Charging for use of infrastructure by road freight: European experience

Chris Nash
Institute for Transport Studies
University of Leeds
C.A.Nash@its.leeds.ac.uk
Outline

1. Introduction
2. Legislation
3. Measuring marginal social costs
4. HGV charging systems in practice
5. Regulation
6. Conclusions
Why is EC concerned about taxes and charges on road haulage?

- Fair competition between operators in different countries
- Fair competition between modes of transport
- Internalisation of externalities and promoting efficient and environmentally less damaging road haulage in terms of vehicle types and how they are used
- Raising funds for investment in transport infrastructure

Adopted short run marginal cost pricing as basis of policy (White Papers in 1998)
The marginal social costs of road freight transport consist of:

• Road damage, which is sensitive to axle load and road quality;
• Congestion, which varies with traffic volume, and thus with location and time of day
• Environmental and accident costs, which vary widely with vehicle characteristics, geographical location and time of day.
Charges for HGVs in Europe

• Normal charges in all countries are:
  • Fuel taxes
  • Fixed annual charges
  • Insurance

• In terms of supplementary charges there are three approaches:
  • Eurovignette countries (time or distance based)
  • Countries with tolls on specific roads
  • Countries with no direct road charging at all but usually higher fuel tax and or annual charges
Directive 2011/76/EU

Permits kilometre based charging for:

marginal maintenance and renewals costs
noise
air pollution
differentiating charges according to levels of congestion,
(although the overall revenue raised from this charge must not exceed the costs of providing the road system as a whole to avoid giving an incentive to countries with a high level of transit traffic to limit capacity and force up price).
Road wear and tear costs

<table>
<thead>
<tr>
<th>Description</th>
<th>PCU-km</th>
<th>AV.gwt-km</th>
<th>Max gwt-km</th>
<th>Sa-km</th>
<th>Include in MC?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-life pavements</td>
<td></td>
<td></td>
<td></td>
<td>100%</td>
<td>✓</td>
</tr>
<tr>
<td>Resurfacing</td>
<td></td>
<td></td>
<td></td>
<td>100%</td>
<td>✓</td>
</tr>
<tr>
<td>Overlay</td>
<td></td>
<td></td>
<td></td>
<td>100%</td>
<td>✓</td>
</tr>
<tr>
<td>Surface Dressing</td>
<td></td>
<td>20%</td>
<td>80%</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Patching and minor repairs</td>
<td></td>
<td>20%</td>
<td>80%</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Drainage</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Bridges and remedial earthworks</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Footways, cycle tracks and kerbs</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Fences and barriers</td>
<td></td>
<td>33%</td>
<td>67%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verges, traffic signs and crossings</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweeping and cleaning</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road markings</td>
<td></td>
<td>10%</td>
<td>90%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter maintenance and misc.</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Street lighting</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Policing and traffic wardens</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: av.gwt – average gross weight; max gwt – maximum gross vehicle weight; sa – standard axles (a measure of the relative damage due to axle weights). The costs attributed to pedestrians for roads other than motorways (50% of the categories from Fences and barriers through to Street lighting) are removed prior to allocation to motorised vehicles.
Average elasticity of road costs with respect to traffic levels

- Renewals 0.5 - 0.8
- Maintenance cost 0.4 - 0.7
- Operations cost 0

Accident and environmental costs

- Based on willingness to pay for reduced risk and improved amenity
- For accident costs, big issue is how far they are external
- Noise costs generally based on hedonic studies of house prices
- Air pollution costs follow the impact pathway approach (dose response)
- Greenhouse gases best handled by a separate carbon tax based on costs of reaching targets
Example of Marginal Social Cost calculation (hgv euro2 euros per km)

<table>
<thead>
<tr>
<th></th>
<th>Basel-Duisburg</th>
<th>Duisburg-Rotterdam</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak</td>
<td>Off-Peak</td>
</tr>
<tr>
<td>Noise</td>
<td>0.036</td>
<td>0.059</td>
</tr>
<tr>
<td>Congestion</td>
<td>0.657</td>
<td>0.009</td>
</tr>
<tr>
<td>Accident</td>
<td>0.050</td>
<td>0.050</td>
</tr>
<tr>
<td>Air pollution</td>
<td>0.031</td>
<td>0.031</td>
</tr>
<tr>
<td>Climate change</td>
<td>0.021</td>
<td>0.021</td>
</tr>
<tr>
<td>Wear and tear</td>
<td>0.151</td>
<td>0.151</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>0.946</strong></td>
<td><strong>0.321</strong></td>
</tr>
</tbody>
</table>

Notes: Peak Period – 07.00 to 18.00, Off-Peak – 18.00 to 00.00. Night – 00.00 to 07.00.
Source: Ricci et al. (2008).
### Comparison of HGV km charges in three countries

<table>
<thead>
<tr>
<th></th>
<th>Switzerland</th>
<th>Austria</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation date</td>
<td>2001</td>
<td>2004</td>
<td>2005</td>
</tr>
<tr>
<td>Roads to which charges are applied</td>
<td>All Swiss road network</td>
<td>Initially motorways</td>
<td>Initially Motorways</td>
</tr>
<tr>
<td>Lorry weight charged</td>
<td>&gt;3.5 tonnes</td>
<td>&gt;3.5 tonnes</td>
<td>&gt;12 tonnes</td>
</tr>
<tr>
<td>Technology</td>
<td>Tachograph + GPS</td>
<td>Microwave</td>
<td>GPS</td>
</tr>
<tr>
<td>Differentiation by euro Class?</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Modelled impact Europe-wide (IASON/TIPMAC/GRACE)

- Biggest traffic reduction in core countries – they benefit more than periphery
- Reassignment of traffic from urban to rural areas
- Higher proportion of large trucks
- 6% of road tonne km diverted to rail and water
- But 50% of traffic reduction comes from changing distribution systems and more local sourcing of inputs and consumer goods
- Substantial benefits (1.6% of GDP) from a km charge on all vehicles not differentiated by location and time of day
Regulation

- Both road and rail natural monopolies
- Issues about efficiency, pricing, investment
- No requirement for a road regulator
- European legislation does require a rail regulator, largely to prevent discrimination against new entrants, but also requires a multi annual investment plan
- Often this is simply negotiated between government and rail infrastructure manager, but in Britain the regulator plays a key role
Rail planning in Britain

A 5 yearly cycle comprising:

- High level output specification HLOS (capacity, reliability, safety) and statement of funds available SOFA by DfT
- Periodic review of Network Rail by Rail Regulator (determination of revenue requirements, to be met by access charges, government and borrowing)
- Regulator undertake benchmarking studies of Network Rail costs
- Regulator must ensure Network Rail has adequate finance; otherwise it must reduce planned outputs
Advantages

- Well considered long term plan with committed funding
- Pressure for efficiency

Government now proposing essentially to transfer this approach to the Highways Agency, which would become a publicly owned company.

The rail regulator would conduct benchmarking studies for road as well
Conclusions

• There is now much evidence on how to measure marginal social cost

• Technologies exist to implement marginal social cost pricing for HGVs, although whether a full GPS based system as opposed to a simple kilometre charge is worthwhile remains uncertain.

• There are benefits from having an independent regulator to examine efficiency, charges and funding.