces work, labor markets become even less efficient
- Increases work, labor markets become more efficient

Gasoline and leisure are relative complements—a gasoline tax increases work.

Optimal gas tax even higher than external costs.
Are there failures in the market for fuel economy?

Do consumers undervalue future fuel costs?

- Greene (1997): small savings, too much information, boundedly rational consumers → undervaluation

- Kleit (*Econ. Inquir.* 2004) speaking of MPG:
  “it is difficult to think of an automobile attribute that is better communicated to consumers” (p. 281)

- Dreyfus and Viscusi (*J. Law Econ.* 1995):
  “consumers do have a long-term perspective with respect to safety and fuel efficiency…” (p. 103)
Are there failures in the market for fuel economy?

- Surprisingly little work has been done to determine the effect of CAFE on producers’ fuel efficiency decisions
  - Greene (1997) “magic of standards”
  - Portney et al. (JEP 2003) “manufacturers could undersupply vehicle attributes”—strategic behavior
## Policy options

<table>
<thead>
<tr>
<th>Policies that reduce gasoline consumption and miles driven:</th>
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<tbody>
<tr>
<td>- Gas tax</td>
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<td>- Carbon tax</td>
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<td>- Pay-as-you drive insurance premiums</td>
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</tbody>
</table>

<table>
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<tr>
<th>Policies that reduce gasoline consumption but <em>increase</em> miles driven:</th>
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<tr>
<td>- Fuel economy standards</td>
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<td>- Gas guzzler tax</td>
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<td>- Feebates</td>
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</table>
CAFE versus the gas tax

- “Rebound effect” offsets 10 percent of initial fuel reduction from tighter CAFE standards (Small and Van Dender 2006)

- Like gasoline, miles driven are complements to leisure (West and Williams (AER 2005))
Distributional Effects

- Gasoline tax is regressive, but:
  - Behavioral effects make tax significantly less regressive (West \(JPubE\) (2004), West and Williams \(JEEM\) (2005))
  - Simple revenue rebate scheme can entirely offset regressivity (West and Williams \(JEEM\) (2005))

- CAFE standards
  - Likely to be progressive on consumer side
  - Effect on workers?
CAFE versus gas tax

- CAFE standard has major downside
- Recent changes in CAFE good move
- Potential for failures in market for fuel economy
- Need policies that reduce miles driven
- Gasoline tax increase administratively simple
Carbon tax or tradable permits

- Carbon tax or cap-and-trade alone do not internalize all externalities from driving.

- Carbon tax or cap-and-trade plus congestion pricing attractive.
  - Regional variation in external costs of driving means gas tax should also vary.
  - Carbon tax everywhere, congestion pricing only where congestion is present.
New research directions

- The effect of gasoline price on fuel economy
  - West (working paper 2007)
    - Effect of gas price on probability of buying SUV, truck, van, car
    - Using only contemporaneous price significantly underestimates effect of gas price on vehicle choice
  - Sallee and West (work in progress)
    - Effect of gasoline prices on new vehicles’ prices
    - Threshold and duration effects, asymmetries
    - Dealer-level new vehicle transactions, weekly gas prices by city
New research directions

- Ethanol demand: Anderson (2007)
  
  http://www-personal.umich.edu/~sorenta/

  - Data from Minnesota

  - Consumers substitute very easy between fuels

  - Simulates adoption of national ethanol standard:
    - Average consumer is willing to pay a small premium for ethanol
    - This reduces cost of a moderate ethanol content standard
    - Policy remains quite expensive: Implied cost per gallon of gasoline saved or ton of carbon emissions avoided far in excess of marginal external damages.