



Fiscal instruments for internalising external costs

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Perspective of economic theory

Taxes are essential instruments for internalising external costs

- Pigouvian tax = social marginal cost of pollution (marginal value of damage) → socially optimal level of tax in the first-best world
- Baumol-Oates approach: environmental tax = marginal abatement cost corresponding to a given environmental target

Advantages:

- allocative efficiency: marginal abatement costs are equalised across firms
- dynamic efficiency: strong incentive for further pollution abatement and development of clean technologies (because taxes paid on all remaining emissions)
- revenue recycling effect: taxes generate revenues that can be used to reduce other distorting taxes in the economy

Further considerations:

- interactions with pre-existing distorting taxes entails a welfare loss, as environmental tax will reduce real household wage and thus reduce labour supply
- according to Parry-Oates (2000) this negative tax interaction effect may dominate revenue recycling effect → double dividend in a strong sense may not exist (depends, however, on labour market conditions, elasticity of labour supply etc.)

Implications:

- optimal tax in the second-best setting $<$ Pigouvian tax
- the optimal level depends on the marginal cost of public funds (e.g. Bovenberg-Goulder, 2001), the size of environmental damage and the form of revenue recycling
- revenue recycling increases the optimal level of tax and mitigates the negative tax interaction effect
- on efficiency grounds emission taxes (or auctioned emission permits) are preferred to emission trading based on grandfathering

The EU framework

- the Community competence in the area of taxation is limited
- Art. 93: "The Council shall, acting unanimously ... adopt provisions for the harmonisation of legislation concerning turnover taxes, excise duties and other forms of indirect taxation to the extent that such harmonisation is necessary to ensure the establishment and the functioning of the internal market...."
- Community legislation exists in the areas of VAT, excise duties on alcohol, tobacco and energy products
- a new proposal on car taxation currently under negotiation
- good functioning of the internal market is the main justification of all this legislation, EU environmental objectives also play a role, but have secondary importance
- in many Commission policy documents (Sustainable Development Strategy, 6EAP) the wider use of market-based instruments is strongly recommended as a means to achieve environmental objectives in a cost efficient way

Energy Tax Directive 2003/96/EC

- EU-wide minimum tax rates for all energy products (incl. electricity, natural gas and coal)
- upgrades the minimum tax rates on mineral oils from the 1992 level
- several provisions for harmonising the structure of taxes (conditions for applying exemptions, differentiated or reduced rates on specific energy products)
- transitional periods accorded to the Member States to adjust national level of taxation on specific energy products
- the level of minimum tax rates is largely the result of political compromise and does not as such reflect any estimates of external costs

The level of EU minimum tax rates in comparison with a carbon tax of 10€/tCO₂

	10€/tCO ₂	EU minimum	tax rates 2004
		€/Gj	€/ phys. unit
Coal	0.97	0.15-0.30	0.15-0.30/Gj
Heavy fuel oil	0.77	0.37	15/ton
Light fuel oil/ gas oil	0.73	0.58	21/1000 l
Natural gas	0.56	0.15-0.30	0.15-0.30/Gj
Petrol	0.69	10.27	359/1000 l
Diesel	0.73	8.10	302-330/1000l
Electricity	1.18	0.14	0.5-1.0/MWh

...The level of EU minimum tax rates in comparison with a carbon tax of 10€/tCO₂

- the table is from a study made for DG TAXUD with GEM-E3 model in 2004 by CES-KULeuven, ICCS-NTUA and CPAS-BUES
- the first column shows the structure of EU minimum rates in case they are made dependent on the carbon content of the energy product and increased to the level corresponding to 10€/ton of CO₂ (a purely hypothetical case)
- the second and third column show the level of current EU minimum tax rates of the same products in €/Gj and €/ physical unit
- the tax rate on electricity is computed taking into account the CO₂ emissions of the electricity sector and the electricity production of the EU in 2000 (average fuel use of electricity production)
- the table shows that the current minimum rates of most energy products are significantly below the 10€/CO₂ level, which itself is somewhat below the current estimates of external costs related to CO₂ emissions
- transport fuels are an exception, minimum rates exceed by far the value of CO₂ externality
- increasing the EU minimum rates to this level would not have any dramatic economic impact in the revenue recycling case, according to model simulations, but would reduce CO₂ emissions at the EU level only 3.5% by 2010

Examples of practices in the Member States

- all the Nordic countries introduced a CO₂ tax in the context of the ecological tax reforms of the 90s
- the tax rates are made proportional to the carbon content of the product, but not all CO₂ emissions are taxed
- parallel to CO₂ taxes also energy taxes not dependent of CO₂ content are used
- electricity is taxed only upon delivery to the end user, fuels used for electricity production are exempted
- different schemes for alleviating the tax burden of industry (or energy-intensive industrial sectors) are used in all countries

Effective CO2 tax rates in the Nordic countries in 1999, €/ton of CO2

	Sweden	Norway	Finland	Denmark
Total	23	16	8	10
Households	43	17	46	23
All industries	17	15	6	7
Manufacturing	9	5	6	14
Wholesale and retail trade	43	11	14	42
Financial interm.	43	28	:	107

... Effective CO2 tax rates in the Nordic countries: comments

- the table is from Eurostat (2003) publication "Energy taxes in the Nordic countries – Does polluter pay?"
- effective tax rates are computed as CO2 tax revenues divided by CO2 emissions
- effective tax rates exceed significantly the level of EU minimum rates in all the four countries
- households pay the bulk of tax burden
- industries, in particular manufacturing, pay much less, and much less than their share of CO2 emissions (polluter does not pay)
- effective tax rates paid by industry reflect the fact that all the countries apply various schemes to alleviate the tax burden of industry for international competitiveness reasons
- → **for proper internationalisation of external costs more cooperation at the EU and wider international level is needed**