Acceptability of road tax reform

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Increasing fuel efficiency and the market penetration of electric cars make that car use taxes are slowly disappearing;

This creates issues of tax revenue as well as external cost problems.

Distance taxes varied in function of external costs would be the best alternative.

How acceptable is this transition in economic terms, neglecting technical and privacy issues?
Approach

- Wedge between marginal external costs and current user taxes requires a tax reform
- Focus first on tailoring the tax system to the external costs – 2\textsuperscript{nd} phase is to check tax revenue outcome and correct by increasing taxes on low elasticity consumption
- How do we define acceptability?
- 4 dimensions of differentiated distance taxes and how to make them acceptable:
  - Congestion charges
  - Urban / non-urban differentiation
  - The right level of fuel taxes
  - Optimal timing of the introduction of a distance tax
- Optimal phasing in of distance taxes
- Conclusions
Wedge between marginal external costs and user taxes

- Air pollution and climate damage will become small with EV
- Congestion and some air pollution accidents remain with EV
- Important difference between urban and rural external costs
- Benefit of reform: equal to $\frac{1}{2} \times (\text{wedge} \times \text{quantity response})$
- Average costs of infrastructure (3 €ct/vehkm) but marginal infrastructure costs of cars are close to 0

Note: The external cost data and fuel taxes are based on External cost study of the EC (2019) and represent average conditions for the EU – cfr. BOX 1
Definition of acceptability

• We look for political acceptability
• Our approach: Pareto improvements for a large majority of population
• Most individuals need to be better off in terms of utility
• Avoid modelling of political process that depends on institutions and quality of politicians
• Pareto improvements according to economics (revealed preference of behaviour) – perception (surveys) may be different, need to close this gap.
Tax reform accounting per individual

• Budget neutral reform in the aggregate

• Utility accounting (including external costs, time gains and consumer surplusses) is wider than the pure tax accounting that is used in many public debates

• Car drivers as well as non car drivers are affected
  • Less gasoline taxes may imply more income taxes etc..

• Many more sources of differentiation than income
Figure 3 Density of annual mileage by income group in Flanders region in Belgium

Source: Heyndrickx, Vanheukelom and Proost, 2021
Different options for distance taxes and their acceptability

• Congestion pricing
• Urban vs non-urban pricing
• Pricing the use of fuels
• When to introduce?
Acceptability of congestion charges

Table 2. Benefits and costs of tax reform for the different users of peak urban roads

<table>
<thead>
<tr>
<th></th>
<th>Cost</th>
<th>Time Gain</th>
<th>Distributed tax revenue</th>
<th>Net Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remaining users (0 to q*)</td>
<td>t</td>
<td>g</td>
<td>TTR/N</td>
<td>Loss</td>
</tr>
<tr>
<td>Users that left with high valuation (q* to q')</td>
<td>Large surplus loss</td>
<td>TTR/N</td>
<td>Loss</td>
<td></td>
</tr>
<tr>
<td>Users that left with low valuation (q' to q*)</td>
<td>Small surplus loss</td>
<td>TTR/N</td>
<td>Small gain</td>
<td></td>
</tr>
<tr>
<td>Non-users of urban peak roads (q* to N)</td>
<td>TTR/N</td>
<td>Gain</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: De Borger & Proost (2012)
Acceptability of congestion charges (theory)

- Simple diagram shows:
  - Difficult to have drivers accepting if they do not share in toll revenues
  - Information will be important as drivers face ex ante a new equilibrium where they do not know the advantages of the new equilibrium
  - One can “compensate” those that do no longer drive by improving PT or cyclepaths but this still leaves remaining drivers with insufficient compensation
  - One promising alternative are grandfathered tradeable mobility rights, they do not deliver any tax revenue but this may not be the most important in the reform (De Borger, Glazer, Proost, JUE, 2022)
Acceptability of congestion charges (practice)

• Higher acceptance ex-post than ex-ante
  • Would an experiment solve the problem?
  • Yes but there may be a majority against and it may be politically risky (Majundar & Mukand (2004))
    • Status quo bias? Yes but what underpins this bias?

• Discounts for very frequent users

• Revenues dedicated to environment, PT, ..but not to general tax revenues

• HOT lanes experience in the US, Israel: accepted if invested in new lanes or in parallel PT line
Different options for distance taxes and their acceptability

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• Urban vs non-urban pricing
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• When to introduce?
Wedge between marginal external costs and user taxes

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Urban vs non-urban pricing

• External costs are very different – but gasoline taxes are uniform in most countries for different reasons (tax competition,..)

• Political CONSTRAINT FOR A FEDERAL DIFFERENTIATED DISTANCE TAX: it is difficult to treat areas differently if cost differences are not well understood

• Easiest SOLUTION IS TO DECENTRALISE part of the distance charge setting to the regions, this will also help for congestion charges.

• This reform gives an optimally differentiated distance tax if there are no spillovers (Fung & Proost, 2016)

• If there are spillovers, one ends up with tax exporting and this requires federal constraints on the use of the tax revenues

• This leaves a REVENUE GAP for rural areas: best solved via regional or national income taxes?
Different options for distance taxes and their acceptability

• Congestion pricing
• Urban vs non-urban pricing
• Pricing the use of fuels
• When to introduce?
Fuel taxes and fuel differentiation

- **GOVERNMENTS ARE SLOW IN ADAPTING THE TAX SYSTEM WHEN NEW TECHNOLOGIES SHOW UP**
  - In 90 ties, diesel cars became more performant and more fuel efficient, but they were more polluting (other examples: dual fuelled cars, LPG etc.
  - It took some countries a long time to adapt their tax system
  - EV’s are nothing more than another new technology

<table>
<thead>
<tr>
<th>Total Share of diesel cars in a Year</th>
<th>Belgium</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>33%</td>
<td>12%</td>
</tr>
<tr>
<td>1995</td>
<td>39%</td>
<td>11%</td>
</tr>
<tr>
<td>2005</td>
<td>49.1%</td>
<td>15.7%</td>
</tr>
<tr>
<td>2010</td>
<td>60.3%</td>
<td>16.8%</td>
</tr>
<tr>
<td>2017</td>
<td>57.8%</td>
<td>16.8%</td>
</tr>
</tbody>
</table>
Fuel taxes on cars

• For the EU, the objective is to reach 0 net emissions in 2050

• To reach this objective one needs
  • Same carbon tax in the whole economy as 1st principle
  • R&D support for learning by doing and pure R&D – this R&D needs subsidies but also a long term commitment to a certain fuel tax level

• 100 €/ton of carbon puts us at the same level as industry who is committed to reach net 0 via the intertemporal ETS system

• No need to add a carbon tax on top of the fuel tax
Different options for distance taxes and their acceptability

• Congestion pricing
• Urban vs non-urban pricing
• Pricing the use of fuels
• When to introduce?
OPTIMAL TIMING (mental scheme, no real values, assuming fuel tax = average external cost in EU)

Average use revenues and costs per year per car

Average gasoline revenue

Constant average tax on cars

Average marginal external driving cost

Saving Climate+ Other air pollution costs

2022 t*

Time
Delays in tax reform: “kicking the can forward”

• Tax reforms are politically difficult for several reasons: they are unique, require design efforts and can fail

• Alesina & Drazen (1991) found that macro-economic reforms can be seen as a war of attrition, different groups want to tilt the reform in their favour
  • every group waits until the cost of waiting is higher than the cost of their agreement

• Applied to EV’s:
  • Alternative for distance taxes is using income tax revenues (US states..)
  • The no-car or low car users, suffer most when distance taxes are delayed as they then have to pay the missing revenues via income taxes, they risk to give in earlier than the car owners
How to avoid delays in distance taxes

• Governments should be aware that there is a problem by publishing the way they substitute for the missing gasoline revenues

• Tell population how much user costs they pay for their car use (cfr; good pension information)

• Start by implementing a new user tax for EV’s as they are still a small share of the car stock
  • This will not stop the introduction of EV’s in the EU as it is mainly driven by the fuel efficiency standard
Optimal phasing in of distance taxes..

a first vague picture (for EU)
Optimal phasing of distance taxes in 4 steps

Reform A – minimal reform
Charge only the EV and Hybrids -this forces policy makers to define non carbon and non air pollution part in current fuel tax

Reform B – distance tax applied to all Cars for non-carbon and non air poll cars Replaces part of the fuel tax (acceptability ok, waiting is costly)
Optimal phasing in of distance taxes

Reform A – minimal
Charge only the EV and Hybrids –

Reform B – distance tax for all Cars

Reform C – regional differentiation and decentralisation of distance tax
Fossil fuel tax at level of carbon tax

Reform D – distance tax differentiated in function of congestion
Summing up

• Distance taxes are an opportunity to improve pricing of road use
  • EV penetration is mainly steered by efficiency standards on manufacturers (in EU)
  • Distance taxes offer opportunities to price according to place and time

• Acceptability means compensating those that pay more with the reform
  • Congestion: tradeable permits or targeted compensation
  • Urban/non-urban differentiation will necessitate the decentralisation of part of the user taxes and this may create cost recovery issues for the rural transport system
  • Governments are very slow to implement important tax reforms, delay is costly and risk is that fossil tax revenue role is taken over fully by income taxes

• Possible phasing in (EU) : EV and Hybrid tax, followed by a early distance tax on all fossil cars with smaller fuel taxes that slowly disappear, next urban/ rural distance tax setting and congestion pricing
### BOX 1. Order of Magnitude of marginal external costs versus fuel tax in EU – estimates for 2016

<table>
<thead>
<tr>
<th>EUR ct per veh km</th>
<th>Type of vehicle</th>
<th>Air pollution</th>
<th>Climate change</th>
<th>Noise + accidents</th>
<th>Congestion</th>
<th>TOTAL marginal external cost</th>
<th>Fuel tax</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dense traffic metropolitan area</strong></td>
<td>Fuel eff petrol car</td>
<td>0.22</td>
<td>1.57</td>
<td>3.00</td>
<td>4.8 - 71.1</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fuel eff diesel car</td>
<td>1.35</td>
<td>1.38</td>
<td></td>
<td>0 - 66.3</td>
<td>5.7 - 72.0</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td>Full electric car</td>
<td>0.08</td>
<td>0</td>
<td></td>
<td></td>
<td>3.1 - 69.4</td>
<td>0</td>
</tr>
<tr>
<td><strong>Dense traffic rural motorways during day</strong></td>
<td>Fuel eff petrol car</td>
<td>0.13</td>
<td>1.35</td>
<td>0.45</td>
<td>1.9 – 30.5</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fuel eff diesel car</td>
<td>0.72</td>
<td>1.24</td>
<td></td>
<td>0-28.6</td>
<td>2.4 – 31.0</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>Full electric car</td>
<td>0.08</td>
<td>0</td>
<td></td>
<td></td>
<td>0.5 – 29.1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Car user</td>
<td>Non car user</td>
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<td>--------------------------------------</td>
<td>-----------------------------------------------</td>
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</tr>
<tr>
<td>Change in Fuel tax paid (1)</td>
<td>Becomes smaller or disappears</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in Distance tax paid (2)</td>
<td>Becomes Important</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in Other taxes paid (3)</td>
<td>can ↓ or ↑</td>
<td>can ↓ or ↑</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Change in TOTAL TAX paid (4) = (1) + (2) + (3)</td>
<td>can ↓ or ↑</td>
<td>can ↓ or ↑</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Benefit of transport consumption (5)</td>
<td>can ↓ or ↑</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benefit of other consumption (6)</td>
<td>can ↓ or ↑</td>
<td>can ↓ or ↑</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damage externalities other than congestion (7)</td>
<td>Expected ↓</td>
<td>Expected ↓</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Change in TOTAL BENEFIT (8) = (5) + (6) + (7)</td>
<td>can ↓ or ↑</td>
<td>Expected ↑</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
Figure 2. Transport surplus changes for an individual

- **Peak car use in Urban area**
  - Demand function peak trips
  - Vehicle cost + time cost
  - Vehicle cost + time cost*
  - Distance tax*
  - Before tax vehicle cost

- **Off peak car use in non-urban areas**
  - Demand function off peak trips
  - Vehicle cost incl. fuel tax
  - Vehicle cost incl. fuel tax*
  - Distance tax
  - Before tax vehicle cost

- Generalised Cost
- Generalised cost
- Qp*
- Qp°
- Number of trips
- Qop*
- Qop°
- Number of trips
- Fuel tax

*Notes: * denotes the cost with fuel tax.
Carbon tax debate (beyond transportation as we already have a 300 € carbon tax in transport)

• In theory, this is an opportunity to improve the overall tax system
• But this is difficult to sell, a lump sum rebate or spending on climate projects works better;
• Carbon taxes were only introduced in some countries (Sweden, Norway,...) where there was sufficient trust in the government
<table>
<thead>
<tr>
<th></th>
<th>REFORM A Distance tax for EV’s and plug in hybrids</th>
<th>REFORM B Distance taxes for all cars</th>
<th>REFORM C Urban/rural differentiation</th>
<th>REFORM D Distance tax with Congestion pricing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline and Diesel taxes</td>
<td>Kept</td>
<td>Kept but in line with climate damage</td>
<td>Kept but in line with climate damage</td>
<td>Kept but in line with climate damage</td>
</tr>
<tr>
<td>Estimate?</td>
<td>Equal to average gasoline tax – climate cost</td>
<td>Equal to average non-climate externality</td>
<td>Equal to average non-climate externalities</td>
<td>Equilibrium computation of additional charge for congested areas</td>
</tr>
<tr>
<td>Compensation of losers?</td>
<td>Decrease registration tax for EV’s and plug in hybrids</td>
<td>Not needed as it merely substitutes an existing tax</td>
<td>Tax revenues are allocated to the regions Interregional transfers may be necessary</td>
<td>Capped charges for frequent users Targeted PT improvements Grandfathered peak mobility rights</td>
</tr>
<tr>
<td>Alternative instruments?</td>
<td></td>
<td>Urban externalities can be addressed by LEZ etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welfare Benefit</td>
<td>Growing</td>
<td>Growing</td>
<td>High</td>
<td>Highest</td>
</tr>
<tr>
<td>Acceptability</td>
<td>easiest</td>
<td>possible</td>
<td>Depends on institutional context</td>
<td>Difficult</td>
</tr>
<tr>
<td>Total tax revenue</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
</tbody>
</table>