Illustrate how the economic efficiency impacts of fuel taxes and fuel economy standards depend on:

(a) automobile externalities

(b) distortions created by the broader tax system
Gasoline tax

Marginal cost

$2.1 \text{ b}$

Gasoline tax

Marginal cost, $/\text{gal.}$

% reduction in gasoline

$G \quad G^0$

Quantity of gasoline

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Fuel economy standard

Marginal cost

$3.5 b
\[
\text{fuel-related} \quad \text{mileage-related} \\
E = E_{CO2} + E_{OIL} + \beta \{E_{CONG} + E_{ACCIDENT} + E_{POLL}\}
\]

\[E_{CO2} = 10 \text{ cents/gal} \text{ (Pearce 2005)}\]

\[E_{OIL} = 16 \text{ cents/gal} \text{ (Leiby, pers. com., 2004)}\]

\[E_{CONG} = 70 \text{ cents/gal} \text{ (Parry/Small)}\]

\[E_{ACCIDENT} = 60 \text{ cents/gal} \text{ (Parry/Small)}\]

\[E_{POLL} = 40 \text{ cents/gal} \text{ (Parry/Small)}\]

\[\beta = 0.4 \text{ (Parry/Small)}\]

\[E = 94 \text{ cents/gal}\]

\[E - t^0 = 54 \text{ cents/gal}\]
Gasoline tax – with externalities

Marginal cost

$5.5 b

Marginal social cost

Welfare gain

$0.54

Price

$5.5 b

% reduction in gasoline

Marginal cost

Gasoline tax – with externalities
Fuel economy standard – with externalities

Marginal cost

Total cost $5.5 b
Tax Distortions in the Labor Market

\[ \text{Wage} \]

\[ w \]

\[ w(1-t_L) \]

\[ L^0 \quad L^* \]

\[ \text{Labor supply} \]
Gasoline Tax

2 additional welfare effects

(a) Revenue-recycling effect

(b) Tax-interaction effect
Gasoline tax
−$9.7 bn
Fuel economy standard
$6.6 bn

% reduction in gasoline

marginal cost, $/gal.
Summary

Accounting for externalities and fiscal interactions strengthens the efficiency advantage of fuel taxes over fuel economy standards.

However
• Revenue may not be used to increase economic efficiency
• Fuel taxes are difficult to implement