Comparative Study of Costs Incurred by Transportation Users and Charges Compensated

Abhisek Mudgal  
Institute for Transportation  
Iowa State University  
2711 S. Loop Drive, Suite 4700  
Ames, IA 50010-8664  
abhisek@iastate.edu

ABSTRACT

Studies show that motor vehicle users (both the automobile and truck users) in the United States seem to pay only about 77.9% of the costs they occasion. In this paper, it is shown through a series of studies how total external cost (primarily accident, emissions, and noise) is significant in comparison to other private costs of using transportation facilities. The globe is facing a challenge from the increasing number of cars leading to greenhouse gas (GHG) emissions and traffic congestion, causing a loss of millions of dollars. Internalizing the external costs can support shifting of ridership from auto to public transportation, evaluation (decision making) of the true cost and benefits of consuming a particular transportation facility, and increasing the awareness of the responsibility of minimizing accidents, emissions, and noise. While it is essential to assimilate these into the user cost, very limited research has been published that assigns actual dollar values to the costs of vehicle-generated externalities. There are challenges associated with (1) quantifying actual adverse affects and (2) aggregating a variety of road users who contribute differently to the transportation externalities. Even without considering the external cost, the present government expenditures fall short of the tax and fee payments. Considering the external cost would further supports the thesis that there is a significant discrepancy between the charges paid by the users and the actual cost incurred by them.

Key words: external cost—freight—private cost—transportation externalities—transportation tax
Comparative Study of Costs Incurred by Transportation Users and Charges Compensated

Abhisek Mudgal
PhD Student, CCEE, ISU
Outline

• Transportation externalities
• User costs
  – Freight
  – Automobiles
• Total cost calculation
• Summary
Transportation externalities

• Costs which are not..
• Air pollution and greenhouse gas emissions
• Congestion (automobiles)
• Pavement damage (trucks)
• Accidents
• Noise (trucks)
  – Pavement
  – Engine
Point to ponder

- Studies show that motor-vehicle users (both the automobile and truck users) in the United States seem to pay at most 77.9% of the costs they occasion.
  - Transportation externality
Freight (Forkenbrock 1999)

• In 1994,
  – accidents cost = $14,800,000 per HMVMT
  – compensation = $6,091,000 per HM VMT
• Externality (in 1994 cents per ton-mile)
  – Accident = 0.59
  – Air pollution = 8.2
  – CO$_2$ emissions = 14.8
  – Noise = 0.04
  – Congestion = 0.169 (Gorman, 2008)
• Total external cost = 1.11
• Total private cost = 8.42
Freight contd. (Forkenbrock 2001)

• External cost of rail
  – 0.24 cents per ton-miles (Trucks => 1.11)
  – 9.3 to 22.6% of private cost (trucks => 13.2)

<table>
<thead>
<tr>
<th></th>
<th>Private cost(3)</th>
<th>External cost(2)</th>
<th>User charge Underpayment (3)</th>
<th>(2) + (3) as percent of (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General freight truck</td>
<td>8.42</td>
<td>0.86</td>
<td>0.25</td>
<td>13.2</td>
</tr>
<tr>
<td>Intermodal train</td>
<td>2.68</td>
<td>0.25</td>
<td></td>
<td>9.3</td>
</tr>
<tr>
<td>Heavy unit train</td>
<td>1.19</td>
<td>0.24</td>
<td></td>
<td>20.2</td>
</tr>
<tr>
<td>Mixed freight train</td>
<td>1.20</td>
<td>0.24</td>
<td></td>
<td>20.0</td>
</tr>
<tr>
<td>Double-stack train</td>
<td>1.06</td>
<td>0.24</td>
<td></td>
<td>22.6</td>
</tr>
</tbody>
</table>

Mudgal
Analysis for Passenger Car

- The user tax falls short of the government expenditure.

- Payments and expenditures rise constantly but at somewhat different rates at different times.

- These differences, combined with the blueprint of fuel consumption over time result in the cents per gallon user-payment shortfall.

- Current tax - fee payments = 20 – 70 cents per gallon of all motor fuel.

- What if we include the
  - cents-per-gallon-value of any non-monetary environmental or
  - oil-use externalities such as global warming or
  - the macroeconomic costs of oil disruptions.

High cost case (Delucchi, 2007)

Low cost case (Delucchi, 2007)
Summary and Conclusions

• Not many studies comparing costs
  – Difficult to ascertain because of difference in users.
• External costs are significant as compared to the private cost.
• Effect from equity, economic and environmental side
• Solution???
Compensations for TE

- Shifting ridership to public transportation
- Green fuel
- Clean fuel
- Increasing fuel taxes
- Congestion pricing
  - Restricted entry as in Europe
- Education and awareness
- Freight tax for externality
  - Pavement damage
  - Air pollution
THANK YOU

QUESTION OR COMMENTS PLEASE