Reforming Maine's Gas Tax for Economic and Environmental Sustainability

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April 2014
Sustainability: Fiscal & Environmental

- Historic method of funding our nation's roadway infrastructure is primarily from excise taxes levied on gasoline and diesel.
  - Federal excise tax (per gallon) for gasoline and diesel has been constant at $0.184 and $0.240 since 1997.
  - Maine excise tax: $0.300 and $0.312
  - A few states have sales taxes as well
- Emerging consensus:
  - method of funding is not fiscally sustainably
  - leads to an inefficient use of the our transportation infrastructure and large external costs to drivers and the environment
Why Fiscally Not Sustainable?

• Primarily due to increase in the fuel efficiency of new vehicles
• Use of fuel (federal) taxes to support transit and other non-highway infrastructure projects
• To a lesser extent, increases in the number of grid-connected hybrid or pure electric vehicles
• Per-gallon rates of taxation do not keep up with the costs of construction
Fuel Economy & Fuel Use: New Vehicles
Maine Highway Fund Revenues
(Millions, FY 2013)

Source: Maine Dept. of Administrative & Financial Services, 8 August 2013
Maine Gas Tax Revenues & Gallons

The graph illustrates the changes in gas tax revenues and gallons over time. Key points:

- Gas Tax Revenue (Millions) shows a significant increase followed by a decrease.
- Gas Gallons (Millions) exhibits a steady increase.

Notable changes include:

- A $0.22 increase in gas tax revenue.
- A $0.30 increase in gas tax revenue.

The graph spans the years 2000 to 2012.
Why Environmentally Not Sustainable?

- Mismatch between rates of taxation per gallon of fuel and social costs which vary by:
  - Per mile costs depends on:
    - Location,
    - Time of day
    - Fuel type (gas, electricity)
  - Per gallon, GHG emissions
  - Taxes are relatively small
  - Variability is in crude price

http://www.eia.gov/petroleum/gasdiesel/
Driver Costs Per Mile ($2010)

Sources: AAA, Mobility Report, EPA, others
Driver Variable Costs Per Mile (Include Capital?)

Sources: AAA, Mobility Report, others
Annual GHGs per Vehicle & Transportation’s Share of National GHG

Kg GHG per Year

- Residential: 28%
- Commercial: 18%
- Agricultural: 17%
- Industrial: 9%
- Transportation: 29%

TEDB, V32, Tables 4.19 & 11.4
Transportation’s Share of National Emissions of Criteria Air Pollutants

Transportation Energy Data Book, v32, Table 12.1
Externality Costs Per Mile

- Fuel taxes ~ 2 cents/mile

Sources: EPA, GREET, Mobility Report, others
How Responsive Are Drivers to Fuel & Mileage Taxes?

• Price elasticity of gasoline demand

\[ \varepsilon_{PG} = \left\{ \varepsilon_G \frac{1}{M} + \varepsilon_M \frac{1}{C} + \varepsilon_C \right\} \]

• Elasticity of gasoline (G) holding mileage (M) and car ownership (C) constant

• Elasticity of mileage (M) per car (C) with respect to gasoline price

• Elasticity of car ownership (C) with respect to gasoline price (P)

Price Elasticities for Gasoline Demand

![Graph showing price elasticities for gasoline demand in short and long runs for Havranek, Espey, and Brons.]
Price Elasticities for Miles Demand

![Bar chart showing price elasticities for different models: EPA, Brons SR, Brons LR, Parry. The chart indicates that Parry has the highest elasticity, followed by Brons LR, Brons SR, and EPA with the lowest.](image-url)
VMT Taxation

• Essentially MPG taxation is appropriate for fuel-related taxation – GHG emissions
• VMT taxation is better suited to mileage related external costs
National Surface Transportation Infrastructure Financing Commission

- Bi-partisan Congressionally-created commission

- Concludes that current system provides users with weak price signals to use the transportation system efficiently
  - System users are typically unaware of how much they pay in fuel taxes (as distinct from the price of gasoline), such that daily swings in price mask the tax component and blunt its effect on demand;
  - Fuel taxes and other direct and indirect user fees currently account for less than 60 percent of total system revenue (federal, state, and local), so that users do not bear anywhere near the full costs of their travel;
  - Fuel taxes have no direct link to specific parts of the system being used or to times of the day and thus cannot be used to affect these kinds of traveler choices.

National Surface Transportation Infrastructure Financing Commission

• Recommendations:
  – Transition to a charge by mile system by 2020
  – Reduce and ultimately eliminate current fuel and other vehicle-related charges recognizing that the fuel tax may play a role in meeting other important national policy objectives
  – Establish VMT technology standards and require OEM vehicle manufacturers to install standardized technology
  – Initiate an extensive public outreach effort
Cost & Public Acceptance

• Fuel taxes are collected from fewer than 2,000 fuel wholesalers around the country and passed along to consumers in the retail price of gasoline and diesel.
  – Cost ~ 1% of revenue

• Mileage fees much more complicated,
  – legitimate concern that the advantages of mileage fees will be outweighed by the increased cost of collecting them.
  – Costs ~5% of revenues

Source: Sorenson, P., Access, 43, 2013
# Pilot Programs

<table>
<thead>
<tr>
<th>Pilot Program Name</th>
<th>Vehicle</th>
<th>Year/Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Iowa</td>
<td>Passenger</td>
<td>California, Florida, Idaho, Illinois, Iowa, Kansas, Maine, Maryland, Montana, New Mexico, North Carolina, and Texas, 2008-2010</td>
</tr>
<tr>
<td>Oregon Road User Fee Pilot</td>
<td>Passenger</td>
<td>Portland, Oregon, 2006</td>
</tr>
<tr>
<td>Puget Sound Regional Council</td>
<td>Passenger</td>
<td>Seattle, Washington, 2005</td>
</tr>
<tr>
<td>Minnesota Department of Transportation</td>
<td>Passenger</td>
<td>St. Paul Minnesota, 2012</td>
</tr>
<tr>
<td>Nevada Department of Transportation</td>
<td>Passenger</td>
<td>Las Vegas, 2013</td>
</tr>
<tr>
<td>Oregon Truck Road Use Electronics</td>
<td>Commercial Trucks</td>
<td>Oregon, 2010</td>
</tr>
</tbody>
</table>

# Pilot Programs

<table>
<thead>
<tr>
<th>Pilot Program</th>
<th>Methodology/Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Evaluation of a Mileage-based Road User Charge (U. of Iowa)</td>
<td>2600 volunteer participants, 2008 and 2010. GPS-based, on-board unit that computed hypothetical mileage fees and uploaded charges over a cellular communications link. Bills were sent monthly to participants. System did not retain or transmit any GPS coordinates. Researchers found: mileage-based road-user charging is technically feasible using currently mature technologies; however, the installation of charging equipment into existing vehicles may pose a significant challenge.</td>
</tr>
<tr>
<td>Field tests in 12 states: California, Florida, Idaho, Illinois, Iowa, Kansas, Maine, Maryland, Montana, New Mexico, North Carolina, and Texas</td>
<td></td>
</tr>
<tr>
<td>Oregon Road User Fee Pilot Program</td>
<td>12-month field test with 285 volunteer vehicles, using a prototype, pay-at-the-pump mileage fee system. Vehicles with a GPS to determine hypothetical mileage charges based on zones and a wireless transmitter used to transmit mileage to the fueling station’s point-of-sale system. When participants filled their tanks, participants’ fuel receipts showed the difference in a hypothetical payment in a mileage fee system; zone pricing strategy produced a 22% decline in driving during peak periods</td>
</tr>
</tbody>
</table>

## Equity: Gas Tax Regressive

<table>
<thead>
<tr>
<th>Household</th>
<th>VMT (mi)</th>
<th>Fuel Economy (mpg)</th>
<th>Tax Burden ($)</th>
<th>Tax Burden (% of income)</th>
<th>Fuel Tax (cents/mi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National population</td>
<td>25,061</td>
<td>20.0</td>
<td>223</td>
<td>0.65</td>
<td>0.92</td>
</tr>
<tr>
<td>Income &lt; 20,000</td>
<td>15,509</td>
<td>19.4</td>
<td>135</td>
<td>1.49</td>
<td>0.95</td>
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<tr>
<td>20,000–40,000</td>
<td>20,693</td>
<td>20.0</td>
<td>183</td>
<td>0.61</td>
<td>0.92</td>
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<tr>
<td>40,000–60,000</td>
<td>27,627</td>
<td>20.2</td>
<td>246</td>
<td>0.49</td>
<td>0.91</td>
</tr>
<tr>
<td>60,000–80,000</td>
<td>31,778</td>
<td>20.3</td>
<td>284</td>
<td>0.40</td>
<td>0.91</td>
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<tr>
<td>80,000–100,000</td>
<td>33,195</td>
<td>20.4</td>
<td>297</td>
<td>0.33</td>
<td>0.90</td>
</tr>
<tr>
<td>Income &gt; 100,000</td>
<td>33,412</td>
<td>20.0</td>
<td>304</td>
<td>0.20</td>
<td>0.92</td>
</tr>
<tr>
<td>Geographic Urban</td>
<td>20,394</td>
<td>20.7</td>
<td>174</td>
<td>0.56</td>
<td>0.89</td>
</tr>
<tr>
<td>Second city</td>
<td>21,225</td>
<td>20.1</td>
<td>185</td>
<td>0.66</td>
<td>0.92</td>
</tr>
<tr>
<td>Suburban</td>
<td>24,100</td>
<td>20.3</td>
<td>211</td>
<td>0.47</td>
<td>0.91</td>
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<tr>
<td>Rural</td>
<td>28,958</td>
<td>19.6</td>
<td>264</td>
<td>0.78</td>
<td>0.94</td>
</tr>
</tbody>
</table>


Gas tax is regressive: low-income drivers spend a larger share of income and pay a higher equivalent rate per mile on federal gasoline tax each year than drivers with higher incomes.
Changing from a Gas tax to VMT Tax

• Winning groups include households earning less than $40,000 per year and households in rural areas.
• As a group, retired households with an average change in welfare of are affected most positively.
• Losing groups are households earning more than $40,000 per year, households in urban and suburban areas, and households with children.
• VMT fee shifts the tax burden from those owning fuel-inefficient vehicles to those owning efficient vehicles

Final Thoughts

• This is time to make changes to our financing system
  – Environmentally not sustainable
  – Fiscally not sustainable