



Three broad categories of environmental policy instrument have evolved over the past two decades:

regulatory instruments, whereby public authorities mandate the environmental performance to be achieved, or the technologies to be used, by firms;

economic instruments, whereby firms or consumers are given financial incentives to reduce environmental damage;

voluntary approaches, whereby firms make commitments to improve their environmental performance beyond what the law strictly demands.

These categories are not mutually exclusive, in that some policy instruments exhibit characteristics from more than one of the categories, but they provide a useful general classification.

The Research Network on Market-Based Instruments for Sustainable Development was a Concerted Action involving thirteen European research institutes funded by the European Commission's DGXII under its Environment and Climate RTD programme. The Network is largely concerned with economic instruments and voluntary approaches, which are here collectively referred to as 'market-based instruments'. The series of policy briefings reflects the results of workshops organised by the Network on the following topics:

1. Voluntary approaches
2. Emissions trading
3. Environmental policy targets and non-market valuation
4. Green tax commissions
5. **Institutional aspects of market-based instruments**
6. Environmental policy and competitiveness
7. Environmental implications of market-based policy instruments
8. Market-based instruments and international trade

Summary

“Market-based instruments, such as taxes, charges and tradeable emission permits, have in the past decade become more frequently applied for environmental protection purposes. Their introduction has rarely gone unnoticed, as dispute has shifted from the ends to the means of environmental policy. Considerable expectations have been attached to their ability to assure effective and efficient environmental policy, but what are the chances that market-based instruments characterised by exemptions, earmarking and moderate rates actually can deliver what environmental economics stipulates? The institutional aspects of market-based instruments address the contextual issues pertinent to the succesful use and application of market-based instruments.”

Box 1:

Source: (Majone, 1989)

“In constructing a theory it may be proper to disregard the institutional context in order to facilitate understanding of how an instrument would perform in an idealized situation. Formal theories of economic or environmental policy usually proceed in this fashion. But practical problems are always related to particular contexts and must be met by actions taken in certain specified situations. Unlike theorists, analysts are not free to make simplifying assumptions but must consider how policy instruments are effectively constrained by political, administrative and other institutional factors - and by people's attempts to manipulate these factors in their favour.”

1. Definitions and Descriptions

Market-based instruments can be defined as proxies for market signals in the form of changes to relative prices and/or a financial transfer.

Market-based instruments are aiming at:

- forcing producers and consumers to take account of the implications for the environment of their action,
- leaving them the freedom to choose and adapt their activities,
- enabling them to apply least-cost solutions,
- creating a dynamic which encourages the search for and application of better and cheaper means of maintaining and improving environmental quality,

Types of market-based instruments:

- user charges
- emissions charges or taxes,
- deposit-refund systems
- subsidies
- emission reduction credits
- tradeable permits



Box 2:

European Commission, February 1997, COM(97)9.

“The use of environmental taxes and charges is rapidly increasing in the Member States, in line with the 5th Environmental Action Programme and its recent review. The Commission supports this evolution, as it opens up the scope for a more cost-effective environmental policy”



2. Background

“Much of the original debate on economic instruments remained too remote from the realities of the economic process and the policy arena” (OECD 1994: 35).



The use of market-based instruments for environmental policy has been developed from the theories and principles of environmental economics. This discipline is rooted in neoclassical economics, with its rather strict assumptions regarding the criteria for pareto-optimal solutions. The economic theory presents the use of economic instruments for environmental policy in an ideal but also quite partial analysis. Market-based instruments are implicitly treated as complete substitutes for command-and-control regulations, despite the fact that economic instruments often have to co-exist with a complex body of traditional regulations.

According to Baumol and Oates (1988), the authors of what has now become the standard work on environmental economics:

“The formal analysis confirms that in a competitive setting the solution to our problem requires only a single policy measure: a Pigouvian tax (or effluent fee) on emitters equal to marginal social damage. More precisely, the environmental authority should levy a fee per unit of smoke emissions equal to the marginal damages (to residents and other firms).”

While strict assumptions are ideal for the science of economics and have helped achieve substantial insights into the application of economic instruments for environmental policy, many questions remain unanswered for those who wish to understand how market based instruments can work as a stimulus in a somewhat more complex setting of regulations and institutions.

Research on the institutional aspects of market-based instruments addresses concerns such as:

- Why is the design of market based instruments often sub-optimal ?
- Why are market-based instruments more likely to be adopted under some political and regulatory systems than in others ?
- How do market-based instruments interact with other types of policy frameworks, such as hierarchies, standards and planning procedures ?
- What role do transaction costs play in shaping a rational response, among firms and other target groups, to the incentives from market-based instruments ?

3. Experience

Policy-makers are rational in a different way than economists. There is not one unitary governmental actor which collects information, performs analysis and imposes the proper level of taxes or charges. Rather a whole range of actors are involved in policy-making, including interest groups, bureaucratic actors as well as the formal decision-makers. As these groups of actors have different perceptions of the costs and benefits related to instrument choice, it is generally difficult to reach consensus on what constitutes the optimal solution. Each actor seeks to optimise his own utility, and actors that are likely to be impacted by economic incentives will seek to avoid or diminish the expected costs during the decision-making process. Elected policy-makers are vote-maximisers and will seek solutions that satisfy as many interests as possible, without sacrificing their general intention to do something for the environment, e.g. by introducing an environmental tax or charge.

As a result market-based instruments are difficult to introduce and many of the market-based instruments that have been introduced are sub-optimal from an economic perspective. This does not imply that they are unable to yield environmental and economic effects, but only that these effects are less than optimal.



Box 3: Sub-optimal design of market-based instruments

Source: Bressers and Huitema (1997).

1. Too low stimuli. The level of the tax or charge is not high enough to accurately reflect external costs.
2. Slow development to full-fledged stimulus. It often takes a long time before a tax or charge reaches a level sufficient to make an appreciable impact. Its incentive effects are often impeded by other regulations, which only gradually are lifted.
3. Earmarking of the revenues from charges and taxes. To make charges and taxes politically acceptable the revenue is often earmarked for specific purposes and groups.
4. Allocation of valuable permits free of charge. To avoid the negative allocation effects to polluters of tradeable permits, these are minimized at the expense of the cost-effectiveness or fairness of the instrument.
5. Limiting or supplementing direct regulation. Charges do not replace regulations, but supplement them. Regulations are kept in place as a 'safety net', e.g. due to the distrust of some groups in regard to the effects of market-based instruments.
6. Full or partial exemptions limit the impact. The competitiveness argument is often used to obtain exemptions from market-based instruments - and these exemptions are often provided for the largest polluters.
7. Sub-optimal scale and level. Existing market-based instruments have been introduced where support could be found, but not necessarily directed towards the most pressing problems where cost-effectiveness is required, which generally is at the global level rather than the local.

“ex post analysis of the performance of economic instruments in environmental policy is able to provide more firmly-based evidence about key responses affecting the environmental and economic effectiveness of economic instruments than can be obtained on the basis of considering theoretical arguments or ex ante forecasts”
(OECD 1994: 35).

French experience: Packaging	Source: Godard (1997)
In 1992 the French government introduced a new regulation on packaging, intended to promote recycling, while the use of landfills and even incinerators would be phased out - except for materials that could not be reused. The private organisation Eco-emballage was established, and it was to organise recycling on the basis of general packaging-fees - similar to the German 'green-dot' system. However, as responsibility for waste management according to older laws rests with the French municipalities, Eco-emballage needed to contract with these in order to have packaging waste collected. Eco-emballage offers subsidies to the municipalities for systems to collect packaging materials for recycling. So far the municipalities have been reluctant to enter into such contracts and in 1996 only municipalities covering about 1/3 of the population had agreed to contracts. One reason for the reluctance is that the subsidies are not sufficient to cover the additional costs of recycling. The basic packaging-fees have been set at a level too low to provide the necessary finances. The reason for the low rate of the packaging fee seems to be the close involvement of packaging and materials industry in the drafting of the law. Paradoxically, funds have been accumulating under Eco-emballage until now. Other problems relate to the undifferentiated rates offered for different types of materials. The ambitious target of 75 per cent recycling of packaging waste is likely to be undermined by increased incineration.	

Scandinavian experience: Taxes on fertilizers & nutrients

Source: Daugbjerg (1997)

The political systems of the Scandinavian countries resemble each other, and these countries have been particularly active in introducing market based instruments in their environmental policies. Still, there are also considerable differences as to the use of such instruments. While Sweden and Norway had already introduced fertilizer taxes in the 1980's, this instrument has not been introduced in Denmark.

Differences in the way that interest groups have been involved in agricultural policy-making have affected decisions on fertilizer taxes. While Denmark has had a closed and cohesive policy network, comprising only the agricultural organisation and the agricultural ministry, consumer interests were also part of the agricultural policy networks in Sweden and Norway since the 1960's. In Sweden and Norway consumer interests took part in price negotiations regarding the support for agriculture. When nitrate pollution reached the agenda, the Ministries took an independent position from agricultural organisations and supported such taxes. In Denmark the Agricultural Ministry sided with the agricultural organisations in refusing proposals for a fertilizer tax.



Japanese experience: The SO₂-tax	Source: Ueta and Matsuno (1997)
Japan introduced a tax on SO₂-pollution from stationary sources in 1974. The purpose of the tax was primarily to raise funds for the thousands of pollution victims that had been recognized after the famous pollution trials in the 1960's. The tax also took on a regulatory function, as emitters responded to the tax by cutting emissions. Japan became a leader in the development of scrubber technologies, and could export these to Europe when acid rain was recognized as a problem in the 1980's. Recent research by Japanese environmental economists has shown that the big power plants reduced pollution below the economically efficient level, given the level of the charge, in part as a consequence of the agreements entered between these big emitters and the government, but could also reflect risk-averse behaviour on the part of these plants. Smaller and middle-sized companies tended to reduce pollution more in accordance with what was economically efficient	



Danish experience: The national waste tax	Source: Anderson (1997)
The Danish tax on solid waste was introduced in 1987, originally at a rate of 40 kroner/ton, but from 1997 the tax rate for landfills was raised to 335 kroner/ton - or almost ten times the initial level. It is a national tax imposed on waste delivered at landfills and incinerators. The Danish Environmental Protection Agency initiated an official review of the function of the tax which was published in late 1997. From 1987 to 1996 the amount of waste delivered to landfills and incinerators declined by 26 per cent, while at the same time recycling increased, comprised mainly of heavy waste such as building waste and garden waste; efforts driven by guidelines for glass and paper recycling were less succesful, a finding that confirms the central role of the tax. While the municipalities and the construction sector responded to the tax, few responses were detected at private manufacturing companies. Here waste costs remained too marginal to be of concern, and only a few companies had analysed their waste management costs. The Danish waste tax is a fiscal tax, and was increased as a component of Denmark's green tax reform in 1993 which shifted taxation from income towards pollution and energy consumption. The main problem with the tax is that it is weight-based, while many transactions in the waste sector are volume-based, something that distorts the price-signal. Experiences from authorities with weight-based tariffs show a greater response to the tax, than in the case of authorities with traditional volume-based tariffs.	

5. Analysis

Sub-optimal market based instruments - what is the problem ?

Although, as applied most market-based instruments have not been optimal in the strict sense, they have in most of the cases analyzed (see European Environment Agency, 1996) helped achieve substantial environmental improvements at lower social costs than similar command-and-control regulations would have been able to do. In a comparative study of water policies in four European countries the cost-savings of the Dutch water quality policy from 1970-1990, based on effluent charges, were assessed to be 1:4 compared with the water quality policy in Denmark, which was based on planning and standards (Andersen, 1994). These savings were achieved despite the charges being quite moderate and earmarked for investments to reduce effluents. The earmarking of revenue seemed in this case to compensate for the moderate level of the charges.

The problem of sub-optimality represents a loss which could be converted into a more efficient solution, if decision-makers were to be less receptive to the complaints of affected interests. The problem is the basic asymmetry between the different types of interests involved in the decision-making process. While those who will become subject to a tax or a charge have a strong incentive to mobilise for a loud-voiced opposition, those who will benefit from the policy will only have a more general and diffuse interest as taxpayers in its efficiency, and will not be strongly motivated to participate in the deliberations. For this reason opponents of market-based instruments are likely to be much more vociferous than the beneficiaries of such a policy. In addition environmental organisations tend to view market-based instruments with scepticism, and as a means to 'allow pollution for payment', so that there are few advocates in favour of such instruments to counterbalance the lobbying of overtly affected interests.

Why market-based instruments are more likely to be adopted under some political and regulatory systems than under others.

Market-based instruments have become frequently applied in countries such as Belgium, Denmark, Finland, The Netherlands, Sweden and Norway. They are less frequently applied in countries such as Germany, France and UK, and are hardly applied at all in southern European countries. Command-and control regulations remain the most frequently used policy instruments in most countries.

The relatively high tax pressures in the Nordic countries have made green taxes a feasible alternative to income taxes, and as such, green taxes enjoy considerable public support. This is partly because most voters do not see themselves as 'polluters', although in fact ordinary households are taxed for their energy and water use. In Denmark and Norway green taxes contribute more than 10 per cent of the revenue for the state budget. The tax shift from income taxation to green taxes reduces the pressure on salaries and improves the overall competitiveness of the Nordic economies. As the difference between the tax pressure in the Nordic countries and the rest of Europe has diminished in recent years, other countries may follow the Nordic path.



Another essential factor which explains differences in the adoption of market based instruments relates to policy style. The mechanisms for achieving consensus between the government and organised interests are well-developed and cultivated in the corporatist societies in Benelux and Scandinavia, and influence the viability of innovative policy instruments. In Germany the tradition for command-and-control regulation and a public administration dominated by lawyers has created a natural bias against market-based instruments. The US policy style is more favourable to emission trading than to taxes and charges. The French policy style, with its emphasis on the role of the state, is more likely to accommodate the use of fiscal taxes and charges.

Market-based instruments are used perhaps most prominently in Central- and Eastern Europe, where they have supplanted traditional planning and regulation oriented approaches. They play a vital role in providing finances for environmental protection through special funds, such as the Polish National Fund for Environmental Protection. Despite difficult pollution problems environmental investments are now relatively high in Poland, and reached 8-9 per cent of industrial investments in recent years. Earmarked charges are also a vital source for environmental financing in other central and east european countries, such as the Czech Republic, Hungary and Estonia.

The interaction of market-based instruments with other types of policy instruments, such as hierarchies, standards and planning procedures.

In the political system bargains and compromises are institutionalised in specific structures of administration and management, as well as in terms of certain resource allocations. Political actors face high transaction costs if they try to reach agreement not only on specific policies or instruments but also on changes in the broader institutional set-up. The desired incentives to be provided by market-based instruments can hence be obscured by institutional impediments which filter or disturb the desired price signal.

Institutions may influence the design of an economic incentive and the way it is combined with other policy instruments and administrative arrangements. Standard-operating procedures for policy-making may lead policy-makers to prefer certain designs of environmental policy which are in accordance with previous choices. Secondly, institutions may affect the operation of economic instruments, i.e. by providing a grid that limits the options available to the target groups.

The fundamental patterns of regulation are quite different within different sectors (agriculture, energy, waste etc.), and are often not reflected in the process where economic instruments are designed. The transaction costs of redesigning existing administrative arrangements, changing or removing well-established subsidies, or reconsidering possible impacts of legislation in other sectors in order to introduce an economic incentive, will often be perceived to exceed the expected benefits, and such potential changes are therefore often ignored. Economic instruments are therefore often applied, at the margin of existing regulatory arrangements. When in operation, the expected incentive from the economic instrument and the accruing internalisation of externalities in transactions, will have to work within the context provided by the more or less unaltered institutional arrangements.

5. Recommendations

Market-based instruments are most likely to be successful when:

- decision-makers are aware of the lobbying asymmetry between polluters and tax-payers, so that exemptions and design sub-optimalities can be avoided as far as possible,
- broad public support for market-based instruments is created by lowering income taxes or social contributions where such instruments are introduced,
- a dialogue takes place not only between the government and the affected target groups, but also involving consumer and environmental groups,
- existing regulations and procedures are carefully considered, and possible institutional impediments to the price incentives from market-based instruments are removed or softened,
- if the rates of taxes or charges are too low to provide adequate incentives for polluters, the revenue could be ear-marked to support polluters' technical adaptation
- learning and evaluation mechanisms are built into the introduction of market-based instruments, allowing for systematic review and improvement

“There are, you will recall, two certainties in life: death and taxes. Before we die, then, let us at least make the taxes we have better taxes. Systems developed without regard for the environment must be made “greener”. The Treaty requires it, and public opinion is behind it. I really don't mean more taxes, I mean more useful taxes.”

Institutional aspects of Market-based Instruments

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The European Union Research Network on Market-based Instruments for Sustainable Development.

The European Commission (Directorate XII), as part of its Environment and Climate RTD programme, “Human Dimensions of Environmental Change”, provided financial support for a network of research institutes devoted to the study of the design and use of market-based instruments for sustainable development. A series of workshops were held, where the latest research on particular market-based instrument or related theme was presented and discussed by leading scholars and policy practitioners. One of the products of each workshop has been the synthesis of the findings into a research policy brief.

The network was co-ordinated by Frank J. Convery and managed by Sheenagh Rooney, Environmental Institute, University College, Dublin. Web Page address for further information: <http://www.ucd.ie/~envinst/index.html>

Author and Editor

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The draft has been edited by the series editor, Frank J. Convery, Department of Environmental Studies, University College, Dublin, to ensure consistency in style and content with the series objectives. The series are produced to bring insights from the latest research and experience to those in the policy process.

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