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**Current and Potential  
Uses of Economic Approaches  
to  
Environmental Management**

by

**Anton Meister  
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Basil Sharp**

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Department of Agricultural Economics and Business  
School of Applied and International Economics  
Massey University, Palmerston North, New Zealand

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**Anton Meister<sup>1</sup>  
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**August 1993**

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<sup>1</sup> Professor, Natural Resource and Environmental Economics, Department of Agricultural Economics and Business, School of Applied and International Economics, Massey University, Palmerston North.

<sup>2</sup> Associate Professor and Head of the Department of Economics, University of Auckland, Auckland.

## FOREWORD

The Resource Management Act of 1991 states that one of the functions of the Minister for the Environment is the consideration and investigation of the use of economic instruments (including charges, levies, other fiscal measures, and incentives) to achieve the purpose of this Act (section 24(h)). This discussion paper is a direct consequence of this requirement of the Act.

In late 1992 a research project was undertaken for the Ministry for the Environment to look at the current uses of economic instruments around the world and to comment on their suitability for use in New Zealand. The mention of the term 'economic instrument' in the Act has caused much confusion in the minds of those involved in resource planning and environmental management as to what these new tools really were, what they could or couldn't do and how relevant they might be to the New Zealand resource management situation. Claims were being made about the efficiency and effectiveness of these policy instruments in resource and environmental management. The evidence for this came from the myriad of applications of these instruments overseas.

This discussion paper briefly looks at some of this evidence. The application of a range of economic instruments is discussed and the successes and failures of them in terms of a series of criteria are highlighted. The major groups of economic instruments are charges (or levies), subsidies, deposit-refund systems, market creation (transferable rights or permits) and enforcement incentives. For each group, examples of overseas applications are presented and possible potential for application in New Zealand is discussed.

It is important to make the following points or disclaimers:

1. Due to limited time available, the coverage of actual applications of economic instruments is far from complete.
2. Economic instruments, in the main, are a recent phenomena and for that reason little in-depth analyses were available as to the full impact of the policy instruments in those countries where they had been applied.

3. This paper is a **discussion paper**. For that reason some of the suggestions for potential application in NZ should be taken with a grain of salt. The report points out in several places, that more research needs to be conducted before even considering the use of these policy instruments. This does not take away however, the need to do some of this research as potential does exist for these policy instruments as adjuncts to the existing regulatory system for resource and environmental management.
4. This report is, to some extent, already out of date as this year much more work on the use of economic instruments has been published, here and overseas. It is felt however, that the information in this report can still serve a useful purpose in providing details not found in other published material. Also, the authors feel that their conclusions need not change in light of more recent work on economic instruments.
5. The term economic instruments is used because in the main they are the instruments the report is dealing with and also because it seems to be the 'in' term. For this report a broader title has been chosen to indicate that economic approaches to environmental management do not finish and end with economic instruments.

The authors are grateful to the Ministry for the Environment (as well as the Ministry of Commerce and The Treasury) for this research contract and they hope that the results go some way towards easing the minds of all those involved in the large, but important, task of managing the environment and the resources of New Zealand as far as economic instruments are concerned.

Allan N Rae  
Head of Department of Agricultural Economics and Business  
School of Applied and International Economics

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# CHAPTER 1

## 1.0 INTRODUCTION

Current interest in N.Z. regarding the use of economic approaches to environmental management is a reflection of similar interest in the rest of the developed (as well as developing world). The standard approach to environmental management has been the 'command and control' or regulatory approach, adopted in an effort to bring a quick halt to major pollution problems. The expanding cost of pollution control under this approach, the lack of success in many areas of attempts to stem increasing levels of pollution, the increasing complexity of regulatory regimes, and the failure of regulation to encourage technological innovation beyond what was required by law, have all caused governments to look for new policy tools.

The 'new' economic approaches are directly derived from the economic theory of externalities: pollution and environmental damage arise from the fact that environmental resources are not priced. By pricing such resources, their users (including polluters), instead of wasting them on the grounds that they are 'free', are encouraged to take suitable measures to limit consumption and deterioration.

Economic approaches have as a major goal the establishment of an economic interest in efficient environmental protection and rational use of resources. This goal involves, therefore, economic incentives in the use of natural resources, in reducing the quantity and degree of pollution, in recycling, in effective reclamation, and in compliance with the general principle of minimisation of human intervention in the environment. The advantages for economic approaches can be summarised as:

- they are more **cost-effective**. Effluent charges, at a suitable rate, or emissions trading, can minimise the total cost of pollution control.
- they offer a **permanent incentive** to reduce pollution for the period of time that a payment is made. They also lead to further encouragement for technical change through research and the development of non-polluting products or better and more effective processes of pollution control.
- they increase **flexibility**. For the authorities, it is easier to modify or adjust a charge than to modify legislation; for polluters, freedom of choice and adjustment is preserved.
- they provide a **source of finance**. In most cases, economic approaches play an important role in the collection of funds, which may or may not be used to fund pollution control facilities or other environmental projects.

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As the rest of this report will indicate, achievement of these advantages in real life applications has been scant (or hard to prove). At the same time there are also some disadvantages one of which is that, for some instruments, application of the instrument will not give certainty as to what will be achieved. By leaving the polluters the freedom to react to the policy instrument as they see fit, environmental management becomes a 'wait-and-see' situation. This may not be satisfactory in some particular environmental management situations. Therefore, as will be discussed, economic instruments are mostly applied within a regulatory framework, and as such they become complementary to that policy approach rather than being a substitute for it.

### **1.1 AN OVERVIEW OF TYPES OF ECONOMIC APPROACHES**

Economic incentives (or approaches or instruments) can come in the form of a financial transfer (tax, charge or subsidy), a modification of relative prices (taxation on certain products), or a clear specification of rights (transferable emission permits, or resource rights). These instruments operate as financial incentives to polluters, who select the most advantageous solution: polluting and paying, or investing in pollution control to avoid paying. In other words, they are intended to modify behaviour (to induce a switch from polluting to pollution control or prevention) merely through financial incentives and market forces.

In then, the common elements of economic approaches are:

1. The existence of a financial incentive;
2. The possibility of voluntary action;
3. The involvement of government (related) authorities;
4. The intention of (directly or indirectly) maintaining or improving environmental quality by applying the approach.

Approaches that fit the above description are described below. An overview of the extent of their use in OECD countries is provided in Appendix 1.

#### **1.1.1 Charges**

These are the most widely used form of economic instrument. Central to their implementation is the ultimate destination of the revenues collected. For the **revenue raising charge** this destination is to pay for investment and

maintenance cost of some collective form of treatment measures. This instrument is useful when there is a situation where collective treatment facilities present a reasonable approach to dealing with environmental quality problems (even though there is little to encourage preventative measures here). If individual treatment or prevention measures are possible and the charge is high enough, then this economic instrument can also have some regulatory side effect.

Examples of this approach are: co-responsibility charges (such as effluent charges), user charges, administrative charges, product charges, and tax differentiation.

With these applications the linkage between the revenue raised and the environmental objectives pursued is not always direct. With many applications there is not a connection between actual damage caused and the level of the charge.

The alternative to revenue raising charges are **regulatory charges**. These are similar to the examples mentioned above, but revenue raising is not of primary importance, rather the regulatory effect is. For that reason, the charge rate is set at such a level that prevention ( eg. in-house treatment facilities and substitution) is made financially attractive. Other examples are the existing charge on leaded petrol to bring about substitution or a charge on pesticides to bring about volume reduction and/or substitution.

The distinction between the two approaches is not always clear and charges, purely put in place for revenue raising purposes, can also have a regulatory effect. Regulatory charges of course also raise revenues. Therefore for both approaches, the destination of these revenues is of quite some importance and will have an influence on the success of this policy instrument.

### **1.1.2 Subsidies**

Subsidies can take many forms, including grants, soft loans, tax advantages etc. Their purpose is to make environmentally friendly activity cheaper. This is in contrast to most other economic instruments which make environmentally damaging activities more expensive. Subsidies can be effective when they are given in proportion to the reduction in environmental damage. It is desirable that subsidies have a short term duration and are only obtainable by economically viable enterprises.

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These instruments have received much criticism. Although they provide a carrot and therefore, hopefully, a greater chance that pollution control facilities will be put into place or environmentally degrading activities will be reduced, the whole concept flies in the face of the polluter-pays principle.

Experience round the world has been that equipment tied subsidies have led to capital intensive pollution control facilities. Further, subsidies for particular kinds of activities on for example particular lands, will become capitalised into the price of the land. Harrington et al. (1985) list the following undesirable effects subsidies may have:

1. They can provide payments to people to do things they would have done anyway;
2. They can distort the mix of inputs used to achieve the desired objective (the capital intensive programmes mentioned above);
3. Once established, subsidy policies are extremely difficult to revise or abandon;
4. All subsidy programmes have the problem of defining the baseline against which future performance is to be measured;
5. A subsidy programme can have unintended effects that negate some or all benefits. These unintended effects have plagued agricultural programmes in the past. An example of this is discussed by Kirby and Blyth (1987) when discussing the economic aspects of land degradation in Australia (for a brief see Meister (1990)).
6. They have to be financed from other sources.

### **1.1.3 Deposit-refund schemes**

Most economic instruments are based on the principle of internalising environmental costs. Deposit/refund schemes are put into place to get people to pay for the environmental costs of wrongly disposing of wastes (bottles, cans, cadmium, batteries, etc.). The deposit money is an advance paid at purchase which is refunded when the commodity (or material) is handed back in. On return, the costs to the user are zero and the producer or shopkeeper is now responsible. The deposit rate must be such that a high return percentage is achieved. The deposit is independent of the environmental cost of not returning the commodity (or material). Hence, no real internalisation takes place if the commodity (or material) is not returned.

The environmental goal is to separate the goods (to be recycled or disposed of) from the general waste stream and to direct them to recycling or to other means of disposal. Besides the traditional deposits on bottles other possibilities for

deposit/refund applications are also found with goods such as batteries and cars and even certain minerals or materials (e.g. heavy metals, sulphur, etc).

Preconditions for successful implementation are:

- clear definition of the product;
- environmental problems clearly related to use of the product;
- recycling opportunities;
- reasonable measurability;
- stability of the product throughout the production and consumption process.

Some of these preconditions are less important by the "half deposit refund schemes", consisting only of a delivery (handing-in) premium. This can also be seen as a form of subsidy and avoids the problem of monitoring and balancing the books for deposits and refunds between producers and retailers. This delivery premium scheme is also an effective approach for goods already in circulation.

Deposit-refund systems may perform better than alternative instruments in that:

1. they also work when the act of environmental degradation is not directly observable or when the potential injurers are numerous and/or mobile;
2. they simplify the proof of compliance in some cases;
3. they specify the (maximum) economic consequences of noncompliance;
4. actual or expected damages are covered by actual payments (at least in principle), and
5. in certain applications they may stimulate people other than those directly involved to reduce the effects on the environment (such as scavengers, school groups, scouts, etc. in the case of refunds on littered items).

The use of this type of instrument depends on a compromise between fine tuning the incentive structures and keeping administrative and enforcement costs as low as possible.

#### **1.1.4 Transferable rights**

Environmental policies using transferable rights seek to create a structure of property rights that, through the process of trade, will signal information on the relative scarcity of environmental assets. Existing, and potential, users of the asset have the choice of paying the market price for a right or implementing an innovation that will reduce their use of the natural resource.

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Successful outcomes using this class of economic instrument depend on both the dynamics of the market place and the management agency and/or the legal framework used to delimit the market.

Transferable rights cannot be viewed in isolation from legal and government agencies. For example, the total quantity of water rights for abstraction could be defined for a given geographical area.

Transferable water rights, within a competitive market, move to their highest valued use. This will lead to more efficient resource use. Because the market will be constrained in some way - e.g. with respect to transfer, or certain classes of trade are excluded in the market - it is not possible to claim that the instrument is allocatively efficient. At best, it will achieve targeted outcomes - e.g. sustainable harvest, reduction in emissions - at least cost.

Overseas examples of this approach are air pollution emission trading rights, acid rain allowance trading, tradeable consumption and production rights for CFCs and halons, tradeable water pollution rights and trading in lead-additives. The NZ examples to be discussed are transferable rights for fisheries, radio spectrum frequencies, water and development rights.

### **1.1.5 Performance bonds, non-compliance fees and offsets**

These are legal instruments to achieve physical regulations. Application of these instruments is either ex-ante or ex-post, and the level can be based on damage compensation. The instruments can, depending on the level set, have a preventative effect.

**Performance bonds** are ex-ante payments to authorities in expectation of compliance with imposed standards. This deposit is refunded upon satisfactory compliance, usually at the end of the project. The security deposit or bond is held until the project is finished and the development has been undertaken in accordance with pre-specified conditions. If the conditions are not satisfied, work required to achieve the standard will be paid out of the bond. The remainder is refunded. Throughout the world there are many cases where firms have decided to walk away from their obligations and lose their deposit. Under the performance bond system, firms have a right to do this and, hence, it is important that performance bonds are of sufficient size to cover the cost of meeting any obligations associated with resource use and development.

**Non-compliance fees** are imposed as an ex-post payment (fine) when polluters do not comply with certain regulations. The amount charged usually relates to

the profits made through non-compliance. The fees give a developer or resource user the choice between meeting a pre-specified standard on their land or paying a fee that represents the cost of replacing the environmental functions and benefits lost. The choice is up to the developers, but usually there is much less incentive to find the most innovative and cost-effective solution. In particular, there is no dynamic or continuing incentive to improve nearby land (Young, 1992:166).

**Offset arrangements.** Offsets are a developing concept. Many development decisions lead to natural resource depreciation. In such cases the Offset Principle suggests that significant adverse effects on environmental quality should be balanced by complementary investments that lead to natural resource appreciation or environmental improvement elsewhere. The more efficient of these programmes give developers the choice between offsetting any lost environmental and ecological functions themselves and contributing to a fund established for that purpose.

## **1.2 GENERAL EXPERIENCE WITH ECONOMIC APPROACHES**

OECD countries, in particular, have turned increasingly to the use of economic approaches (see Appendix 1 for a reasonably complete list of applications by type of approach). Environmental taxes and charges and deposit-refund schemes were among the early approaches, followed, more recently, by the use of tradable emission permits and transferable rights. Within the last 4-5 years there has been an explosion of the use of these economic instruments. Charges and taxes are mainly found in the Scandinavian and West European countries. Deposit-refund schemes are found in Scandinavia and the US and are being considered in western Europe. Marketable emission permits are very much an American invention but are now also being considered in Europe. Transferable resource rights are found in Australia (water), the US (air and water) and New Zealand (fish and others). Financial enforcement incentives are of many shapes and forms and are found everywhere.

Although there is widespread interest and application, the place of economic approaches should not be judged simply by the number of them deployed. Rather it should be judged by how effective the approaches have been in achieving stated goals, by their cost of implementation and by their long-term durability.

Little in-depth analysis of most of the instruments documented in Appendix 1 is available. The reason for this is that not enough time has passed to get a clear



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indication of the full impact (this is so except for a few instruments which are included among the cases studied). Further, in many cases where the instruments have been applied, they have **not** substituted for, for example, regulatory approaches, rather they have been added onto the regulatory approach to achieve greater efficiency and effectiveness in environmental management. For that reason, few if any, studies have been conducted to compare different instruments in terms of achieving environmental management goals (most of that work has been theoretical e.g. all the work on charges versus standards). With regard to practical applications, most of the research has concentrated on describing the applications and the failures or successes in achieving stated goals.

In this report a series of case studies is presented. Each case study presents the application of an economic approach to a particular environmental problem. Sometimes the case study deals with one single application while in others a group of applications in different countries is discussed. Full details of the case studies are documented in a series of appendices. The case studies are summarised in the next section and the relevance of each particular approach to N.Z.

The case study summaries will briefly describe the particular economic approach to environmental management, and discuss (wherever possible) the following aspects:

- institutional context;
- effectiveness in achieving the intended policy outcome;
- impact on general allocative efficiency and equity;
- public finance implications;
- merits of the instrument relative to alternatives;
- special factors that helped contribute to the outcomes;
- preliminary assessment of the potential for applying the economic instrument in New Zealand.