

# Green Taxes and Incentive Policies

An  
International  
Perspective

Glenn Jenkins  
Ranjit Lamech

*Sector Study Number 11*  
*International Center for Economic Growth*  
*Copublished with the Harvard Institute for*  
*International Development*



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**A Copublication of the International Center for Economic Growth and the  
Harvard Institute for International Development**

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## Copublishers' Preface

ICEG and HIID are pleased to publish jointly this volume by Glenn Jenkins and Ranjit Lamech as the eleventh in ICEG's series of Sector Studies. Sector Studies either analyze one country's response to a specific policy problem or compare the policies of several countries. This sector study examines alternative mechanisms for protecting the environment.

Improving the environment is an objective widely shared by producers and consumers in rich countries and in poor ones. While there is a consensus among disparate groups that something needs to be done to reduce the pollution of our air and water, there is no consensus about how to achieve this goal. Some advocate a regulatory approach with stiff penalties applied to all who violate some legally established standard of pollution. Others argue that market-based incentives that allow polluters choice in how to achieve reductions in damage to the environment are not only easier on the polluters, they also are usually more effective in reducing the overall level of damage and doing so at a lower cost to both the producers and society.

This study by Glenn Jenkins and Ranjit Lamech comes down clearly on the side of market-based incentives. The regulatory approach may appeal more to confrontation-minded advocates and to the government officials and lawyers who will manage the regulatory process, but that approach wastes resources by distorting economic choices. Through market-based approaches, it is possible to take into account the varying circumstances facing different polluters of the environment. Compliance, to a substantial degree, can also be made voluntary because the incentives will either make it financially rewarding to use environment-friendly technologies or financially costly not to do so.

Designing effective market-based incentives requires in-depth knowledge of the alternative kinds of taxes and subsidies available and how firms and individuals are likely to respond to them. To that task, Glenn Jenkins and Ranjit Lamech bring a wealth of experience. HIID, together with Harvard's International Tax Program, which HIID helps to run, has been involved in reforming tax systems around the world over nearly two decades. In more recent years, work on the environment, which had been done on an ad hoc basis, has become a major focus of both HIID's research program and of its overseas advising activities. This study brings these two strands of HIID's work together in one place. The focus of the volume is on the experience of advanced industrial economies, for the most part, because that is where much of the experience with market-based environmental incentives resides. The lessons learned, however, with some adjustment for differing circumstances, can be readily applied to the increasingly severe environmental problems of the developing world as well. ICEG has a long-standing interest in the environment, having published several major environmental studies and having in progress or in development several multi-country environmental studies.

This study, therefore, fits well into the series of books that ICEG and HIID have done collaboratively on some of the major issues facing today's developing world and the tools available for dealing with those issues.

Nicolás Ardito-Barletta  
General Director, ICEG

Dwight H. Perkins  
Director, HIID

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# Introduction

Over the past few decades, the environmental policy debate has evolved to recognize the importance of **market-based incentives** (MBIs) as instruments for encouraging pollution abatement. A market-based incentive affects the estimates of costs and benefits of alternative actions, hence influencing the decisions and behavior of individuals, firms, and governments, so that environmentally superior alternatives are chosen. The use of MBIs saves economic resources because decision makers are made aware, through prices, of the environmental implications of their choices. Despite their appeal, most MBIs are difficult to administer and are sometimes politically unacceptable. Therefore, it is imperative that the fiscal instruments designed for pollution control are appropriate to the existing situation.

In this book, we present an overview of the alternative instruments for pollution control. We have included a review of the theoretical foundations of market-based incentive instruments and a discussion of the disadvantages of the traditional regulatory approaches used to control pollution versus the advantages of the market-based incentive approach. Most of the book, however, is devoted to discussing the use of pure fiscal (or tax) incentives to influence pollution abatement. To date, such tax incentives have been the dominant form of market-based incentive employed by governments. We analyze the intent and design of investment tax incentives and their economic and environmental impact by studying specific examples from industrialized countries, as well as reviewing the theory of tax incentive instruments. The purpose is to create a framework for iden-



tifying structural weaknesses and negative behavioral influences, thus introducing the criteria that may be used to evaluate tax incentives. The use of a comparative methodology also suggests structural and legislative modifications of tax incentives that may enhance their effectiveness and promote efficiency.

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# Chapter 1

## Theoretical Foundations of Market-based Incentives

### **The Demand for Market-based Incentives**

Market-oriented pollution-control strategies have emerged due to a realization that traditional regulatory approaches are inefficient for most pollution abatement.<sup>1</sup> First, the spending required in order to comply with increasingly stringent environmental laws and regulation is becoming a major cost of production. The U.S. Environmental Protection Agency (EPA), for example, estimates that over \$100 billion is spent annually to comply with federal regulations.<sup>2</sup> Governments are, therefore, investigating control options and mechanisms that would maximize the pollution abatement per dollar spent.

Second, it is increasingly clear that the costs of installing and operating the necessary control equipment vary greatly both within and between industries. To get the most efficient (least-cost) reduction in pollution, industries with the lowest abatement costs should reduce their level of pollution with due compensation from industries with higher abatement costs. To provide a sense of the cost variability, we refer to a 1982 study that estimated the investment in pollution-abatement equipment and operating costs of pollution-control activities by manufacturing industries.<sup>3</sup>

The study indicated that pollution-control expenses form only a small part of the total costs of most industries. These expenses are concentrated in a relatively small number of activities, with three sectors—chemicals, petroleum refining, and primary metals—accounting for 55 percent of the total spending. Investment in pollution abatement consumes more than 20

percent of the total investment for the pulp and paper, petroleum refining, and primary metals industries. The primary metals industry has the largest share, at slightly more than 2 percent of the total expenditures on pollution abatement.

Third, concern over the impact of environmental regulations on the strength of the national economy and the nation's ability to compete in international markets is acute. Consequently, policy makers place an increasing emphasis on the degree and type of burdens placed on businesses and individuals.

### **The Economics of Market-based Instruments for Pollution Control**

Efficiency arguments in favor of public intervention to mitigate pollution problems are well established.<sup>4</sup> Fundamentally, it is recognized that market failures do occur, with the end result that the true social cost of a product or physical input is not reflected in its price. These failures are termed "externalities." An external effect occurs when the welfare of a household depends not only on its own actions, but also on the actions of others. If the activity imposes an adverse impact on others, it is termed a negative externality. Polluting activities are a prime example of negative externalities.

When there are pollution externalities, the market mechanism fails to induce the polluter to consider the costs to others of his or her activity. In other words, a free market without corrective intervention would result in pollution emissions in excess of the "optimal" levels. More specifically, an industry would pollute until its private marginal benefits equalled its private marginal cost.

An externality is manifest when the welfare of those hurt by the pollution, expressed in terms of social benefits and costs, does not influence the polluters because the costs do not directly affect their decisions to pollute (that is, the costs of environmental damage are external to the polluter).

Economic theory suggests that if the monetary value of the environmental damage caused by pollution can be determined, an environmental charge equal to the cost of damage could be established to serve as a disincentive for environmentally harmful behavior. By imposing this charge on polluters, the cost of pollution is internalized, automatically encouraging them to reduce pollution to the optimal level.

**Equivalence of Taxes and Subsidies.** Environmental charges are commonly viewed as taxes imposed on the polluter. However, an established monetary value does not necessarily have to be a tax; the same optimal pollution level can be achieved by providing a subsidy to the polluter. In that case, the polluter is paid to curtail pollutant discharges in accordance with the degree of willingness to pay for cleaner surroundings.

The equivalence of an environmental tax and a subsidy is an important concept. Intuitively, if pollution has a social welfare cost, society should be willing to pay to stop the polluter from continuing the polluting activity. The net effect is the same as one obtained by imposing a tax on the polluter. The level of the subsidy or tax should be equal to the charge determined by the estimate of environmental damage. If we step back one level from the individual entities (that is, polluters and society), it is evident that, on balance, whether there is a tax imposed on polluters or a subsidy given to them, the economic resources expended to achieve a given optimal amount of pollution reduction are approximately the same.<sup>5</sup>

This equivalence is referred to as Coase's Law and has become of central importance in recent developments, applying economic reasoning to legal issues.<sup>6</sup>

**The Polluter-pays Principle.** Another concept gaining credence among policy makers is the **polluter-pays principle (PPP)**. The convergence of the principle and the use of MBIs leads to a critical policy stance—the elimination of subsidies for pollution reduction. Economic theory leads us to understand that there is no net economic difference between a tax on pollution and a subsidy to reduce pollution. The PPP favors placing the entire burden of pollution abatement on the polluter. This distinction is only normative, since there will in reality be a partial or full transfer of the burden onto the consumer, depending on the relevant demand elasticities. Thus, a market-based incentive embracing the PPP only eliminates the subsidy option from consideration.

The PPP was accepted by the Organization for Economic Cooperation and Development (OECD) member countries in the 1985 Declaration on Environment Resources for the Future, in which they undertook to introduce more flexibility, efficiency, and cost-effectiveness in pollution control. In particular, they pledged to carry out a consistent application of the polluter-pays principle and a more effective use of economic instruments, in conjunction with their environmental regulations.<sup>7</sup>

The Recommendation on the Implementation of the Polluter-Pays Principle<sup>8</sup> (adopted in 1974) specifies that member countries, as a general rule, should not assist polluters in bearing the cost of pollution control by granting subsidies or tax advantages. Exceptions to this rule (to be notified through the OECD Secretariat) were allowed only if all of the following conditions were met:

1. If they related to industries, areas, or plants where severe difficulties would occur.
2. If they were limited to well-defined transition periods adapted to the specific socioeconomic problems associated with the implementation of a country's environmental program.
3. If they were not likely to create significant distortions in international trade and investment.

Britain adheres most closely to the PPP in the area of industrial pollution control. It is a firm government policy to make industry responsible for the installation and operation of pollution-control equipment capable of reducing emissions to the legally acceptable level. If a particular company cannot afford to buy the necessary antipollution equipment, the government does not offer subsidies.<sup>9</sup>

In keeping with this policy guideline, Britain has no specific legislation regarding the tax treatment of expenditures related to pollution-control equipment. Equipment expenditures are, therefore, subject to the general taxation provisions contained in the current legislation.

**The Regulatory System.** To assess the advantages and structure of the market-based incentive approach, it is useful to first examine the more common regulatory approach. Traditionally, regulatory instruments have been used as the primary mechanisms for translating environmental policy into objectives and results. This approach consists mainly of imposing standards regarding emissions and discharges and product or process characteristics through licensing and monitoring. The basis for this control is some form of legislation or government decree. The polluter's compliance is mandatory and noncompliance sanctions are quite common.

The principal distinguishing feature of a regulatory approach is that it

forces all polluters to bear identical shares of the pollution-control burden, regardless of their relative costs of control. This is economically inefficient since the actual cost of reducing a unit of pollutant can vary widely based on plant age, process characteristics, etc.

There are two basic types of regulatory instruments: **uniform technology standards** and **uniform performance standards**. Technology standards specify the method, and sometimes the equipment, that firms must use to comply with a regulation. Usually, technology standards do not explicitly specify the technology, but instead establish standards on the basis of a particular technology.<sup>10</sup> In one case, all firms in an industry might be required to use the "best available technology" to control water pollution; in a more extreme example, electric utilities may be required to utilize a specific technology, such as electrostatic precipitators, to remove particulates. Performance standards, in contrast, set a uniform control target for each firm while allowing them some latitude in deciding how to meet it. Such a standard might set the maximum allowable units of pollutant per time period, but be neutral with respect to the means by which each firm should reach this goal.

The regulatory (command-and-control) approach just described is inferior to the economic incentive approach for two main reasons:

1. *Relatively high costs are imposed on society.* Technology or performance standards can force some firms to use unduly expensive means of controlling pollution. In a survey of eight empirical studies of air-pollution control, it was found that the ratio of actual, aggregate costs of the conventional command-and-control approach to the aggregate costs of least-cost benchmark ranged from 1.07 for sulphate emissions in the Los Angeles area to 22.0 for hydrocarbon emissions at all U.S. DuPont plants.<sup>11</sup> The reason is that the costs of controlling emissions can vary greatly between, and even within, firms, and the right technology in one situation may be wrong in another.

2. *It discourages technological innovation.* The regulatory approach tends to work against the development of technologies that could provide greater levels of control. Little or no financial incentive exists for firms to exceed their control targets. (However, it should be noted that both types of standards contain a bias against experimentation with new technologies.) A firm will not be enthusiastic to develop a new control technology that could subsequently be held as the future standard that it must use or meet, without allowing it any opportunity to benefit from the innovation.



Despite awareness of its disadvantages, the command-and-control approach continues to be used by a number of nations in their approach to environmental protection. The motivations have been discussed extensively by Bohm and Russell.<sup>12</sup> The roots of this anathema toward economic instruments for pollution control is the adversarial attitude that has characterized the beginnings of the environmental movement in many instances. Pollution has often been characterized more as a moral failing of corporate leaders than as a by-product of modern civilization. The characterization, though successful from a political standpoint, has unfortunately resulted in widespread antagonism toward corporations and a suspicion that anything supported by business is probably bad for the environment. In fact, for many years, market-based incentives were regarded as “licenses to pollute.”<sup>13</sup> Needless to say, environmental groups frequently apply different and more rigorous standards when measuring market-based systems against their command-and-control options.

Besides the external forces that have resisted the imposition of market-based environmental protection measures, there has been opposition from within the environmental bureaucracy. A number of individuals in these agencies perceive, sometimes correctly, that their work routines, organizational power, or even existence may be threatened by such market-based approaches. For example, market-based policies would not require the service of engineers in the EPA whose task is to evaluate technologies for disparate sources of emissions across the country. Instead, decisions to select particular technologies to control air pollution would be left up to individual firms. However, the EPA could provide a valuable service by acting as a clearinghouse for information on the capabilities of, and experiences with, various control technologies.

In addition to opposition from the market players, there is also resistance from the firms themselves.<sup>14</sup> Firms seem to prefer regulation because they feel that market-based incentives would result in costs that may be additional to the existing regulation compliance costs. There is also the implicit feeling that they could have more influence on regulations through negotiations.

Finally, governments may also prefer to be slow in proceeding since there is an element of uncertainty regarding revenues and the inflationary and distributional effects of the various market instruments. Fiscal instruments such as taxes and charges are also politically unpopular in some countries. They are often poorly administered and viewed as being unfair in their application.