Incentives for CO$_2$ emissions reductions in motor vehicle taxes

Presentation at an ITF roundtable on Stimulating low-carbon Vehicle Technologies

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A paper Dr. Rana Roy, London, prepared for OECD discusses the theoretical basis for CO\textsubscript{2}-related tax rate differentiation in motor vehicle taxes is available at www.oecd.org/env/taxes and.

This presentation describes the current use of such tax rate differentiation, drawing on information in the OECD database on instruments used for environmental policy: www.oecd.org/env/policies/database.

(Additional) CO\textsubscript{2}-related tax rate differentiation in motor vehicle taxes in Austria, Denmark and the Netherlands is not included in the present presentation.

The tax rates shown were valid as of 01.01.2009.
Types of differentiation used

- One-off (purchase) taxes vs. recurrent (use) taxes;
- CO$_2$-differentiation vs. energy-efficiency differentiation;
- Petrol vs. diesel (and possibly other engine categories);
- Tax rates varying with motor vehicle prices.
One-off – tax per vehicle, petrol-driven

Petrol-driven vehicles

- France
- Norway
- Portugal
- Canada
- Spain
- Finland
- Ireland
- Austria

€ per vehicle vs. gram CO₂ emitted per km driven
### One-off – tax per vehicle, petrol-driven

<table>
<thead>
<tr>
<th>Country</th>
<th>Tax (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>15,000</td>
</tr>
<tr>
<td>Norway</td>
<td>10,000</td>
</tr>
<tr>
<td>Portugal</td>
<td>10,000</td>
</tr>
<tr>
<td>Canada</td>
<td>10,000</td>
</tr>
<tr>
<td>Spain</td>
<td>10,000€</td>
</tr>
<tr>
<td>Spain</td>
<td>25,000€</td>
</tr>
<tr>
<td>Finland</td>
<td>10,000€</td>
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<tr>
<td>Finland</td>
<td>25,000€</td>
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<tr>
<td>Austria</td>
<td>10,000€</td>
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<tr>
<td>Austria</td>
<td>25,000€</td>
</tr>
<tr>
<td>Ireland</td>
<td>10,000€</td>
</tr>
<tr>
<td>Ireland</td>
<td>25,000€</td>
</tr>
</tbody>
</table>

#### Graph:
- **Petrol-driven vehicles**
- **gram CO₂ emitted per km driven**
- **€ per vehicle**
- **1 to 400 km driven**

The graph shows the relationship between grams of CO₂ emitted per km driven and the tax per vehicle for different countries. The y-axis represents the € per vehicle, and the x-axis represents the km driven. The graph includes lines for different countries and tax levels.
One-off – tax per tonne CO₂, diesel-driven

The calculations assume that each vehicle is driven 200,000 km over its lifetime.
One-off – tax per tonne CO₂, diesel-driven II

The calculations assume that each vehicle is driven 200 000 km over its lifetime.
Recurrent – tax per year, petrol-driven

<table>
<thead>
<tr>
<th>Country</th>
<th>Price (€ per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>1,000</td>
</tr>
<tr>
<td>Germany</td>
<td>1,500</td>
</tr>
<tr>
<td>Ireland</td>
<td>2,000</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>2,500</td>
</tr>
<tr>
<td>Portugal</td>
<td>1,000</td>
</tr>
<tr>
<td>Sweden</td>
<td>1,500</td>
</tr>
<tr>
<td>UK</td>
<td>2,000</td>
</tr>
</tbody>
</table>

Graph: Recurrent tax per year for petrol-driven vehicles, showing the cost as a function of CO₂ emissions per km for different countries.
Recurrent – tax per tonne CO$_2$, petrol-driven

The calculations assume that each vehicle is driven 200,000 km over a lifetime of 15 years.
Recurrent – tax per tonne CO₂, discounting

Petrol-driven vehicles, no discounting

- Denmark
- Germany
- Ireland
- Luxembourg
- Portugal
- UK
- Sweden

€ per tonne CO₂ emitted over the vehicle’s lifetime

gram CO₂ emitted per km

Petrol-driven vehicles, 4% discounting

- Denmark
- Germany
- Ireland
- Luxembourg
- Portugal
- UK
- Sweden

€ per tonne CO₂ emitted over the vehicle’s lifetime

gram CO₂ emitted per km

Petrol-driven vehicles, 7% discounting

- Denmark
- Germany
- Ireland
- Luxembourg
- Portugal
- UK
- Sweden

€ per tonne CO₂ emitted over the vehicle’s lifetime

gram CO₂ emitted per km

Petrol-driven vehicles, 15% discounting

- Denmark
- Germany
- Ireland
- Luxembourg
- Portugal
- UK
- Sweden

€ per tonne CO₂ emitted over the vehicle’s lifetime

gram CO₂ emitted per km
Total taxes – per tonne CO₂

### 120 gram CO₂ per km

<table>
<thead>
<tr>
<th>Country</th>
<th>Petrol</th>
<th>Diesel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>500</td>
<td>700</td>
</tr>
<tr>
<td>Canada</td>
<td>900</td>
<td></td>
</tr>
</tbody>
</table>

### 180 gram CO₂ per km

<table>
<thead>
<tr>
<th>Country</th>
<th>Petrol</th>
<th>Diesel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Canada</td>
<td>300</td>
<td></td>
</tr>
</tbody>
</table>

### 280 gram CO₂ per km

<table>
<thead>
<tr>
<th>Country</th>
<th>Petrol</th>
<th>Diesel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>400</td>
<td>600</td>
</tr>
<tr>
<td>Canada</td>
<td>800</td>
<td></td>
</tr>
</tbody>
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### 380 gram CO₂ per km

<table>
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<tr>
<th>Country</th>
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The chart above illustrates the total taxes per tonne CO₂ emitted for various countries and models of vehicles, categorized by 'One-off' and 'Recurrent' tax types. The graphs show a range of tax amounts from 100 to 900 € per tonne CO₂ emitted, with specific countries and models noted for their tax rates.
Conclusions

- The tax rates applied per tonne CO\textsubscript{2} emitted over a vehicle’s lifetime varies significantly between countries – with Norway, Portugal, Ireland and Denmark having very high tax rates for high-emission vehicles.
- It is difficult to see strong reasons why the tax rate per tonne lifetime CO\textsubscript{2} emissions should increase with increasing emissions per km driven.
- Given the much lower marginal abatement costs for other CO\textsubscript{2} emission mitigation options, one can also question why so strong incentives are provided to abate CO\textsubscript{2} emissions from some motor vehicles.
- Difficult to understand why a tonne CO\textsubscript{2} emitted over a vehicle’s lifetime should be higher for diesel-driven than for petrol-driven vehicles.
- Also, from an environmental point of view, the arguments for applying a higher tax rate per tonne CO\textsubscript{2} emitted from an expensive vehicle than from a cheaper one seem weak.