Environmental taxes: economic principles and the UK experience

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Organised by Economics for Energy and the Energy Chair of Orkestra (Basque Institute for Competitiveness)
Outline

• Economics of environmental taxes
  – rationale for green taxes in environmental policy: externalities
  – pros and cons of green taxes
  – using green tax revenues

• Outline of the current UK green tax system
  – transport-, energy- and resource-based taxes
  – significance of green taxes in total receipts

• Failures of the UK system against good economics
  – inconsistent carbon taxes
  – motoring taxes not targeting the external costs
Economics of environmental taxes
The externality principle

• Costs of environmental damage not borne by polluters
  – pollution is a ‘negative externality’
• Private decisions lead to socially excessive pollution levels
• Tax can help polluter recognise full social costs
  – ‘internalise’ the externality
  – generate socially optimal outcomes and improve economic welfare
Externality-correcting green taxes

Costs, benefits

Revenue

Marginal Social Cost

Marginal Private Cost

MPC + $t$

Marginal Private Benefit

Welfare gain

$P_0$

$P_1$

$t$

$Q_0$

$Q_1$

$Q_0$

Revenue

Marginal Private Benefit

Welfare gain

$P_0$

$P_1$

$t$

$Q_0$

$Q_1$
Economics of environmental taxes
The externality principle

• Costs of environmental damage not borne by polluters
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• Some key insights for ‘Pigouvian’ green taxes:
  – set according to marginal external cost at socially optimal outcome
  – target the tax as closely as possible to the externality
• Taxes or regulatory ‘command-and-control’ approach?
Advantages of environmental taxation

• Static efficiency
  – with many polluters, likely to be different costs of abatement
  – regulation may fail to account for this
  – taxes incentivise efficient abatement patterns (low cost do more)

• Dynamic efficiency
  – ongoing incentives to reduce emissions

• Reduce need for individual negotiation
  – minimise risk of ‘regulatory capture’

• Revenue raising
  – UK green taxes generated about £43 billion in 2011 (8% of revenue)
Disadvantages of environmental taxation

• A uniform tax rate may not be efficient
  – variation in external cost by across emissions, location
  – can be hard to differentiate taxes appropriately
• Unintended behavioural responses
  – environmental consequences could be more damaging
  – may add to costs of tax collection and compliance
• Not always compatible with firm decision-making
  – small taxes may be ignored?
What about the distributional effects?

- Concern that green taxes are regressive
- Shouldn’t assume this to be true – UK evidence is mixed
  - energy taxes regressive
  - vehicle fuel taxes appear not to be (low car ownership among poor)
  - taxes on aviation progressive
- Green taxes about sending efficient price signals
  - wider tax and benefit system can compensate (at least on average)
- Other environmental policy has distributional effects
  - much less transparent and harder to compensate
How should the revenue be spent?

- Should green tax revenues be hypothecated?
  - no compelling economic rationale
  - efficient pattern of taxes and spending not necessarily linked
  - political value – but policy makers should make clear economic case

- Is there a double dividend?
  - use revenues to reduce distortionary taxes (e.g. on labour)
  - environmental benefit and improved labour supply incentives
  - but higher green taxes increase prices
  - reduces real wages and labour supply incentives
  - overall effect could go either way
## Current UK environmental taxes
### Transport-related taxes

<table>
<thead>
<tr>
<th>Tax</th>
<th>Key points</th>
<th>Rate(s)</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fuel duty</strong></td>
<td>• Equal for petrol and diesel since 1994</td>
<td>57.95p/litre</td>
<td>£26.9 billion</td>
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<td>• 71% real rise 1993–1999 (‘escalator’)</td>
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<td>• 17% real fall since 1999</td>
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<td>• No current reduction for biofuels</td>
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<td><strong>Vehicle excise duty</strong></td>
<td>• Annual vehicle ownership tax</td>
<td>£0–£475 (£1,030 in year 1)</td>
<td>£5.8 billion</td>
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<td>• Varies with fuel efficiency (13 bands)</td>
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<td>• Different first-year rates for new cars</td>
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<td><strong>Air passenger duty</strong></td>
<td>• Departing passenger tax</td>
<td>£13–£184</td>
<td>£2.7 billion</td>
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<td>• Varies by destination (4 distance bands)</td>
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<td>• Varies by class of flight (2 bands)</td>
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<td><strong>Company car &amp; fuel taxes</strong></td>
<td>• Value benefit in kind income tax purposes</td>
<td>0–35% of list price</td>
<td>£2.1 billion (2009/10)</td>
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<td>• Rates depend on efficiency and fuel type</td>
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Revenues for 2011/12 unless otherwise stated
# Current UK environmental taxes

## Energy-related taxes

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| **Climate change levy**        | • Tax on commercial energy use  
• Varies by energy type  
• 65% reduction for carbon-intensive sector                                  | 0.509p/kWh (elec)  
0.177p/kWh (gas)                                      | £0.7 billion                   |
| **Renewables obligation**      | • Requires energy companies to supply proportion of energy from renewables  
• Can ‘buy out’ unmet obligation                                   | £40.71/MWh buyout            | £0.4 billion (recycled) |
| **EU ETS auctioning**          | • UK to auction 7%+ of Phase II permits  
• First auction in 2008                                             | Last cleared at €8.11/tCO₂     | £0.7 billion                   |
| **Carbon reduction commitment**| • Tax on carbon content of fuels used by mid-sized firms and organisations  
• League table of participants                                 | £12/tCO₂                     | £0.7 billion                   |

Revenues for 2011/12 unless otherwise stated
# Current UK Environmental Taxes

## Natural Resource and Waste Taxes

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| **Landfill tax**     | • Tax on waste sent to landfill  
                     | • Lower rate for inert waste  
                     | • Annual escalator in place since 1999 | £64/t  
                     |                                           | £2.50/t (inert) | £1.2 billion |
| **Aggregates levy**  | • Tax on commercial exploitation of sand, gravel and rock                   | £2/t          | £0.3 billion |
Green taxes less important in recent revenues
Real revenues (2011 prices) and as a share of total receipts, 1963–2011

Source: author’s estimates, calculated from ONS data
The inconsistency of prices on carbon

- Efficiency requires carbon price to be consistent
  - marginal external cost of tonne of carbon the same everywhere
  - inconsistent prices raises costs of carbon abatement
- Multiple policies in UK set implicit and explicit carbon prices
- Generates wide range of effective prices
  - firms vs. households (no carbon taxes on domestic gas)
  - firms of different sizes, carbon intensiveness
  - different types of fuel (some taxes do not vary by carbon content)
The inconsistency of prices on carbon
Effective carbon prices from UK energy policies, by fuel & user (2013/14)

Source: Advani et al. (2011). Note: Business rates assume CRC participation.
The inconsistency of prices on carbon

- Putting the ‘right price’ on carbon emissions is hard
- But efficiency requires carbon price to be consistent
  - otherwise raises cost of reducing emissions
- Evidence of a wide range of effective carbon prices in the UK
  - firms vs. households (no carbon taxes on domestic gas)
  - firms of different sizes, carbon intensiveness
  - different types of fuel (some taxes do not vary by carbon content)
- In fact, household energy use subsidised by reduced VAT
  - average subsidy £178, cost £5.5 billion
  - nine times larger than bill impact of climate change policies
Targeting taxes to the externality: road transport

- Road transport associated with several externalities
  - climate change
  - noise and other local pollution
  - congestion (much the biggest externality)
- Climate change externality depends largely on fuel use
  - around 14p per litre for petrol at current UK carbon values
- Current tax on fuel around 58p per litre
- Hard to know whether other externalities rationalise this level
  - fuel a very poor proxy for other externalities
  - depend on where and when someone drives
Marginal external costs of motoring vary widely
Distribution of marginal external cost in the UK, 2010 estimates

Source: Johnson et al. (2012).
Marginal external costs of motoring vary widely
Distribution of marginal external cost in the UK, 2010 estimates

Source: Johnson et al. (2012).
Conclusions

• Clear economic rationale for environmental taxes
  – should be set based on evidence of environmental costs
  – need to be well-targeted

• Have advantages over other instruments
  – not always the best policy: environmental outcomes uncertain
  – continued role for regulation

• Taxes should be justified by environmental impact
  – hypothecation, double dividend not good rationales

• Several examples where UK reforms could yield big benefits
  – consistency of carbon pricing
  – better targeted transport taxes