Recent developments in the use of environmental taxes in the European Union[1]

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1. Introduction

This paper presents recent developments in the use of environmental taxes in the EU.

Environmental taxes are major tools '… to get the prices right and to create market-based incentives for environmentally friendly economic behaviour…' (CEC, 1992). They help implement the Polluter Pays Principle and the User Pays Principle. Work on environmental taxes is continuing, in the Community as well as in the OECD[2].

The focus on environmental taxes is strengthening due to a number of trends. Firstly, the Kyoto GHG targets set for the EU and Member States are difficult to achieve without the help of additional instruments, including economic instruments, and carbon taxation can be an option. Secondly, the 'Cardiff-Gothenburg process' of monitoring progress towards integration of environmental requirements into sector policies includes the internalisation of external costs and the creation of 'fair and efficient prices' for which environmental taxes are a major instrument. Thirdly, the expected dispersal of traditional tax bases of capital, labour and consumption due to the increased mobility of production and to e-commerce increases the attraction of fixed and material factors such as energy, land and water as tax bases.

2. Recent developments in the use of green taxes

Member States are making increasing use of environmental taxes. The share of environmental taxes in total tax revenue is slowly growing, and evidence of the environmental effectiveness of green taxes is increasing. More data is needed for such evaluations, for which an 'in-built' evaluation framework can be a major tool. Despite progress made in Member States, in the past decade almost no progress has been made at EU level with adoption of environmental taxes. The adoption of the Eurovignette Directive, taking effect in July 2000, is an exception. The requirement of unanimity voting on fiscal matters is a major obstacle, and the idea of an 'Eco-Schengen' is gaining attention.

2.1. Increase in the use of environmental taxes

At the end of the 1990s the use of environmental taxes in Europe accelerated. Many countries have now introduced taxes on environmentally harmful products and activities, or have expanded and refined existing tax schemes with a view to improved environmental effectiveness. By 2001, most EU Member States (eight) will apply carbon taxes, up from only four in 1996. Nine Member States now

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[1] This is the summary of a draft report of which publication is expected later this year

[2] Two databases contain extensive information on market-based instruments: one by the Commission (http://europa.eu.int/comm/environment/enveco/database.htm) and one by OECD (http://www.oecd.org/env/policies/taxes/index.htm)

apply taxes on waste disposal, up from just two in the early 1990s. The number of product tax schemes is also increasing on products such as batteries, packaging and car tyres. Environmental taxes can provide multiple benefits such as economic incentives to reduce pollution and resource use, and revenues that can be used for fiscal reforms (e.g. lower labour taxes and social contributions) and for stimulating investment in the environment. Environmental taxes are one of the tools for integrating environmental requirements into sector policies.

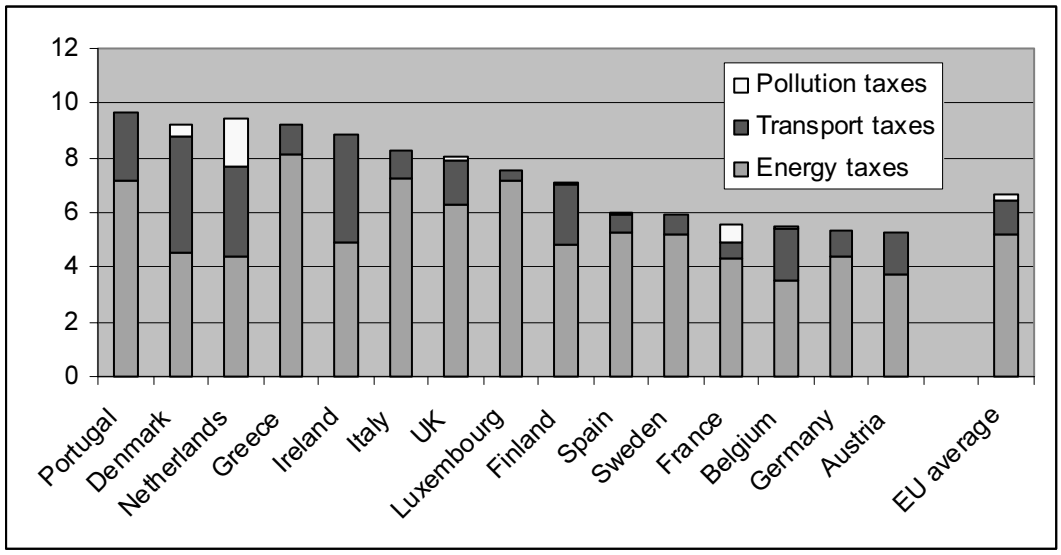
The share of environmental taxes (defined as taxes with a potentially positive environmental impact, hence comprising energy taxes, transport taxes and taxes on pollution and resources) in total revenue from taxes and social contributions in the EU is rising slowly though steadily through time[3]. This share was 5.84% in 1980, 6.17% in 1990 and 6.71% in 1997. Table 1 and Figure 1 present these shares in 1990 and 1997, and by Member State in 1997. Taxes directly on pollution and resources are modest if measured by their share in total environmental tax revenue, but this share is rising substantially through time. Table 1 shows a 50% increase in the share of pollution tax revenue in the period 1990-1997, against a 10% increase for energy taxes and a small decrease for transport taxes. The share of all environmental taxes grew by about 9%.

Table 1: Environmental tax revenue as % of total revenue from taxes and social contributions, 1990 and 1997 (EU15)

EU 15	1990	1997	change (%)
Energy taxes	4.71	5.18	10.1
Transport taxes	1.29	1.26	-2.2
Pollution taxes	0.16	0.25	50.8
Environment taxes	6.17	6.71	8.6

Source: Eurostat

Figure 1: Member States' environmental taxes as % of total revenues from taxes and social contributions, 1997



Source: Eurostat

[3] Rising environmental tax revenues does not automatically imply an increased use of this instrument. Changing revenues may stem from changes in the number of taxes, changes in tax rates or reductions and exemptions, changing pollution, or a combination of these three factors. However, without these taxes, pollution would have been higher than currently is the case.

2.2. New areas for environmental taxation are emerging

As much as 95% of environmental tax revenue in Europe comes from the energy and transport sector. Less than 5% of environmental tax revenue comes from taxes on other items such on emissions, chemical substances, products, waste and natural resources. However, the number of these environmental taxes is increasing and new tax bases are being explored. Examples of such tax bases include agricultural inputs (fertilisers and pesticides), chemicals such as solvents, PVC and phthalates, raw materials, (ground)water, land, aviation and tourism. This broadening of the environmental tax base reflects a widening of the 'polluter pays' principle to the more comprehensive 'user pays' principle, where users pay for ecological services and thus contribute to reductions in material inputs and improvements in eco-efficiency. Examples include taxes on abstraction of (ground)water in France, Germany and the Netherlands, and the tax on aggregates in Denmark.

2.3. Dynamic developments in large EU countries

The larger EU Member States (notably France, Germany, Italy and the United Kingdom) are now joining the ranks of other countries exploring and exploiting the potential of environmental taxation. Germany and Italy have introduced CO_2 taxes in the framework of ecological tax reform, and France and the UK are implementing this reform in 2001. As the emphasis is on taxing energy products, with a view to reducing CO_2 emissions under the Kyoto protocol, an increase in minimum energy tax rates is taking place in most EU Member States. This is happening despite the failure of attempts to implement the Monti Proposal (CEC, 1997) with its extension of minimum tax rates to all energy products (except renewable energy products) and its increase in minimum tax levels in three bi-annual steps. In addition, the planned gradual increase in tax rates over several years to increase predictability for liable parties, can be found for instance in the German and Italian fuel tax systems and was part of the UK's fuel duty 'escalator'.

2.4. Almost no progress at EU level

Despite various attempts in the 1990s to introduce a common CO_2/energy tax and to apply EU-wide minimum excise tax rates to all energy products, the need for unanimity in the Council on fiscal measures has hitherto frustrated such a harmonised approach. Recently, the Commission has proposed to introduce a kerosene tax on aviation (CEC, 2000). The Eurovignette Directive, which haulers must obtain in order to use the motorways of seven Member States (the three Benelux countries, Germany, Denmark, Sweden and Austria) which do not levy motorway tolls, takes effect from 1 July 2000. With EU enlargement, however, the unanimity requirement can be expected to become an even more serious obstacle to fiscal harmonisation. Meanwhile, the idea of energy tax harmonisation in a few EU countries only ('Eco-Schengen') is gaining attention.

2.5. Accession countries play a valuable role

Many countries in central and eastern Europe have several years' experience with elaborate systems of environmental taxes. These taxes, as well as many new taxes under consideration, are mainly designed to raise revenue for environmental investments, but in some schemes the incentive function dominates (e.g. reduced VAT rates for environmentally preferable products). Some of the existing taxes are under reform, with a view to improved effectiveness and efficiency, and to

future EU membership. The accession countries' experiences and plans with environmental taxation could be a valuable source of information and ideas for the present EU, and vice versa. For example, in the forestry sector in these countries, many taxes are applied, such as on wood production and on changing forestry land to other uses. The Czech Republic operates a tax for alternative use of forested land, which is levied on wood production. The tax is differentiated as to the type of forest, and is higher for 'protected' forests than for 'economic' forests.

3. Effectiveness of environmental taxes

3.1. Evidence of effectiveness is increasing

Most ex-post evaluations have been made in northern European Member States (notably in Denmark, Finland, the Netherlands and Sweden). The evidence indicates that many environmental taxes do have a positive influence on the environment. Water pollution taxes (e.g. in France, Germany, the Netherlands), the Swedish NO_x charge and the tax differentiation on leaded and unleaded petrol are well-known cases. More recent evaluations have shown that the Danish waste tax, the Danish, Finnish and Swedish CO_2 taxes, the UK fuel duty 'escalator' and the Danish tax on sulphur in fuels are producing positive environmental results. Table A.1 in the Annex gives examples of the available evidence of environmental effectiveness including cases in the accession countries. A study is currently underway for the European Commission to evaluate the economic and environmental effects of the use of environmental taxes in EU countries. The study will be ready by the end of the year and should provide new results.

In addition to making environmentally compatible behaviour financially attractive and/or raising revenue for environmental investments, environmental taxes also provide 'soft signals' that increase attention, awareness and concern about the environmental issue to which they relate. As these taxes are usually part of a policy package with several other instruments, it is often difficult to disentangle the contribution of each instrument to the overall environmental results. Accurate and sufficient data are also often lacking. The evaluation of policy instrument effectiveness could be facilitated if the introduction of an instrument were accompanied by an 'in-built' evaluation framework (as recommended by the OECD, 1997) in which an evaluation procedure runs alongside the instrument's design and implementation.

3.2. Combined measures and policy packages may be helpful

In theory environmental taxes can, in a perfect market, achieve any environmental target on their own if designed appropriately and if the tax rate is sufficiently high. In practice, high tax rates are politically not always feasible and an optimal tax design may be too costly. Environmental taxes generally have a lower than environmentally optimal rate and are commonly used in combination with other instruments and measures. These may enhance the effectiveness or reduce unwanted side-effects of the tax. In particular, possible negative impacts on industry's competitiveness are usually mitigated by tax-rate reductions or exemptions, or by recycling revenues, in combination with instruments such as voluntary agreements and subsidies that may stimulate industry to achieve the stated environmental objectives. The Danish CO_2 tax system offers a significantly

reduced tax rate for firms that agree to energy-conservation measures. The UK plans to create a similar provision in the climate-change levy.

3.3. Ecological tax reforms serve multiple objectives

A majority of Member States (currently Denmark, Finland, France, Germany, Italy, the Netherlands, Sweden and the UK) introduce (or increase) environmental taxes as part of a wider fiscal reform, encompassing measures such as reductions in direct (labour) taxes and/or in social security contributions. Such comprehensive reforms aim at the simultaneous realisation of environmental and other objectives. In particular, shifting the tax burden from labour to environment and resources may contribute to (but not guarantee) an increase in employment alongside environmental improvements (the 'double dividend' argument).

Table 2 shows that over time and in particular in the 1990s, the share of environmental taxes has indeed been growing faster than the share of taxes on capital, labour and consumption. (Figure 2 gives the complete indexed time series for the period 1980-1997 in a graph). Other objectives to which these 'Ecological Tax Reforms' might contribute include innovation and competitiveness. The feasibility of achieving these multiple objectives appears to depend on various factors, including the initial market situation, existing tax distortions, and the design and details of the tax reform.

Table 2: Tax revenue according to economic factors as % of GDP, 1990 and 1997

EU15	1990	1997	change
Capital	7.2	7.5	3.6%
Consumption	10.9	11.4	4.0%
Labour	22.3	23.5	5.3%
Environment	2.5	2.9	13.7%

Source: Eurostat

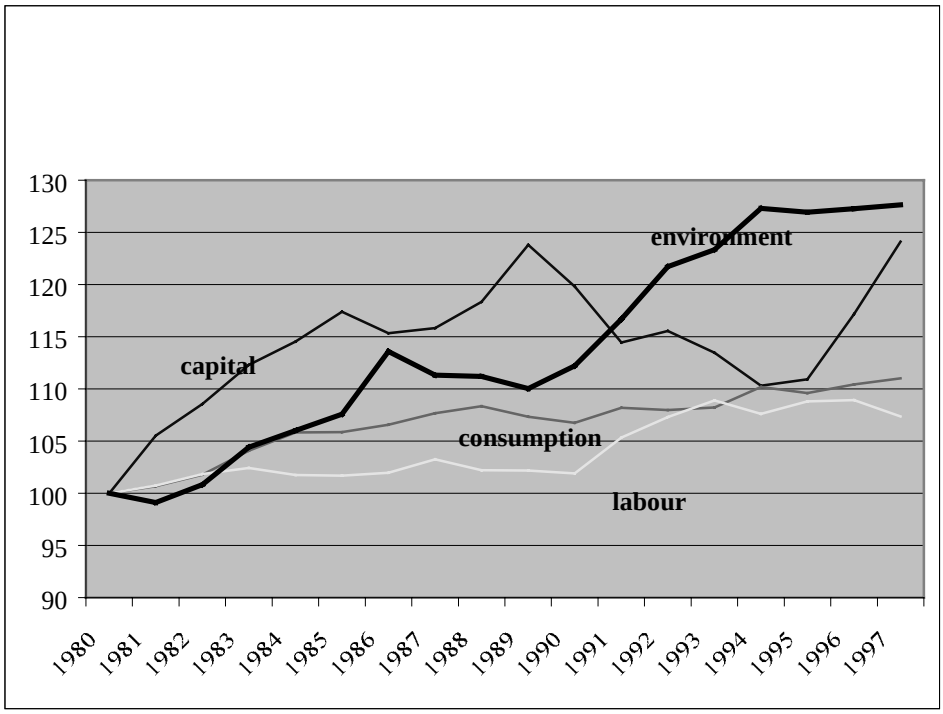


Figure 2: Tax revenue from main economic factors as share of GDP, EU15, index 1980=100

Source: Eurostat

4. Taxes and the integration of environment into sector policies

Quantification of environmental externalities, and the realisation of 'fair and efficient pricing' via relevant taxes, are two of the EEA's criteria for monitoring progress towards the integration of environmental policies into sectoral policies and strategies. Although most environmental tax revenue comes from energy and transport taxes, progress with the internalisation of external costs is variable across Member States but generally is not great. Preliminary attempts to assess the extent of integration have been made for the 'Cardiff' sectors: transport, energy and agriculture (EEA, 1999)

4.1. Energy

About 75% of environmental tax revenue comes from taxes on energy products. Such taxes generally consist of fiscally motivated excise duties and – in an increasing number of Member States – environmental taxes, which are sometimes based on carbon content. Energy taxes include taxes on the final use of energy by agriculture, industry, services, transport and households, as well as on energy used for electricity generation. These taxes improve the incentive to save energy and to develop more energy-efficient technology. However, at current rates, and with economically motivated exemptions for energy-intensive industry, the short-term impact of energy taxes on energy use is usually limited. They have a more pronounced short-term impact on substitution between energy types, as tax rates are often differentiated according to carbon or sulphur content. Tax differentiation schemes with proven short-term effectiveness include those for unleaded petrol and low-sulphur fuels.

4.2. Transport

Almost 20% of environmental tax revenues in the EU are related to transport (excluding transport fuels). They include, among others, car registration taxes and annual car taxes. Although these taxes may influence car *ownership*, there is hardly any evidence that they lead to a lower aggregate level of car *use*. Their main (short-term) environmental impact is possibly through tax-rate differentiation by, for example, emission characteristics (as in Austria and Germany) or by weight (influencing energy use, as applied in many countries). The environmental externalities of transport are estimated at approximately 4% of EU GDP (INFRAS/IWWW, 2000), of which only a small proportion is captured by relevant transport taxes. Taxes on air transport are almost non-existent in Europe. However, several studies clearly show that international agreements do not prevent aviation taxation, provided the taxes are based not on the energy used but on the calculated emissions of the aircraft. Recently, the European Commission expressed its intention to introduce such a tax at EU level (CEC, 2000).

4.3. Agriculture

There is no similar quantification of *negative* environmental externalities for agriculture as there is for transport and energy, though a preliminary estimation indicates considerable costs due to pesticides and fertiliser use, and biodiversity loss (EEA, 1999). Apart from some pesticides and fertiliser taxes there are few examples of taxes being used to internalise these costs. Similarly, the *positive externalities* from agriculture, such as carbon sequestration and maintenance of biodiversity, have not been quantified but are sufficiently large to justify their internalisation via appropriate subsidies such as the agro-environment measures of the CAP.

5. Barriers to the introduction of environmental taxes can be overcome

Despite the strong theoretical arguments in favour of environmental taxes and the available evidence of their effectiveness, reluctance to expand their application is still widespread. Concern about possible negative effects on competitiveness, employment, inflation, and/or income distribution is often a major reason for this restraint.

However, experience shows that a careful design, introduction and implementation of environmental taxes can overcome these barriers. Complementary measures such as tax-rate reductions for liable parties that agree to improve their environmental behaviour may reduce or neutralise possible unwanted side-effects and thus ease opposition to the taxes. Such measures could include the use of environmental taxes and their revenue as part of policy packages and ecological tax reforms, including reductions in taxes on labour and social contributions, and a clear presentation of the tax as an opportunity for firms and households to save money by changing their behaviour in an environmentally compatible direction.

Also, tax harmonisation at EU level may lower barriers to implementation since it may limit differences in competitiveness of individual Member States. However, the requirement of unanimity voting on fiscal measures at EU level is a barrier to

such harmonisation. Concerns about equity can be addressed by tax design, such as exemptions on initial consumption of energy, water etc., progressive tax rates on increasing consumption, or by complementary measures such as energy-efficiency incentives. Modification of EU state-aid rules, for instance to facilitate tax exemptions for firms that take action beyond what is required by environmental law, could also help to remove barriers.

References

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Annex

This table gives some information on evidence of the environmental effectiveness of environmental taxes. Work is ongoing in this field (e.g. the Commission's study of the economic and environmental effects of the use of environmental taxes in EU Member States). The EEA will publish a report in autumn 2000 providing an update of information on the use of environmental taxes and of their environmental effectiveness.

Table A.1: Some environmental taxes in Europe and their effectiveness

Tax on	Applied in	Evidence on effectiveness
motor fuels	all European countries	some impact reported on vehicle fuel consumption (e.g. in case of UK Fuel Duty Escalator) main short-term impact is substitution in response to tax differentiation (e.g. lower rates for unleaded petrol and low-sulphur fuels, e.g. in Denmark)
other energy use (including carbon and sulphur taxes)	many European countries	clear energy-efficiency improvements and fuel substitution observed in countries with highest tax rates (e.g. Denmark, Finland, Sweden) rate differentiation (e.g. by sulphur content) leads to rapid substitution processes
motor vehicle registration or sale	most European countries	some evidence of downward impact on car ownership; main impact when differentiated by environmental classification (emissions and energy use) and in cases where revenues are used to finance car scrapping (premiums)
motor vehicle ownership/use (annual taxes, incl. Eurovignette)	most European countries	main impact when differentiated by environmental classification (emissions and/or energy use)
motor vehicle use (road pricing, tolls etc.)	several European countries	usually applied as a cost-covering charge; evidence on effectiveness as an environmental policy instrument is still lacking
industrial emissions to air and water (measured)	several European countries	clear incentive effect in a limited number of cases (e.g. Swedish NO_x charge; Dutch , French, German water pollution taxes); elsewhere main effectiveness through recycling of revenues to environmental investments (e.g. France, several accession countries)
agricultural inputs (fertilisers, pesticides)	BE, DK, NO, SE AT, FI (abolished)	limited direct impact (as a price incentive) on use; 'soft signals' (awareness raising) possibly more important (e.g. when revenues used for financing training programme – Sweden)
'one-way' packaging and other disposables	BE, DK, EE, FI, HU, LV, NO, PL DE (local level; abolished)	local taxes in Germany reported to be effective, but withdrawn for legal reasons; positive impact on re-introduction of deposit-refund systems observed in Estonia
chemical substances (e.g. solvents, CFCs)	BE, CH, CZ, DK, HU, IS, SK	contribution to reduction in CFC use reported in Denmark
batteries and accumulators	BE, DK, HU, LV, SE	mainly instrumental in stimulating collection of spent batteries
car tyres	DK, HU, LV	revenues used for financing treatment of spent tyres
water abstraction	several European countries	decrease in industrial groundwater use observed in the Netherlands after introduction of tax
waste (apart from cost-covering charges)	DK, EE, FI, IT, NL, NO, SE, GB	effective in several cases (e.g. Danish waste tax) on recycling, waste reduction, and shift from landfilling to incineration, reuse and recycling