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ECONOMIC INSTRUMENTS
IN ENVIRONMENTAL POLICY:
LESSONS FROM THE OECD EXPERIENCE
AND THEIR RELEVANCE
TO DEVELOPING ECONOMIES

by

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RÉSUMÉ

Ces dernières années, on a pu constater une diffusion rapide des instruments économiques (IEs) dans les politiques environnementales des pays Membres de l'OCDE. L'application des IEs a été mieux acceptée politiquement et, très souvent, leurs effets se sont révélés plus incitatifs que générateurs de revenus. En Suède, l'introduction des taxes écologiques a fait partie de la réforme fiscale générale alors que dans d'autres pays, l'approche s'effectue surtout au cas par cas.

Les pays en développement peuvent tirer profit des expériences des pays Membres de l'OCDE avec les IEs, mais ils sont souvent confrontés à des défis ainsi qu'à des opportunités exceptionnels pour l'application de ces instruments. Historiquement, dans de telles économies, les prix des ressources naturelles et certains autres prix ont subi des distorsions et le rééquilibrage de ces distorsions est une des conditions préalables à l'utilisation efficace des IEs. Il faut également noter que les marchés sous-développés, les entreprises publiques ayant des contraintes budgétaires peu rigoureuses et des taux d'inflation élevés peuvent saper les effets d'incitation des IEs. Un fonctionnement satisfaisant des IEs exige : des droits de propriété bien définis et appliqués, une administration fiscale compétente et une acceptation politique générale du principe pollueur-payeur. Les économies en développement qui sont actuellement en phase de réforme structurelle devraient saisir l'opportunité d'introduire les IEs à un stage précoce de cette réforme ; cela favoriserait un alignement harmonieux entre les politiques économiques et environnementales.

L'utilisation des instruments économiques (IEs) doit être échelonnée dans le temps selon l'évolution de la capacité d'application des gouvernements. Un ensemble de taxes appliqué de manière graduelle pourrait se présenter ainsi : suppression des distorsions de prix et des subventions préjudiciables à l'environnement ; identification et suppression des taxes et abattements préjudiciables à l'environnement ; examen des taxes existantes susceptibles d'être adaptées pour remédier aux problèmes d'environnement ; création de nouvelles taxes écologiques en réduisant par exemple d'autres taxes. Pendant une période de transition, le financement destiné aux améliorations de l'environnement pourrait être consolidé plus facilement si les revenus provenant des taxes et redevances sur l'environnement étaient affectés aux équipements de contrôle de la pollution, aux systèmes de contrôle et d'application des normes et enfin, aux budgets de recherche et développement consacrés aux technologies propres.

SUMMARY

In recent years, there has been a rapid spread of economic instruments (EIs) in environmental policies of OECD Member countries. The application of EIs has gained wider political acceptability and, in a growing number of cases, they have come to have incentive rather than merely revenue-raising effects. In Sweden, eco-taxes have been introduced as part of a broad fiscal reform, while in other countries the approach is more piecemeal. Virtually without exception, EIs are employed in combination with regulations and other policy instruments.

Developing countries stand to learn from the OECD experience with EIs, but they often face unique challenges as well as opportunities in applying such instruments. Resource and other prices have historically been distorted in such economies, so correcting such distortions is a prerequisite to the effective use of EIs. Also, underdeveloped markets, public enterprises with soft budget constraints, and

high rates of inflation can all undermine the incentive effect of EIs. Requirements for the proper functioning of EIs include: well-defined and enforced property rights, an effective fiscal administration, and broad political acceptance of the polluter-pays-principle. Developing economies undergoing structural reforms should seize the opportunity to introduce EIs at an early date; this should permit a close alignment between environmental and economic policies.

Economic instruments (EIs) need to be phased in over time as the implementation capacity of the government evolves. A time-phased "tax package" might be as follows: removing environmentally damaging subsidies and price distortions; identifying and removing environmentally damaging taxes or exemptions; examining how existing taxes may be adapted to address environmental problems; developing new eco-taxes, possibly while reducing other taxes. During a transitional period, financing for environmental improvements may be secured most easily through earmarking of environmental tax/charge revenues for specific investments in pollution control equipment, monitoring and enforcement, and research and development of cleaner technologies.

PREFACE

There is a growing interest among developing economies — notably the dynamic non-Member economies of Asia and Latin America — to learn from the rapidly accumulating OECD experience with the use of economic instruments (EIs) in environmental policy. This paper, which draws upon substantial ongoing work at the Environment Directorate, provides some of the major lessons in a form readily accessible to developing country policy makers. It also highlights some of the specific challenges associated with applying EIs in a developing country context.

The paper was originally presented at a Workshop held by the Development Centre in Hanoi, Vietnam, from 8 to 10 September 1993. That Workshop was intended to share with Vietnamese policy makers the findings of the Centre's research project on "Managing the Environment with Rapid Industrialisation: Lessons from the East Asian Experience" and represents an early example of a new thrust toward more active dissemination of the Centre's policy relevant research findings in developing countries. The Workshop was an instance of horizontal cooperation within the Organisation, as both the Environment Directorate and the Development Co-operation Directorate played an active role alongside the Development Centre.

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INTRODUCTION

The evolution of environmental policies since the early 1970s in OECD countries has been characterised by two main features. First, the development of a number of “principles” designed to base these policies on firm and internationally recognised grounds; the “Polluter pays principle” is the most important one. Second, the development and deployment of so called “policy instruments” designed to implement and enforce environmental policies.

I. THE POLLUTER-PAYS-PRINCIPLE (PPP)

The PPP was first defined and recognised as an internationally agreed principle by the Organisation for Economic Cooperation and Development (OECD) in 1972 and defined as a principle whereby "the polluter should bear the expenses of carrying out the [pollution prevention and control] measures decided by public authorities to ensure that the environment is in an acceptable state. In other words, the cost of these measures should be reflected in the cost of goods and services which cause pollution in production and/or consumption. Such measures should not be accompanied by subsidies that would create significant distortions in international trade and investment"¹.

In 1975 the European Community also defined the PPP as the basic principle for its environmental policy².

This definition highlights two key characteristics of the PPP: it is (i) a cost internalisation principle and (ii) an international principle.

A cost internalisation principle

First and foremost, the PPP is a pure product of welfare economics which implies that the cost of marketed goods and services should reflect their full social cost, i.e, production and environmental cost. The fact that an industry discharges polluting substances into the environment means that environmental resources are used as a production input or factor. As long as these environmental resources are not properly priced, they are wasted and devastated.

The absence of pricing of environmental resources is, in economic terms, the very root of environmental pollution and depletion: so-called "external costs" must be "internalised".

The PPP essentially means that this internalisation must be achieved at the polluter level. In other words, the primary purpose of the PPP is to inject into the economic system *price signals* reflecting the "cost" of the environment: if an economic activity causes environmental costs, these must be taken into account (internalised) by the polluter³.

Note that the PPP is not the only cost internalisation principle: polluters could be *subsidised* for pollution control measures; in such case, environmental costs would be paid by tax payers, i.e, the collectivity; one can also conceive a system whereby pollution "victims" would make direct payments to polluters in order not to be polluted. In both cases costs are internalised, but not at the level of the polluter; this form of internalisation is often referred to as the "victim-pays-principle".

An international principle

An important reason why the PPP was formulated and accepted at the international level is the need to ensure that environmental policies in different countries are based on a common cost allocation principle. Suppose that in country A polluters are subsidised, while in country B the PPP is applied; clearly, in country A, as polluting industries would have lower production costs, they would enjoy a competitive advantage. This is why the OECD Recommendation on the PPP stipulates that one purpose of the PPP is "to avoid distortions in international trade and investment" and that pollution prevention and control measures "should not be accompanied by subsidies that would create significant distortions in international trade and investment⁴." In fact, the PPP can be defined as a *non subsidy principle*.

It is of course difficult to imagine policies where subsidies would not exist at all. In particular, when new environmental regulations are imposed, when urgent action is required or when the backlog of pollution must be cleaned up, financial assistance may be required to help polluters to comply promptly and without economic dislocation.

This must be particularly true for developing countries and during the transition to a market economy.⁵

The PPP is only a principle. To implement it, policy instruments are needed. These include regulations and standards, and economic instruments.

II. REGULATIONS AND STANDARDS

2.1. Background and definition

When environmental policies were adopted in the late 1960s and early 1970s in industrialised countries, the authorities turned largely to regulatory controls, either by creating new regulations or by adapting existing ones.

This approach was often opposed to the so-called “*economic approach*” advocating the use of “*economic instruments*” such as taxes, charges and marketable permits (see below). The regulatory, or “command and control (CAC)”, approach remains the most commonly used in environmental policy even though the economic approach is becoming increasingly important.

The CAC approach consists in the promulgation and enforcement of laws and regulations prescribing objectives, standards and technologies polluters must comply with — for instance, laws on water and air pollution and waste disposal. Generally, within the framework of such laws, polluters are prescribed specific rules, usually in the form of *standards*. There are four categories of standards:

- (i) *Ambient quality standards* specify the characteristics of the receiving (ambient) environment, e.g. the maximum concentration of nitrates in drinking water, of sulphur dioxide in the atmosphere, or the maximum noise level in front of houses; in fact, they constitute an environmental objective.
- (ii) *Emission or discharge standards* are maximum allowable discharges of pollutants into the environment, e.g., maximum BOD discharge into waters, maximum SO_x emission into the atmosphere by an industry. In its extreme form, an emission standard is a ban on the use or discharge of a substance, usually toxic substances.
- (iii) *Process standards* specify the type of production process or emission reduction equipment that polluting plants must install (e.g., a specific type of scrubber, pipe, water purification device etc.).
- (iv) *Product standards* define the characteristics of potentially polluting products such as chemicals, detergents, fertilizers, automobiles, fuels etc.

Of course, these different types of standards can be combined.

2.2. Strengths and weaknesses of regulations

The regulatory approach to environmental protection, compared to the “economic approach” (see below), presents advantages and shortcomings.

- (i) The main advantage of regulations is that there is a longstanding experience with them in other fields of public concern such as health and safety, labour, etc. In some cases existing regulatory structures and institutions can be used.

Another advantage is that regulations provide an effective means for preventing hazards and irreversible effects requiring draconian controls or bans.

Finally, regulations give a guarantee as to achievement: once an emission standard is fixed, one can be confident that emissions will not exceed this limit, provided there is *effective enforcement*. However, it often turns out that poor enforcement is the weak link of the regulatory chain.

- (ii) On the other hand, regulations have a number of weaknesses.

- We have just mentioned that *effective enforcement* is required. The fact that enforcement often proves to be difficult or weak is mainly due to the great number of controls, administrative requirements, staff (inspectorate, corps of engineers, lawyers etc.), legal procedures in case of non compliance etc.

The situation varies between countries, but it is generally acknowledged that lack of staff to carry out controls and enforcement makes the probability of being caught rather small; even so, non compliance fines are usually too low to act as a real deterrent. A low non compliance cost multiplied by a low probability of sanction remains below the marginal cost of pollution abatement⁶.

- Another drawback of regulations is that they may be too easily subject to bargaining and negotiations between public authorities and the private sector, and possibly subject to corruption.

It is of course natural that, while a polluting plant is seeking a licence to operate, the terms and conditions of this licence be subject to negotiations. However, one must strike a delicate balance and negotiations can become easily influenced and challenged by lobbies and pressure groups. As a matter of fact, industry often prefers to be subject to direct regulations than to taxes and charges, because it is much more difficult to negotiate and evade taxes.

- A major limitation of regulation is that it is *static* and provides little incentive to technical improvement. Regulations and standards, laboriously negotiated, are not likely to evolve rapidly. For instance, technical progress will become embodied in new regulations and standards only after a long time lag. It is of great importance to devise some kind of built-in “feedback” system which enables regulations to evolve.

- Finally, regulations are *costly*, not only at the enforcement level, but mainly because they are not efficient in economic terms. This is why economic instruments (in particular, taxes, charges and tradeable permits) are increasingly being introduced in environmental policies.

III. ECONOMIC INSTRUMENTS (EIs)

3.1. Definition

It is important to give a precise definition of an economic instrument (EI), particularly because in the recent environment literature misleading references are often made to so-called “market based approaches” or “market instruments” which encompass a mix of policy instruments designed to influence producers and consumers’ behaviour (e.g., product labelling or strict liability rules) but which have loose links with market mechanisms.

EIs provide market signals in the form of a modification of relative prices (e.g. taxation on certain products) and/or a financial transfer (payment of a charge).

An important feature is that EIs leave freedom of choice to economic agents such as polluters who can select the most advantageous solution — e.g., in case of pollution charges, paying the charge or investing in pollution control.

There are seven types of EIs.

- 1 **Emission charges or taxes** (i.e. payment on the quantity and quality of pollutant discharged) are the most commonly used instrument. They are applied in virtually all environmental fields and in all OECD countries, although with varying intensity.
 - *Water effluent charges* form the backbone of water management systems in France, Germany and the Netherlands, but are also used to varying degrees in many other countries.
 - *Waste charges* are also quite common, but with different levels of sophistication and coverage (applying to industrial waste in a few instances only). In OECD countries, there is increasing concern about packaging waste and taxes are also considered as a possible option. Taxes are applied in some instances to non-returnable containers — in fact, a form of product tax (see below).
 - *Air pollution charges and taxes* are increasingly implemented in a number of countries; this takes the form of special energy (fuels) taxes or emission charges (e.g, a charge on SO_x emissions in France, charges on NO_x emissions in Sweden, and, more recently, carbon taxes in Nordic countries and in the Netherlands).
 - *Noise charges* are applied to aircraft in a few countries, ranging from crude to more elaborate systems.

- 2 **User charges** (payment for the cost of collective collection and treatment services) are commonly used by local authorities for the collection and treatment of solid waste and sewage water. They are primarily a financing device.
- 3 **Product charges or taxes** are applied to the prices of products which create pollution as they are manufactured, consumed or disposed of. Examples are *lubricants* (France, Finland, Germany, Italy, Norway, the Netherlands), *sulphur or carbon* in fuels (Netherlands, Nordic countries), *fertilizers* (Denmark, Finland, Norway, Sweden), *non-returnable containers* (Denmark, Finland, Netherlands, Norway, Sweden), mercury and cadmium *batteries* (Italy, Norway, Sweden), base, or “*feedstock*”, chemicals (United States).

Product charges or taxes are intended to modify the relative prices of the products and/or to finance collection and treatment systems.

Rather than introducing new eco-taxes, existing taxes can be adapted to environmental purposes. **Tax differentiation** modifies the relative price of products by penalising those that are harmful to the environment. This is tantamount to a product tax approach but relies on the existing tax structure to achieve this objective rather than introducing new taxes or charges. For instance, existing fuel or vehicle taxes may be adapted to meet environmental objectives (higher tax on leaded petrol, higher tax on polluting or noisy vehicles). This approach requires tax restructuring or fiscal reforms (see below).

- 4 **Administrative charges or fees** are generally designed to help fund licensing or license monitoring systems. A few countries already apply these tools; for example, in Norway a charge is levied when registering new chemical products.
- 5 **Marketable (tradeable) permits** (also referred to as emissions trading) are based on the principle that any increase in emission must be offset by a decrease of emission of an equivalent, and sometimes greater, quantity.

For example, when a statutory ceiling on pollution levels is fixed for a given area, a polluting firm can set up or expand its activity only if its additional pollution emissions are nil, which is usually technically and/or economically impossible. The firm must therefore buy “rights” or permits to pollute from other firms located in the same control area which are then required to abate their emission by an amount equal to the additional pollution emitted by the new activity.

The objective of this approach is twofold: (i) to achieve cost minimising solutions (by inducing firms with high marginal abatement cost to purchase abatement from firms with low marginal abatement cost); (ii) to reconcile economic development activity with environmental protection by allowing new activities to set up in a control area without increasing the total amount of emission within it.

This approach has been developed in the United States for air pollution control, following an amendment of the Clean Air Act in 1977. The system has been further elaborated and made more sophisticated culminating in a new revision of the Clean Air Act in 1990, containing provisions for a more systematic and enlarged implementation of emissions trading. This evolution is significant within a country where environmental policy is based almost exclusively on “command and control” instruments. It is claimed that emission trading has provided substantial savings but it is difficult to obtain a clear picture. Provisions of the new Clean Air Act are expected to yield a 20 per cent reduction in abatement costs for SO_x alone⁷. Nevertheless, the implementation process seems rather complex and trades remain optional, i.e. a complement to the command and control provisions. Possibilities for such trading also exist in Germany.

6 **Deposit-refund systems** are also widely applied in OECD countries, in particular for beverage containers. As packaging constitutes an acute problem (about 150 million tonnes per annum in OECD countries), this approach will probably further develop in the future.

7 Finally, **subsidies** also constitute an important EI. They are used in many OECD countries, although to a limited extent.

The main forms of financial assistance are grants, soft loans and accelerated depreciation.

The main function of subsidies is to help industry (and agriculture) to catch up with the pollution control investment backlog. As environmental regulations can result in substantial modifications of the rules of the game, it may be necessary to set up transition periods, where financial assistance is provided, in order to put environmental policies “on track”.

However, subsidies should only be used as a provisional measure as they will introduce, in the long term, economic inefficiencies. Furthermore, subsidies contradict the PPP.

Subsidies can be financed out of the general treasury, or through special funds financed by environmental taxes and charges (earmarking). This latter approach is quite common and seems especially appropriate during transition periods.

3.2. Advantages of economic instruments

EIs possess a number of intrinsic qualities, of which six are noted here⁸:

- 1 *Automatic adjustment*: Emission levels automatically adjust to the tax (or price): polluters lower their emissions until the marginal cost of abatement equals the rate of the tax. Beyond that point, it is then cheaper to pay the tax (or price) than to abate.
- 2 *Cost effectiveness (static efficiency)*: When fixed at a proper level, emission charges (or taxes) ensure the achievement of objectives at minimum overall cost. In technical terms, this is achieved by equalising marginal abatement costs at the level of the charge rate. Tradeable permits also lead to minimum cost situations.

This can also be explained by common sense; assume an objective of a 80 per cent reduction of emissions; it does not make economic sense to impose on *all* polluters a 80 per cent emission cut if it costs, say, three times more to some polluters than to others. It make much more economic sense to require more abatement of low cost polluters than of high cost ones.

This cost minimisation will be automatically achieved through taxes, charges and tradeable permits.

Studies in the United States indicate that such least cost solutions would cost 10 to 30 times less than standard command and control approaches.

This, however, requires high (incentive) levels of taxes and charges.

- 3 *Incentive*: EIs provide a permanent incentive for “environmentally friendly” behaviour. In particular, emission charges/taxes are a permanent inducement to abate pollution as long as a payment is made. They also constitute a stronger incentive to technical change through the research and development of more efficient pollution- control technologies, “clean” production processes and new non-polluting products — mainly because more efficient technologies provide a “double dividend” in terms of savings in both abatement cost and tax payment.
- 4 *Flexibility*: EIs provide flexibility both to public authorities and private entities; for the former, it is generally easier to modify and adjust the rate of a charge than to change regulations; for the latter, freedom of choice regarding the preferred method of adjustment is preserved.
- 5 *Revenue raising*: Charges, taxes and tradeable permits (when auctioned by public authorities) are a source of revenue which can be earmarked for environmental protection or allocated to the general government budget. Pollution tax revenues can be sizeable (see Table 1).

Table 1: Environmental revenue (selected countries 1991)

	billion \$	% of tax revenue*
France	0.68	0.23
Norway	0.6	1.7
Netherlands	1.4	1.9
Sweden	2.4	2.7
Denmark (1990)	0.2	0.3

* Social security contributions excluded

Source: Barde, Jean-Philippe, *Economie et politique de l'environnement*, Presses Universitaires de France, Paris, 1992.

6 *Resource conservation and transmission*: Pricing environmental resources is an essential component of a sustainable development path and should ensure an efficient use of these resources and their transmission to future generations⁹.

In developing countries which rely heavily on the natural resource base, pricing of environmental resources is a key instrument for sustainable development (e.g, water and forest resource pricing).

IV. MAIN LESSONS FROM EXPERIENCE IN OECD COUNTRIES

The situation in OECD countries can be characterised by five main features.

(i) *A rapid evolution*

The situation in OECD countries has evolved considerably over the last 10-15 years. In the mid-1970s, EIs were used in very rare instances outside of the water management systems in France and the Netherlands, which were implemented in the late 1960s to early 1970s and which rely heavily on waste water pollution charges. A first OECD survey¹⁰ reflecting the situation in 1987 in 14 OECD countries, identified 150 cases of EIs (including subsidies), out of which 80 were environmental charges/taxes. Since then, the situation has continued to evolve and a number of countries have implemented or are intending to introduce new EIs. In some countries the number of EIs has increased by 50 per cent between 1987 and 1993. This is particularly true for Nordic countries (Denmark, Finland, Norway, Sweden), the Netherlands and the United States, where a number of *eco-taxes* have been introduced (e.g., on fuels, fertilizers, pesticides, CFCs).

The use of EIs to tackle global environmental problems is high on the political agenda (global warming, oceans, biodiversity, transfrontier pollution), in particular the issue of carbon taxes. The Rio conference emphasized the key role of EIs in a sustainable development context.

(ii) *The existence of mixed systems*

Past controversy about EIs was principally focused on the issue of EIs *versus* regulation. In fact, the present situation is characterised by the prevalence of "mixed systems" where EIs are used as an *adjunct* to direct regulations. In such systems EIs complement regulation by providing additional incentive for pollution abatement and a source of revenue for financing environmental measures such as treatment of effluents, waste collection and processing, etc.

The actual combination of EIs and regulations varies considerably between countries and according to the type of pollution. In some cases, EIs constitute the cornerstone of the policy (in particular, waste water charges in France, Germany and the Netherlands, air pollution in Sweden); in other instances, EIs only provide an additional financial incentive device (e.g., some types of product charges); in still others, EIs constitute an optional tool and opportunity for cost savings (tradeable permits in the United States). However, this situation may evolve in the future as, in several countries, it is intended to give a more pre-eminent role to EIs, not only by introducing new ones but also by making them more effective through higher rates of taxes and charges capable of inducing actual changes in polluters' behaviour (carbon and sulphur tax and NOx charges in Sweden).

(iii) *A great variety of EIs and situations*

The existing cases of EI use in OECD countries cover in fact a great variety of situations. In some fields and in some countries EIs play a significant role, particularly for water and waste management. EIs are gaining importance in air pollution abatement policies (carbon and sulphur taxes) but remain weak for noise abatement, despite a great potential role. Table 2 gives an overview of the state of the art for environmental charges and taxes in OECD countries in early 1992.

Table 2: **Economic instruments in OECD countries as of 1 January 1992**

	Charges on emissions (of which user charges)	Charges on products (of which tax differentiation)	Deposit-refund	Tradeable permits	Enforcement incentives
USA	5 (2)	6 (1)	4	8	2
Sweden	3 (2)	11 (2)	4		2
Canada	3 (2)	7 (3)	1	2	2
Denmark	3 (2)	10 (2)	2		
Finland	3 (2)	10 (2)	2		
Norway	4 (2)	8 (2)	3		
Australia	5 (2)	1 (0)	3	1	2
Germany	5 (2)	3 (3)	2	1	
Netherlands	5 (2)	4 (2)	2		
Austria	3 (1)	4 (2)	3		
Belgium	7 (2)	2 (2)	1		
Portugal	2 (0)	1 (1)	1		
France	5 (2)	2 (1)			
Switzerland	3 (2)	2 (2)	1		
Italy	3 (2)	2 (0)			
Iceland	1 (1)	1 (1)	2		
Japan	3 (1)	1 (1)			
Ireland	2 (2)	1 (1)			
Greece		2 (1)	1		
Spain	3 (2)				
UK	1 (1)	1 (1)			
New Zealand	1 (1)				
Turkey			1		

Source: OECD, *Integrating Environment and Economics: The Role of Economic Instruments*, Paris, forthcoming.

(iv) *Limited incentive impact and predominance of revenue raising*

Economists are making a strong plea for EIs as an economically efficient, that is, cost minimising, mechanism. Marketable permits seem to meet this criterion. However, this is still rarely the case for charges and taxes, simply because they are often set at too low a level to induce polluters to abate their emissions. In practice, emission charges and taxes have been used primarily for revenue raising purpose. Hence, they are usually referred to as “financing” or “redistributive” charges, in contrast to “incentive” charges.

Increasingly, however, new eco-taxes are intended to have an incentive purpose, such as the carbon tax and NOx charge in Sweden.

(v) *Political acceptability*

Although there is still some opposition, in particular in industrial circles, the implementation of EIs seems, by and large, to be well accepted. Governments now consider that a better use of market forces should be promoted and this is attested to by the significant increase in the number of EIs applied in OECD countries. In some cases, industry claims that EIs are likely to affect its competitive position on international markets and is demanding international harmonization¹¹. On the other hand, a number of business and industry organisations do accept the usefulness of this economic approach to environmental policy.

The OECD Council adopted in 1991 a “Recommendation on the Use of Economic Instruments in Environmental Policy” including a set of “Guidelines” on how to implement such instruments¹².

Agenda 21 of the U.N Conference on Environment and Development (Rio 1992), makes a strong plea for “making an effective use of economic instruments and market and other incentives” (chapter 8, “Integrating Environment and Development in Decision Making, section C).

(vi) *The move towards taxation reforms*

Instead of creating new taxes, one might consider restructuring *existing* taxes in an environmentally friendly manner. Such an approach aims at modifying relative prices by taxing those products that pollute relatively more than others. This approach is developing in several countries and is attracting growing interest in others. For instance, a number of countries have now introduced tax differentiation on leaded versus unleaded gasolines (Germany, Finland, Norway, the Netherlands, Sweden, Switzerland, United Kingdom). In Germany, Norway, the Netherlands, Sweden and Switzerland, motor vehicle taxation has been modified in order to stimulate the use of less polluting vehicles; other countries envisage similar changes. Restructuring direct taxes is also being considered.

In Sweden, a major fiscal reform was implemented in 1990-91. While a number of taxes (including income taxes) were decreased, a number of new eco-taxes were introduced. This resulted in a redistribution of 6 per cent of the GDP¹³.

“Eco-taxation” raises five main issues.

- 1 The introduction of new environmental taxes should, as far as possible, be kept compatible with existing fiscal structures and practices.

- 2 There is a risk that new eco-taxes will unduly increase the general level of government taxation. This raises the issue of “revenue neutrality”: the revenue effect of new taxes can conceivably be offset by removing or decreasing existing ones. This approach has been followed in Sweden, in the context of a major fiscal reform: while new eco-taxes have been introduced, existing taxes (in particular those on income) have been reduced.
- 3 One should also ensure that *existing* taxes do not themselves already induce detrimental effects on the environment (e.g., taxes on energy, transport, land, agriculture).

A number of such “government intervention failures” have been identified in various sectors. For instance, in the case of transport, fiscal concessions induce car over use: in the United Kingdom, 2 million cars (10 per cent of the total car stock) are “company cars” purchased with tax concession. In the former West Germany, income tax deductions for commuting to work by car have been estimated to increase both accident costs and air pollution costs by about 1 billion DM per year. Another case is the tax treatment of factory farms in France, which are considered as agriculture: on the one hand they are exempt from local business tax (*taxe professionnelle*); on the other hand, they pay little or none of the property tax usually paid by farmers because they use small land surfaces; as a result, one of the most environmentally damaging forms of agriculture enjoys the most favourable tax treatment. Many examples of such “fiscal intervention failures” could be quoted in fields such as energy, forestry, and wetlands.

This issue is of particular relevance to developing economies and countries in transition to the market economy, where inappropriate resource pricing or excessive subsidies induce resource degradation and wastage (see section VII below).

- 4 *Fiscal neutrality.* One definition of fiscal neutrality is that the design of tax systems should be influenced only by tax considerations. In other words, the objective of fiscal systems should be primarily to raise revenue and not to encourage or discourage certain activities or behaviour. Fiscal neutrality is also interpreted as implying uniformity in the taxation of each category of goods and services (e.g., all cars or detergents should have the same fiscal treatment).

Fiscal neutrality is often supposed to promote economic efficiency, to impose the least possible cost on the economy. It can be argued, however, that such fiscal neutrality would be optimal only in the absence of externalities: changing the fiscal system in order to correct market failures is thus fully consistent with this definition of fiscal neutrality. Clearly, the objective of “eco-taxes” is *not* neutral: it does aim at influencing behaviour (less use of certain chemicals, for example) and requires differentiated taxes (heavier taxes on more polluting cars or according to fuel sulphur content).

- 5 *Earmarking.* Presently, the revenue of most environmental taxes is earmarked for environmental purposes (e.g., taxes on lubricant oil are used to finance collection and recycling facilities). Earmarking often runs against current recommended practice in fiscal policy. This issue is crucial because, as mentioned earlier, environmental taxes and charges can raise substantial revenue.

The OECD recently completed work on taxation and environment and concluded that environmental and fiscal policies can, and indeed should, be made mutually reinforcing¹⁴.

V. MAIN ISSUES IN IMPLEMENTING EIs

Experience in OECD countries has identified a number of issues related to the application of EIs.

5.1. *Issues related to taxes and charges*

Five main categories of issues can be identified.

(i) *Technical issues*

Difficulties in devising and/or applying efficient rates (that would enable automatic achievement of objectives). This is mainly due to:

- the lack of knowledge of abatement cost functions (hence the difficulty in calculating an efficient tax rate);
- the difficulty of monitoring emissions (hence the use of “proxy variables” like input or output);
- the difficulty of adapting rates to geographical conditions;
- the need to adapt to inflation (a particularly important issue in certain developing countries and economies in transition).

(ii) *Political issues*

- The general public, especially environmental pressure groups and “deep ecology” circles, often construe pollution taxes as “purchasing the right to pollute”.
- Industry is often opposed to taxes because they imply an additional cost burden (this may be true for individual industries, but taxes should minimize cost at the collective level; this is a typical case of conflict between private and public interest). Industry is thus concerned with losses in international competitiveness.
- Industrialists also fear that with economic instruments they will lose their bargaining power (regulations can easily be negotiated, but not taxes).

(iii) *Distributive implications*

Now that environmental taxes are increasingly being introduced in industrialised countries, there is growing concern about their possible regressive impacts. For instance, taxes on energy or other commodities may adversely affect low income groups.

Governments may take either *ex ante* mitigation measures (e.g, reduced tax rates for certain income categories or industries) or *ex post* compensation measures (lump sum compensation payments). The second approach seems preferable as mitigation measures may negate the incentive purpose of taxes¹⁵.

The distributive implications are clearly a key issue in developing economies

where low income populations are particularly sensitive to the price of basic commodities.

(iv) *Institutional issues*

Economic instruments require adapted institutional structures, in particular for monitoring and enforcement. Existing fiscal structures, with appropriate adaptation, constitute a useful channel.

Building up an institutional capacity is also crucial in developing economies (see section VII).

(v) *International trade*

As taxes do affect certain sectors of activity more heavily than others, this may affect international competitiveness, at least in the short term. In the longer term, cost minimisation should, on the contrary, increase competitiveness.

This has now become a key issue in the environment debate in OECD countries. A case in point is the European Community's carbon/energy tax proposal which is presently blocked largely because of trade issues. Hence the "conditionality clause" which implies that the tax would be implemented only if other main EC competitors (mainly Japan and U.S.) would apply similar measures.

The trade issue puts trading partners in the "prisoner's dilemma", and the issue is certainly highly relevant for developing countries.

5.2. *Issues related to tradeable permits*

Tradeable permits, as they are applied in the United States, prove to be efficient but complicated to apply; the main issues include:

- At what level to fix the price of permits?
- Should permits be auctioned (sold) or freely allocated ("grandfathering")?
- Against what benchmark should permits be initially allocated?
- How can transactions be most effectively managed and controlled?
- How to define the optimum geographical scope of tradeable permits?

In the case of air pollution, tradeable permits seem to require fairly sophisticated management structures and mechanisms, probably not well suited to most developing economies. However, tradeable rights may be a promising solution in other fields such as water (irrigation permits) or resource exploitation (fisheries). Furthermore, as far as production costs between firms vary widely in developing countries, potential gains of trading are likely to be large.

VI. APPLYING EIs IN DEVELOPING ECONOMIES

It took a long time before EIs began to be implemented to a significant extent in industrialised economies; this delay has probably been costly. The main purpose of EIs is to achieve an effective *integration* between economic and environmental policies. In fact, this is a key element of sustainable development.

Developing economies could derive greater benefits from EIs if they were introduced early in the policy development process. In fact, structural adjustment and economic and fiscal reforms should provide a unique opportunity to implement economically efficient resource management instruments. This is all the more necessary as command and control regulations are facing great difficulties in developing countries, particularly due to the lack of appropriate administrative and judicial structures and political will. Corruption is also eroding the enforcement process.

There are many issues and prerequisites to the application of EIs in developing economies. A non-exhaustive list contains ten key conditions.

6.1 *Correcting government failures*

In market economies, environmental degradation is essentially caused by so-called "market failures", i.e., when prices do not adequately reflect environmental values. Similar failures are introduced by inappropriate and poorly targeted government interventions that cause environmental disruption; these are:

Administered prices: when prices are fixed by government, and not the market, for social or economic reasons. This may be the case for low energy prices and low agricultural input prices (pesticides, fertilizers).

As far as water is concerned, a World Bank study on 149 irrigation projects in developing countries indicates that the price charged for water covered less than 7 per cent of its supply cost (without even taking into account environmental costs). Repetto (1986) finds low rates of cost recovery on irrigation schemes in six countries studied (see Table 3) whose consequences are waste of water resources, soil saturation and salinisation. In India, 10 million hectares (ha) of land are saturated, and 25 million ha are threatened by salinisation. In Pakistan, 12 million ha are saturated and 40 per cent of the Indus watershed is damaged by salinisation. Industrial water is also underpriced (in Egypt, the charge covers only 20 per cent of the cost).

Table 3: **Cost recovery in irrigation schemes in six countries**
(percentage)

	Operating cost	Capital + operating cost
Indonesia	78	14
Korea	91	18
Nepal	57	7
Philippines	120	22
Thailand	28	5
Bangladesh	18	negligible

Source: Repetto, R., *Skimming the Water: Rent Seeking and the Performance of Public Irrigation Systems*, World Resources Institute, Washington, DC, 1986, p. 5.

Subsidies: Pesticides are heavily subsidised, up to 90 per cent of the price in certain countries. Other examples would include that of forestry (tax concessions for forest clearing in the Amazon resulted in a rate of deforestation of 60,000 km² per year from 1980 to 1988).

Price distortions such as these should first be removed before any new economic instruments are introduced. This is an essential aspect of a structural adjustment process, necessary for a sustainable development path.

6.2 Need for appropriate economic structures

In particular, the following are critical:

- functioning markets;
- controlled inflation (inflation erodes the effectiveness of EIs);
- efficient and transparent circulation of information to economic agents (information on prices, technologies, environmental conditions and objectives);
- removal of the monopolies, which are widespread in developing economies but especially prevalent in formerly centrally planned economies. Throughout the reform period, many public enterprises will retain a degree of monopoly, thus enabling them to pass on taxes and charges to their customers, rather than taking appropriate environmental protection measures. This could seriously jeopardize the role of EIs.

6.3 Appropriate institutional structures and administrative skills

- *Well defined and enforced property rights.* Deterioration and wastage of resources is due to the public good nature of environmental resources, considered as “*res nullus*”. Collective goods cannot be appropriately priced and managed. Property rights, especially on land, must be exclusive, transferable and safe.
- *Well defined and stable regulatory framework.* In developing economies, uncertainty about future institutions and rules can be a serious obstacle to investment planning and decisions. Well-defined rules of the game are an essential prerequisite to the operation of EIs. Also, during a period of market-oriented policy reform, enterprises may be particularly sensitive to economic incentives as new rules are implemented and new investment decisions are made.
- *Appropriate institutions.* Fiscal structures and administrative skills must be developed. Initially, best use should be made of existing structures. For instance, as the introduction of new eco-taxes may require new structures and mechanisms, it may be more efficient to introduce environmental incentive into taxes which have to be levied anyway (e.g., taxes on goods and services), while introducing new taxes progressively, as the administrative and technical capacity develops.
- EIs which are simple and transparent. Tax avoidance is facilitated when the sophistication of fiscal systems makes them hard to understand, to accept and to enforce (see also the OECD guidelines).
- *Acceptance and application of the "polluter pays principle".*

6.4 Early action in the economic reform and restructuring process

When structural adjustment policies — in particular removal of distorting prices and subsidies and fiscal reform — are implemented, the introduction of EIs should take place as early as possible in the context of these reforms.

6.5 Devise EIs based on the technical characteristics of new installations

Levels of taxes and charges based on the high marginal cost of obsolete plants and equipment will force expensive adaptation costs for these plants which may not be viable in the medium term. Part of eco-tax revenue could be allocated to accelerate technical change (e.g., R & D subsidies).

6.6 Apply same rules to public and private sector

Many developing economies — and especially formerly centrally planned ones — have inherited a large public sector which is being progressively privatised. There should be equal treatment for public and private sector industries. Exemptions and waivers for the public sector would perpetuate distortions and compromise the achievement of environmental objectives.

6.7 Combine incentive and revenue-raising functions of EIs

The main purpose of EIs is to provide an *incentive* function, to induce economic agents to take the most appropriate measures based on their own cost/benefit assessment. However, this function may be difficult to fulfil in the short term, as high rates of taxes and charges may cause economic and political hardship.

Environmental improvements can be facilitated during a transitional period if the revenue provided by eco-taxes is earmarked to specific and well-defined environmental purposes. Revenue can be used, *inter alia*, for:

- pollution control equipment;
- cleaning up;
- monitoring and enforcement;
- R & D.

However, care should be taken not to provide artificial life support to obsolete plants.

This financing function of taxes and charges should help to keep a *stable* financial source for environmental protection which could otherwise be jeopardised during the economic restructuring period.

Nevertheless, earmarking should be limited to the transitional period and the level of taxes and charges should increase progressively to an incentive level, according to a predetermined schedule.

6.8 Combine EIs with regulations

EIs are not a panacea. Experience in OECD countries shows that they are invariably used in combination with regulations (see section V). The complementarity of EIs and regulation should be clearly specified: What specific role are EIs designed to play — a revenue-raising and/or an incentive role? How are EIs and regulations to be combined and made complementary? Are EIs designed to evolve over time, and how?

6.9 Combine with fiscal reform

Structural adjustment requires tax reform, including removal of distortionary taxes and introduction of eco-taxes. An unco-ordinated proliferation of new eco-taxes should be avoided. Too many taxes could be confusing, difficult to apply and counterproductive (complexity and “tax fatigue”).

An integrated “tax package” should be implemented.

A possible hierarchy of steps might be:

- removing environmentally damaging, distorting and costly subsidies (see above);
- identifying and removing environmentally damaging taxes or exemptions;
- examining how existing taxes may be adapted to address environmental problems;
- developing new eco-taxes.

6.10 Apply OECD guidelines on EIs

These are¹⁶:

- *A clear framework and objective:* the purpose of EIs should be specified, in particular, their relative role vis-à-vis regulation and the type of allocation for revenue. In the case of charges, the revenue-raising purpose should be clearly separated from the incentive objective.
- *A well-defined field of operation* in terms of pollutants, processes and target groups (point versus non point sources, mobile versus stationary sources, types of industry or users etc.).
- *A simple mode of operation:* the more complex EIs are, the more difficult is their implementation. Complexity affects both responsible authorities who find them difficult to implement and polluters who find them hard to understand and to agree upon. However, one must strike a fine balance between undue sophistication and complexity that would hamper implementation and excessive simplicity which would lessen the efficiency of the instrument. For instance, some product taxes have a limited effectiveness; on the other hand, sophisticated marketable permit systems often prove difficult to implement.
- *Acceptability* increases if adequate and timely information is provided to all interested parties (e.g., on type of instrument, objective and rationale, time of implementation etc.). Consultation with polluters and progressive implementation (e.g., progressive increase in the level of charges) also contribute to greater acceptability.
- *Integration with sectoral policies* is of utmost importance: for instance, charges and taxes on transport vehicles and infrastructure should be

compatible with environmental objectives and the introduction of new EIs should take into account existing fiscal and pricing structures (see above the issue of fiscal reform). EIs can be useless if existing distorting fiscal and pricing practices are not corrected in the first instance. If environmental costs are to be truly reflected in the price of goods and services, existing “government failures” must be corrected first.

- *Reasonable cost of implementation* must be maintained.
- *An assessment of economic and distributive consequences* is desirable, in particular in comparison with the existing situation or potential effects of alternative approaches. The impact of EIs on the general fiscal system needs to be carefully evaluated.
- *Conformity with international policy and rules* must be ascertained. This applies to general principles, like the Polluter-Pays-Principle, international conventions (Basel, Montreal, Rio etc.), and GATT rules.

VII. CONCLUSIONS

The path to sustainable development requires an effective integration between economic and environmental policies. There are many complementary tools to achieve this, but economic instruments are the most cost-effective ones as they are based on market mechanisms.

Economic restructuring offers a unique opportunity to achieve such integration and EIs should be implemented as early as possible in this context.

EIs are not a panacea. They can play a key role but must be combined with other policy instruments.

ANNEX 1

CORRECTING GOVERNMENT INTERVENTION FAILURES

Prices of products and resources are sometimes fixed by public authorities below their market price for economic, social or other reasons — for example, to stimulate industry and agriculture by reducing input prices (raw material, energy, pesticides, fertilizers etc.) or to limit the price of socially essential goods (food, water, energy). This is true in many countries but more so in developing countries and economies in transition.

In Figure 1, AE is the demand curve and MPC the marginal private production cost; MEC is the marginal external cost associated with this production.

The private optimum corresponds to a price P_0 and a production level Q_0 .
The social optimum is determined by a price P^* and a quantity Q^* .

We can see that $Q^* < Q_0$.

If the Government sets the price at a level $P_1 < P_0$, the demand will be fixed at: $Q_1 > Q_0 > Q^*$.

The gap $Q_1 - Q_0$ represents the *intervention failure* (compared to the market price).

The gap $Q_0 - Q^*$ represents the *market failure*.

We can see that the two failures are cumulative.

Clearly, intervention failures need to be removed before implementing EIs to correct the market failures by internalising external costs.

Figure 1 is not reproduced in this document due to technical reasons. Please consult printed version.

NOTES AND REFERENCES

1.. “Guiding principles concerning the international economic aspects of environmental policies Recommendation adopted by the OECD Council on 26th May 1972. For a complete survey OECD texts and analysis of the PPP, see “The Polluter-pays-principle”, OECD Monograph, OECD Paris 1992.

2.. *Official Journal of the European Communities*, N° L 194/1, 25th July 1975.

3.. The PPP is often misinterpreted and misunderstood. Therefore it is important to underline three features.

(i) The fact that the polluter must pay for environmental cost does not mean that he will necessarily *bear* this cost. The polluter may, and indeed will try to, have this cost reflected in the prices of goods and services he produces. Thus, the primary objective of the PPP is that environmental costs be fully reflected in the price of goods and services. If these costs cannot be reflected in prices, or can be only partly reflected (because of the market structure), polluters' profits will be reduced. In any case, environmental costs will be reflected in the market. This implies that the PPP is *not an equity principle*; one may judge equitable that the polluter should pay but this is not the primary objective of the principle.

(ii) Also the PPP *is not a liability principle*. It is not a matter of designating who is responsible for pollution, but of determining at what level it is most appropriate to internalise environmental cost. Take the example of agricultural pollution by fertilizers and pesticides: on the one hand, one could consider that the responsible agents are the manufacturers of these fertilizers and pesticides; on the other hand, the farmers who make an inappropriate use of these inputs may be held responsible; both. It is not the purpose of the PPP to enter into such liability issues: public authorities must decide where it is most efficient to internalise costs. In this example, it may be efficient to impose a tax on fertilizers and pesticides and/or to regulate the characteristics of these products.

(iii) PPP is often, and wrongly, construed as an environmental taxation principle. In fact, the PPP implies that polluters pay the cost of environmental measures decided by public authorities, *whatever form*. It may be compliance cost with a regulation, a pollution charge or tax, damage compensation etc. *This means that the PPP can be applied with any policy instruments.*

"Guiding principles...", op. cit.

This is why both the OECD and the European Community provide “exceptions” to the PPP where financial assistance may be granted. The OECD Recommendation is vague, as it refers to cases where socio-economic hardship can be expected, where there is an especially stringent pollution control regime, need for reduction of serious inter-regional imbalances, and assistance for R and D in pollution control technologies. Such exceptions are acceptable provided they are restricted to sectors facing severe difficulties, limited within transitional periods, and not creating significant trade distortions. The European Community is much more specific in defining exceptions: during a six-year transition period (1974-1980) financial assistance was allowed according to a decreasing scale (45 per cent during the first two years, 30 per cent for the following two, and 15 per cent during the last years). This transition period was then prolonged until the end of 1992.

For instance, in France, the average level of non compliance fines was 2,000 FFr between 1977 and 1990. “The New Clean Air Act: What it Means to You”, *EPA Journal*, Vol. 17, No. 1, Jan-Feb. 1991, Washington DC. For an in-depth analysis, see T.H. Tietenberg, *Emissions Trading*, Resources for the Future, Washington DC, 1985.

For a comprehensive analysis, see Jean-Philippe Barde, *Economie et politique de l'environnement*, Presses Universitaires de France, Paris 1992.

See David Pearce *et al.*, *Blueprint for a Green Economy*, Earthscan, London, 1989.

- .. *Economic Instruments for Environmental Protection*, OECD, Paris, 1989.
- .. This argument needs careful assessment as international harmonization would be needed only in specific cases. Also, there is nothing really different, in this respect, between EIs and other types of policy instrument.
- .. See OECD, *Environmental Policy: How to Apply Economic Instruments*, OECD, Paris, 1991.
- .. See OECD, *Taxation and Environment: The Cases of the Netherlands, Sweden and the United States*, OECD, Paris (forthcoming); see also *Fiscalité et environnement. le cas de la France*, OCDE, Paris (forthcoming).
- .. OECD, *Taxation and Environment: Complementary Policies*, OECD, Paris, 1993.
- .. See D. Harrison, *The Distributive Implications of Economic Instruments in Environmental Policy*, OECD, Paris (forthcoming).
- .. See OECD, *Environmental Policy: How to Apply Economic Instruments*, op.cit.