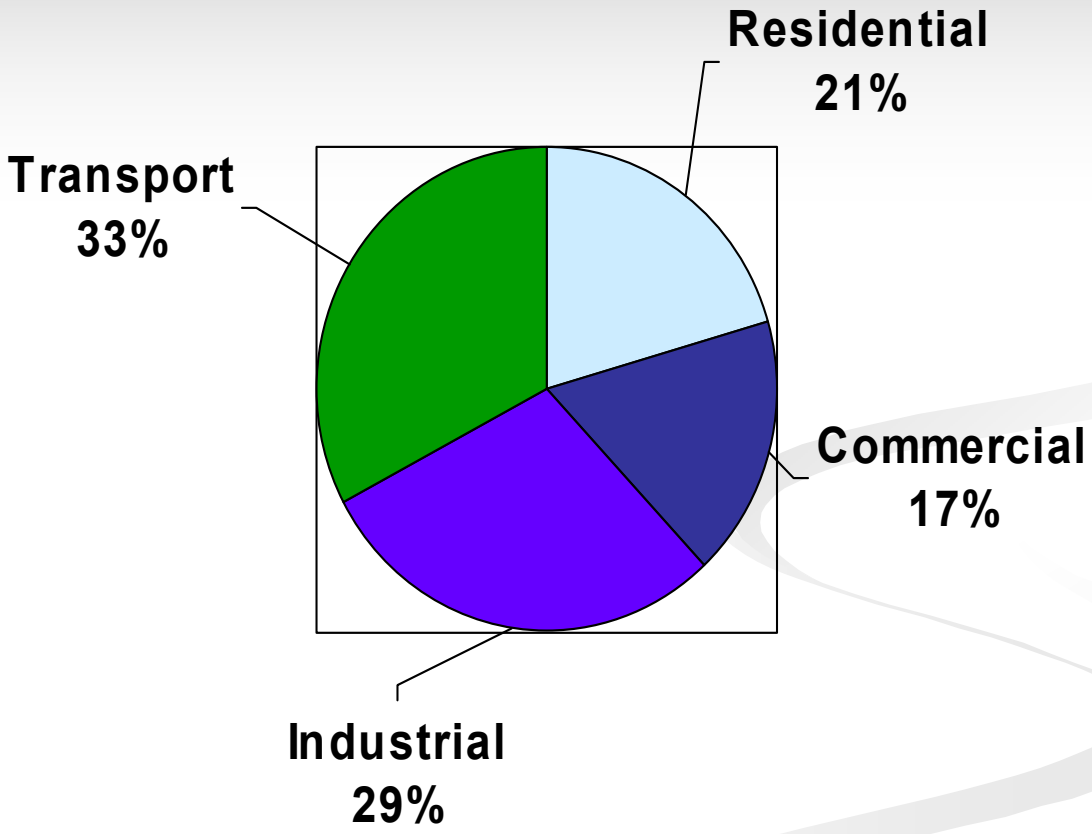
Confronting Global Warming: Policies for the Reduction of Gasoline Consumption

Sarah E. West
Associate Professor
Department of Economics
Macalester College
Email: wests@macalester.edu
Homepage: http://www.macalester.edu/~wests

U.S. Carbon Dioxide by Sector (2005)

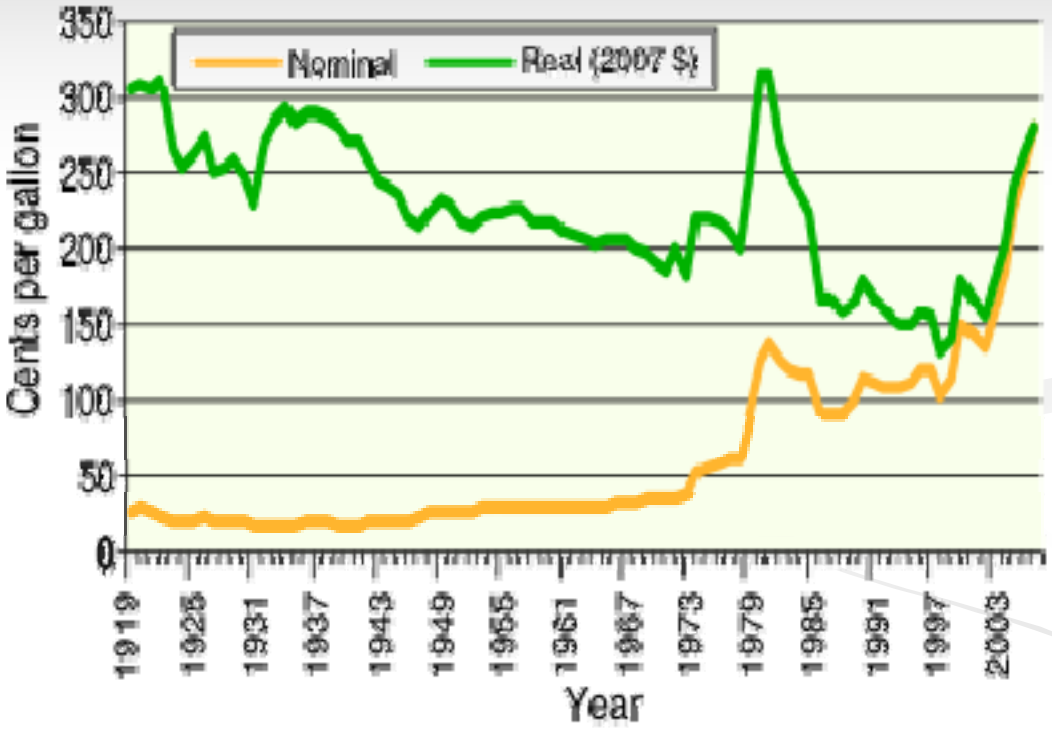
(Data Source: Energy Information Administration)



Outline

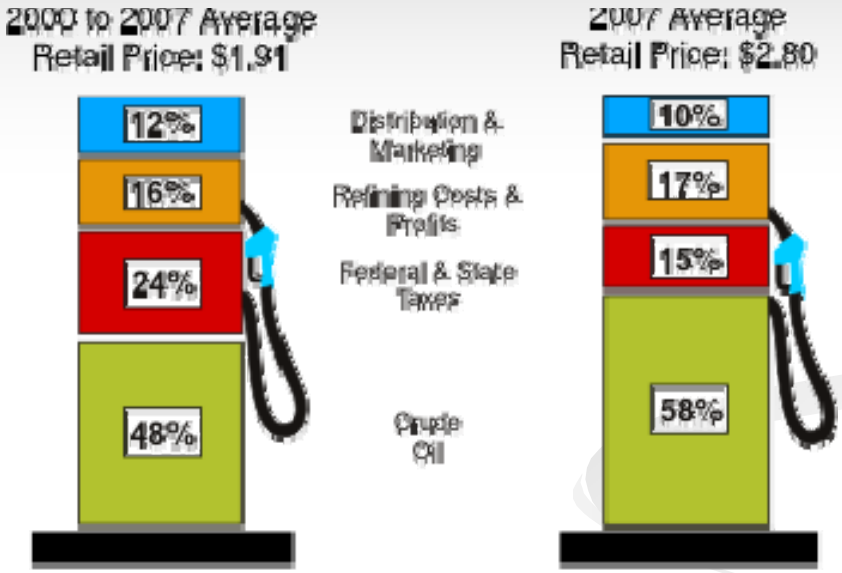
- Gasoline, miles driven, fuel efficiency
- Justifications for regulation
- A few policy options
  - Gasoline tax
  - Carbon tax or tradable carbon permits
  - Fuel economy standards
- New research directions

Gasoline Prices



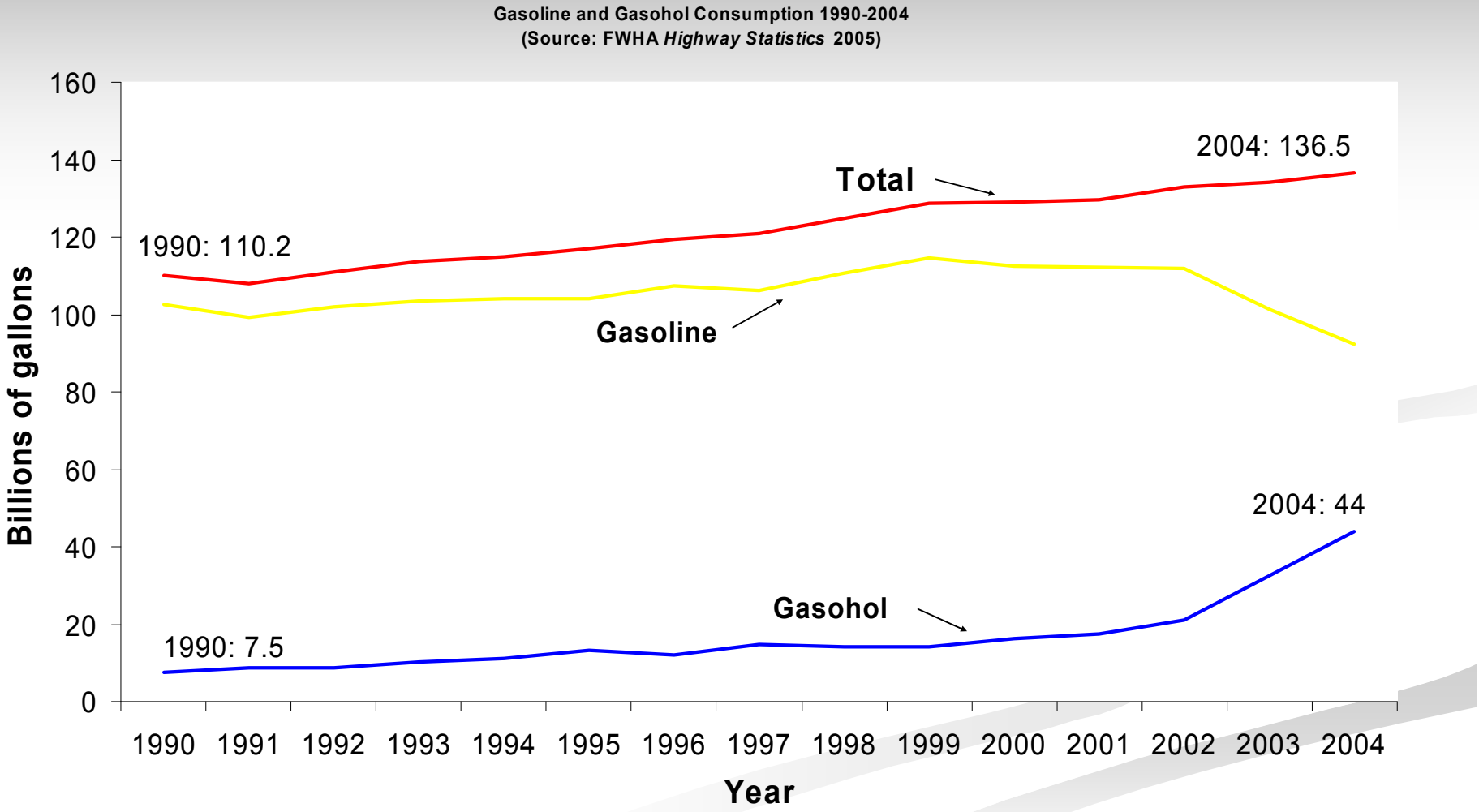
Source: Energy Information Administration, *Short Term Energy Outlook, January 2007*

Components of the price of gasoline



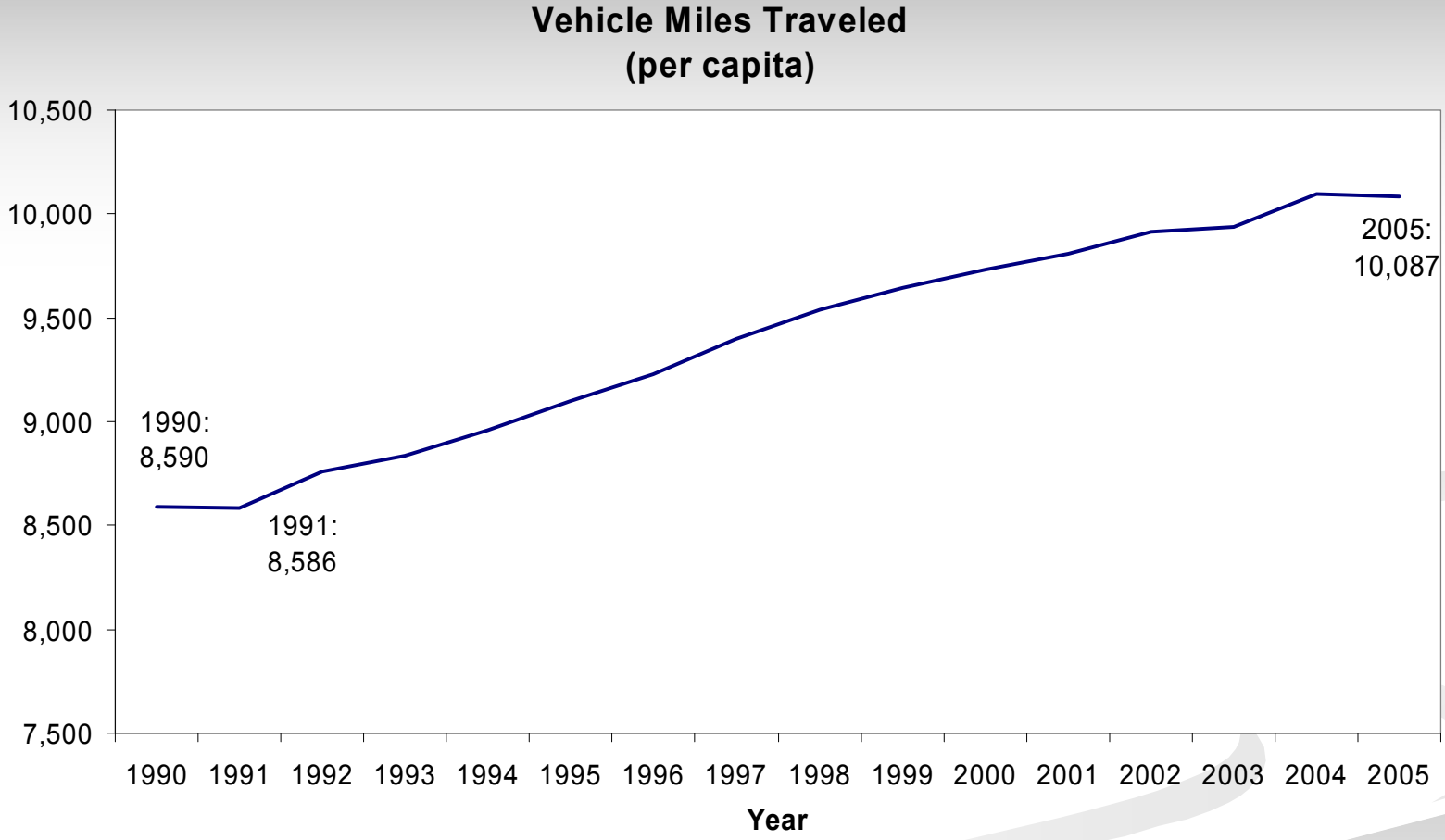
Source: Energy Information Administration

Gasoline consumption



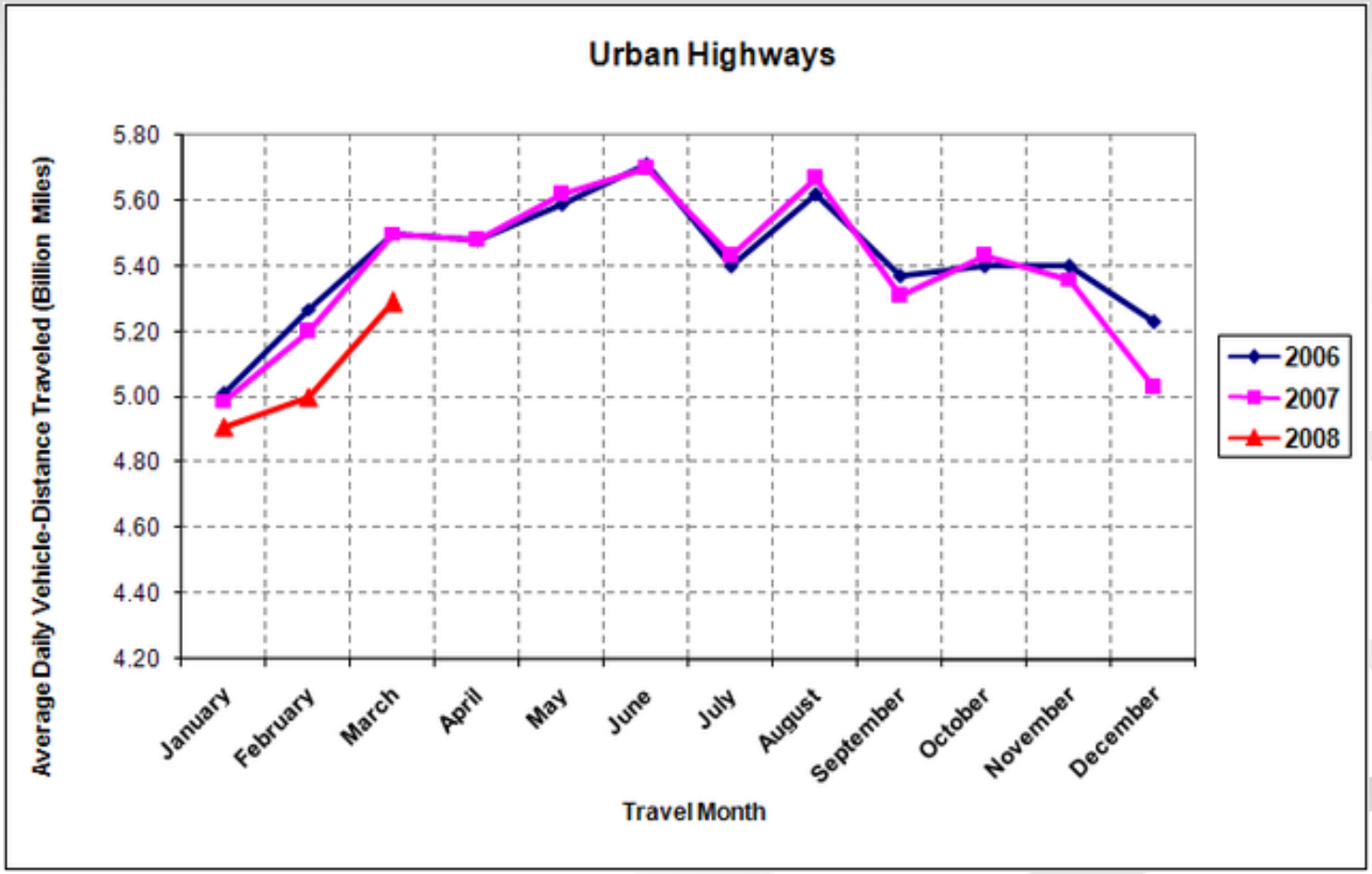
Vehicle miles traveled: 1990-2005

(Source: FWHA *Highway Statistics)*



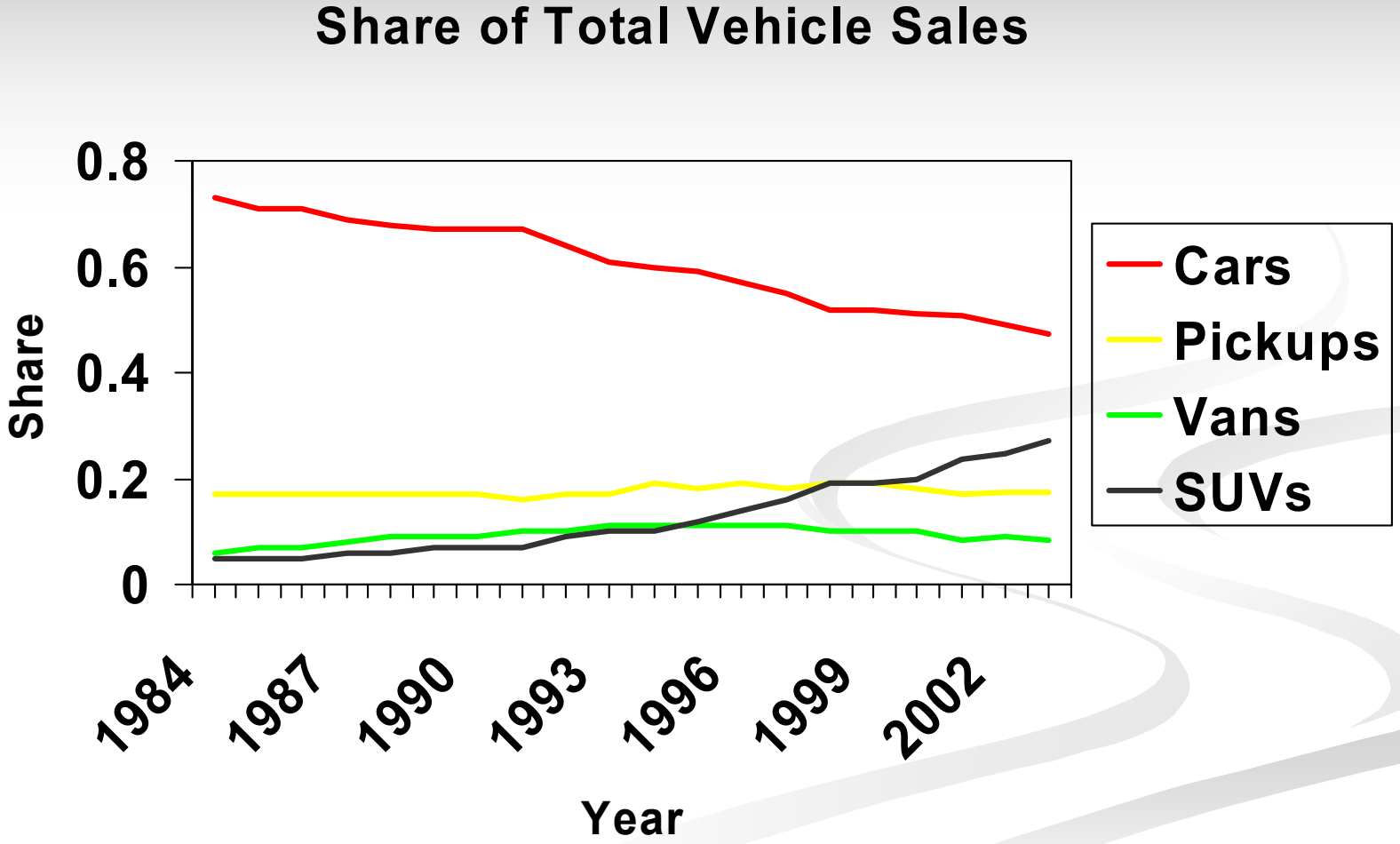
Vehicle miles traveled: 2006-2008

(Source: FWHA *Traffic Volume Trends)*



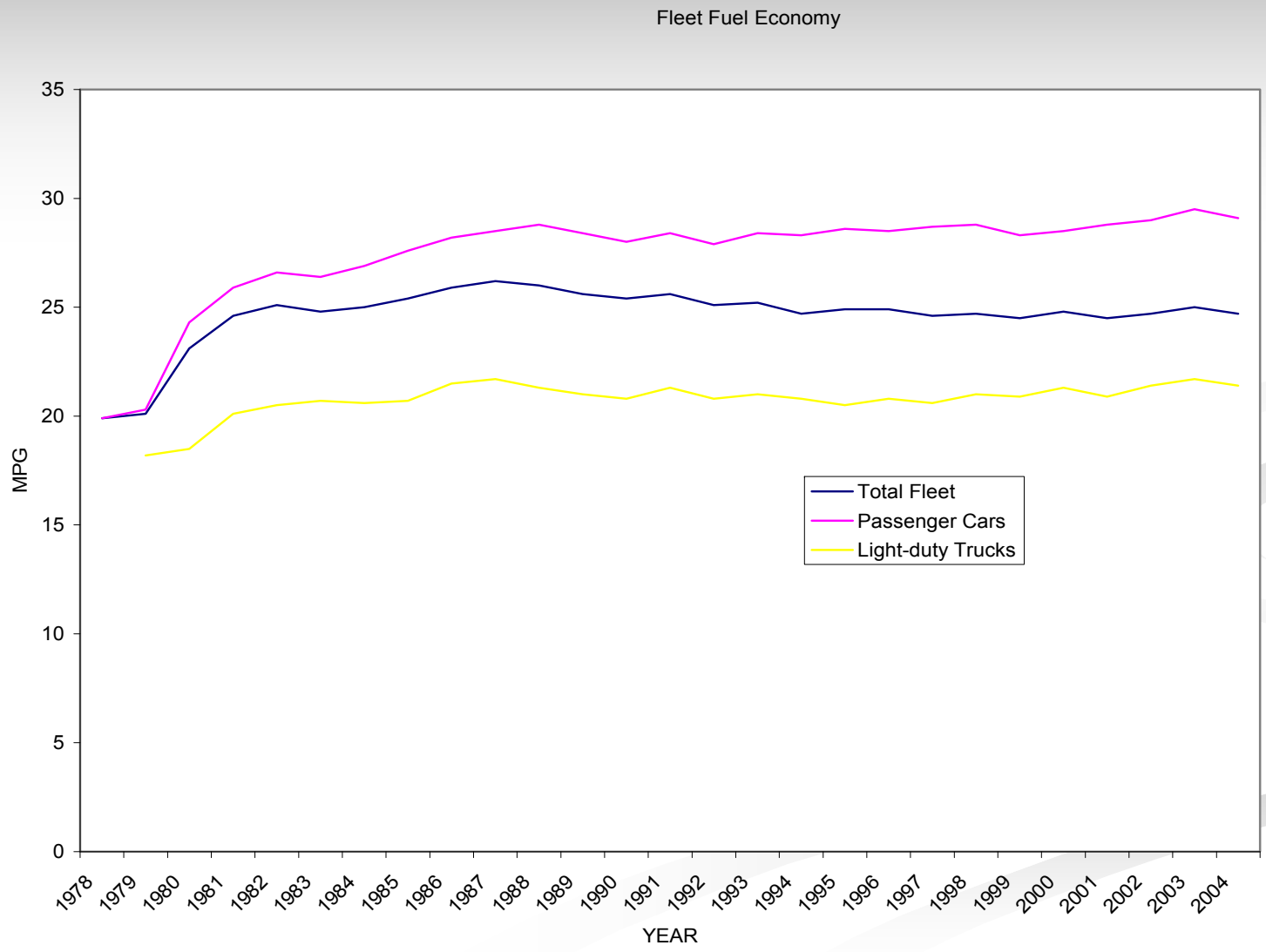
Changes in the vehicle market

(Data Sources: *Ward's Automotive Yearbook, Transportation Energy Data Book*)



Falling fuel economy

(Source: *Transportation Energy Data Book*)

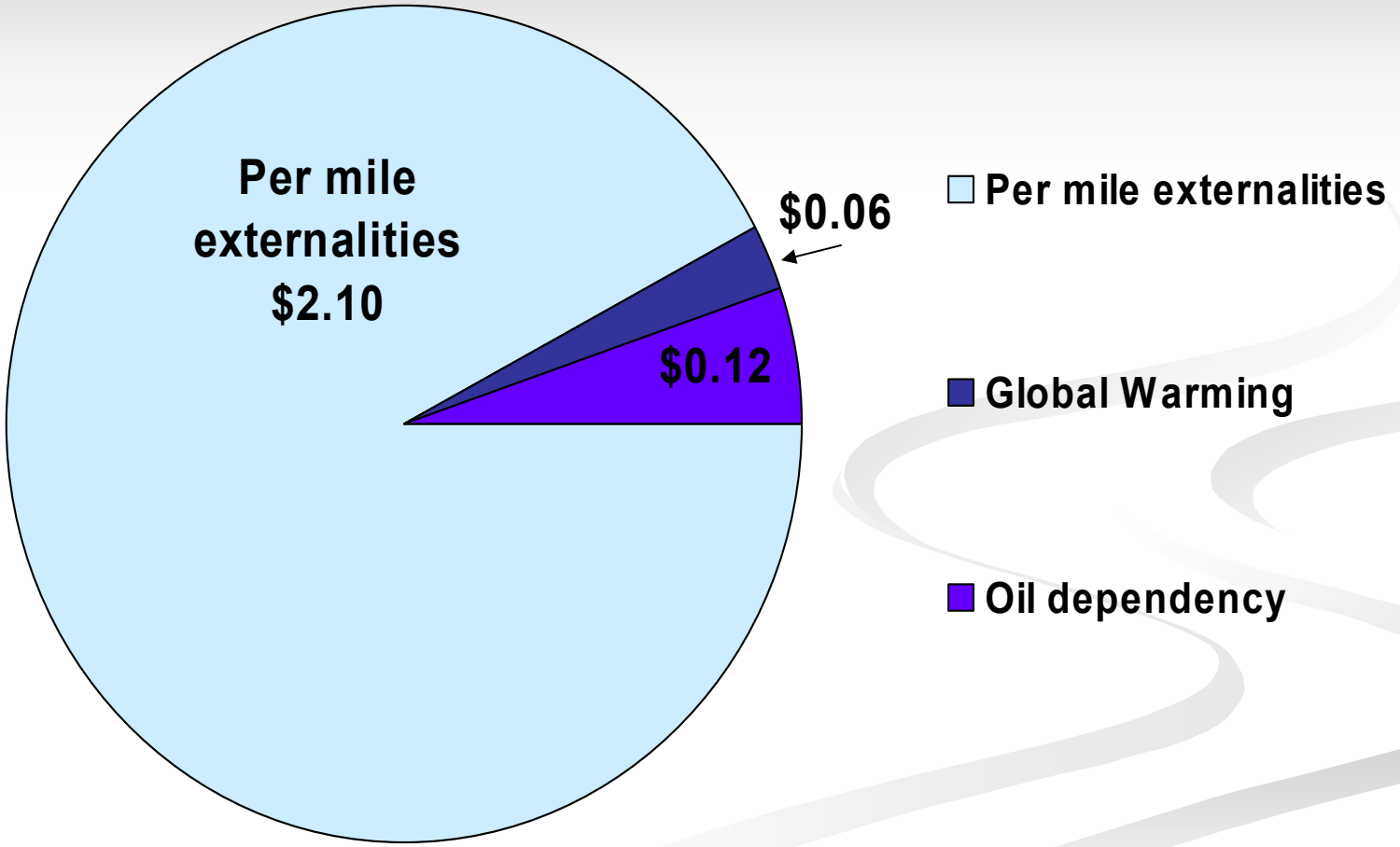


Justifications for regulation

- 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

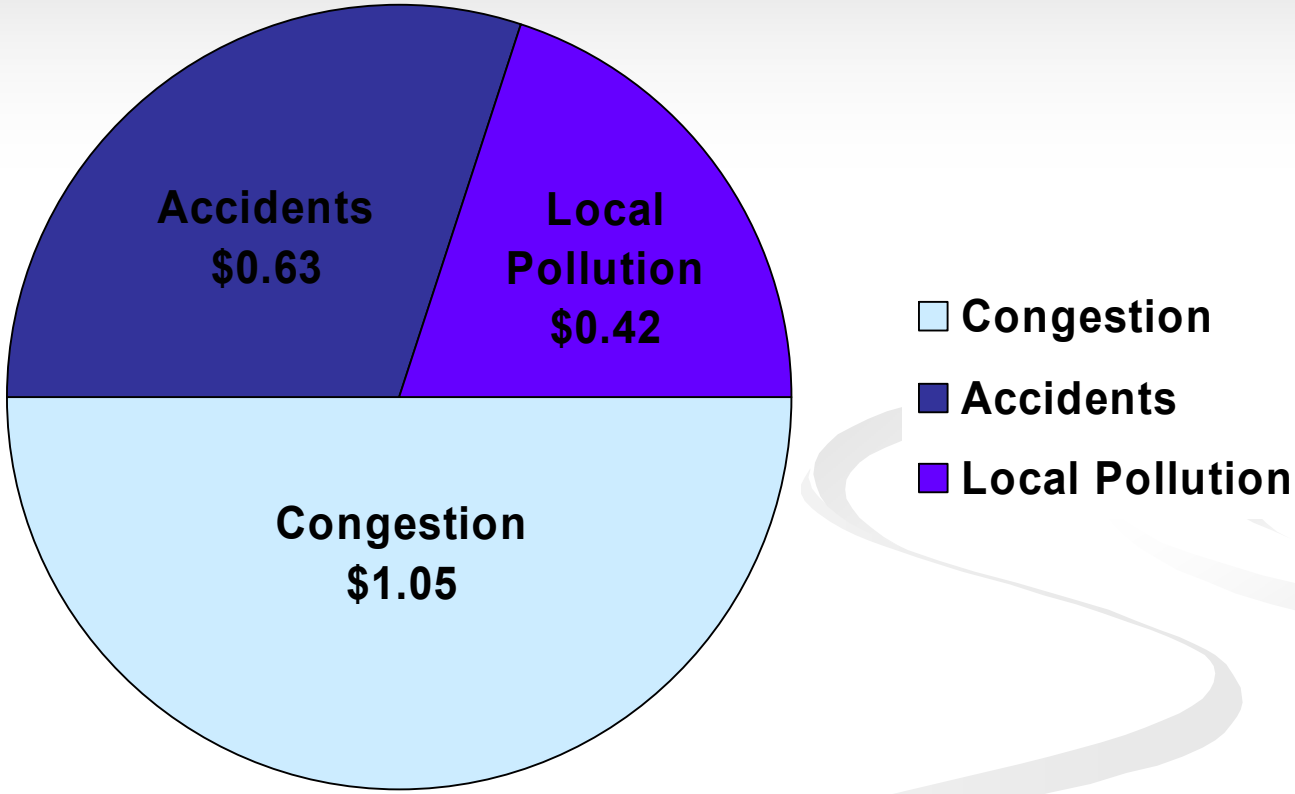
External costs of vehicle use

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



Per mile externalities

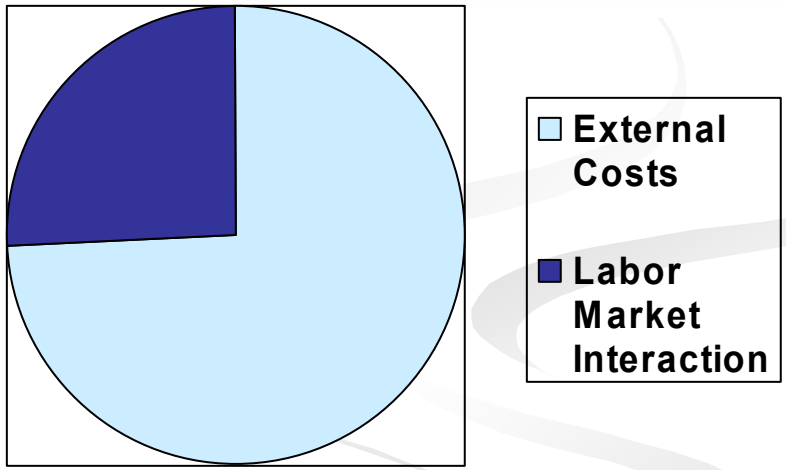
(Source: Parry et al. *(JEL* 2007))



Interactions with labor market

(Source: West and Williams (*JPubE* 2007)

- 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

Policies that reduce gasoline consumption *and* miles driven:

- Gas tax
- Carbon tax
- Pay-as-you drive insurance premiums

Policies that reduce gasoline consumption but *increase* miles driven:

- Fuel economy standards
- Gas guzzler tax
- Feebates

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.