INTERNALIZING NEGATIVE EXTERNALITIES: PIGOVIAN TAXES VERSUS THE COASE THEOREM

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by

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CHAPTER I

INTRODUCTION

The environment has long been considered to be the classic free good, available in unlimited quantities with no price attached to its use. However, because of its continued use as a resource input in productive activities, and because it provides public goods for consumption such as air, water, and the recreational function of nature, the supply of environmental goods has moved from being limitless into the realm of scarcity. The phenomenon is not isolated or random, but in developed economies must be regarded as inherent in man's production and consumption activities.[1] Simply a growth in population affects the quality of the human living space when space is limited, when raw materials are limited, and when the regeneration functions of renewable raw materials are limited.[2]

From the economist's point of view the environment is and always has been a scarce resource, where scarcity implies that competing uses exist for a given good, and that not all demands for its uses can be satisfied. However, unlike private goods it is not subject to a pricing mechanism,

and thus the environment has remained unpriced. Where the resources of the environment are basically unpriced, pollution will tend to be pervasive in the economy.[3]

Because environmental resources can be used at zero price, it is subject both to overuse and to a decline in environmental quality. This causes private and social costs to diverge because the cost of using the resources will be borne by society, not by the ultimate user of the resource. Commodity prices will not indicate the true opportunity costs of economic activity, and pollution intensive activities will become too large relative to an allocation optimum.[4] The result is that sector structure will become distorted in favor of the pollution-intensive sector, and too many resources of production will be attracted to this sector.[5]

Anytime private and social costs diverge we encounter, in the vernacular of economics, the problem of externalities. More specifically, the emission of pollutants into the environment causes negative externalities to become prevalent because society is asked to bear those costs not fully internalized by the firm. Negative externalities and their effect on public goods will be discussed in chapter 2, with particular attention paid to the environment in its context as a public good.

Attempts have been made to introduce programs and policies to deal with this problem; that is, to internalize the cost of this resource. In chapter 3 I will discuss the most traditional of these internalization methods--the Pigovian approach which allows for a tax to be levied on the economic entity deemed to be the polluter, or the payment of compensation from that entity to the damaged party.

While this has been the most widely used policy to alleviate the divergence of private and social costs, its acceptance has not been universal. Just because a particular policy eliminates an externality does not mean that this policy's necessarily desirable or efficient. I will discuss in chapter 4 why it is that the Pigovian solution to externalities is not accepted as a correct policy in all instances.

The most significant alternative offered to the tax-subsidy policy of Pigou is the approach proposed by R.H. Coase, basically advocating a property-rights approach to environmental resource allocation.

> Let exclusive property titles to the environment be defined, and let them be transferable. Let there be no transaction costs. Let individuals maximize their utilities, and let them be nonaltruistic. Then a bargaining solution among different users of the environment will result in a Pareto-optimal allocation of the environment. The resulting allocation is independent of the initial distribution of property titles.[6]

This theorem is discussed in chapter 4, showing examples and graphical representations of the bargaining process.

As with the Pigovian solution, problems are present when advocating a policy in which bargaining between the damaged party and the polluter takes place. Chapter 5 is devoted to a discussion of these problems and how they can hinder the effectiveness of such a bargaining arrangement. While the Coasian solution purports to be neutral, one can envision circumstances in which one party will have an unfair advantage over the other. This is particularly true when a community seeks to negotiate a bargain with a firm which is polluting its air.

CHAPTER II

EXTERNALITIES AND PUBLIC GOODS

From the point of view of economic analysis the problem of pollution takes the form of externalities, or more specifically, external diseconomies. Externalities are of significant importance to economists because they limit the effectiveness of the market mechanism in satisfying consumer preferences,[7] as well as exert influence in production processes.

> For example, consider a steel mill or electrical generating station that emits smoke which increases laundry and cleaning costs for miles around; suppose further that the accumulation of laundry bills far exceeds the cost of smoke elimination devices. Since the steel mill does not pay the laundry bills itself, there is no financial pressures to induce it to limit its outputs of smoke, even though (comparing laundry costs with the cost of the smoke-control equipment), it obviously would benefit society to have such devices installed. Moreover, because part of the cost of the steel production is borne not by the steel manufacturer but by those who pay the resulting laundry bills, the production and sale of steel-using products will be stimulated (by the financial saving to the producers of steel). Steel output will be expanded, not because of a growth in consumer demand, but by the implicit subsidy that occurs when others pay part of the real cost.[8]

Thus, where external diseconomies occur, the private enterprise system will respond imperfectly to the desires of the public, and raise the question as to whether the price system will act as an efficient servant of the public's preference structure.[9]

In their most basic form technological external diseconomies can be described as nonmarket interdependencies among economic activities.[10] Under these conditions the output of one economic agent enters into the production or consumption function of another economic agent without any compensation being paid by either party. This idea is more clearly seen if we consider two production activities, i and j. An externality exists if the output Q_1 in activity i depends on the output Q_j or on the inputs R_j of the other activity. Hence, the production function can be written $Q_1=F_i(R_1;Q_j,R_j)$ where $\frac{\partial Q_1}{\partial Q_j} = 0$ and $\frac{\partial Q_1}{\partial Q_j} = 0$. If the output of good i decreases while the output of good j is rising, then an external diseconomy will prevail.[11] The result is that externalities can, and in many instances do, prevent the market mechanism from functioning efficiently, i.e. giving rise to a Pareto-optimal solution.[12]

Another way of conceptualizing external diseconomies is as a divergence of private and social costs where social costs are defined as those costs not fully internalized by

the producing firm. The occurrence of an external diseconomy will, in general lead to a discrepancy between marginal social net benefit and cost. A prime example of this circumstance is smoke emission by a factory. If the factory pays nothing to emit smoke into the atmosphere this type of waste disposal is encouraged because it is viewed as costless resource by the firm. Clearly the means of disposing of unwanted residuals which maximizes the internal return of decentralized decision units is by discharge into the environment, principally watercourses and atmosphere.[13]

Because these are zero-priced resources for the firm, it is left to society to bear the costs of the emissions in the form of increases in the absolute and potential levels of cardiovascular disease, harmful effects on production processes, and a loss of aesthetic pleasures such as flowers, trees, and clean buildings. Here we have a situation where one producer is creating an atmosphere unfavorable to other producers and consumers. Thus while the discharge of smoke into the atmosphere is viewed as a free resource by the emitting firm, it is not a zero-priced resource for those residing and producing within affected communities.[14] To the community at large the environment is a valuable commodity for which a price should be charged for its use. However, in most instances the physical character of waste

disposal is such that virtually the entire resulting damages and attendant costs are external to the unit actually discharging the wastes.[15]

Such a situation is not unusual. In industrialized, developed societies external diseconomies are not isolated phenomena. Indeed they are inherent in the production and consumption activities of that society. The laws of conservation of energy and mass provide the ultimate evidence of the unavoidable connection between production and externalities, for they show that wastes simply cannot be made to vanish.[16] Material residuals are generated in production and consumption activities, and their mass must be about equal to that initially extracted from nature. Accordingly the services which material objects can yield are used, but their substance remains intact.[17] Since we can reasonably assume that nearly all manufacturing processes make use of at least some resources to produce their final product, part of these resources will be discharged into the environment in the form of wastes, thus creating external diseconomies.

From the point of view of the polluting firm, pollution is a factor of production because the manufacturer may regard waste disposal as another resource which contributes to the production process insofar as a reduction in waste discharge can only be achieved by adopting an alternative production method which emits less waste or by using the

same process with waste control devices.[18] Either of these alternatives entails a diversion of resources away from production and into pollution control. The resulting opportunity cost of a cleaner environment is less production. This may provide industry with an inducement to make technological changes in their productive processes so that efficient production can take place in a less polluting manner.

However, production processes are not solely responsible for pollution. Consumption also produces waste. Except for increases in inventory, final goods ultimately enter the waste stream because goods which are consumed really only render certain services while their material substance balance remains in existence and must either be reused or discharged into the environment.[19]

The result of continued emission of waste into the atmosphere is that the environment has moved from being a limitless resource into the realm of scarcity. If the waste assimilative capacity of the environment is scarce, the decentralized exchange process cannot be free of uncompensated technological external diseconomies unless (1) all inputs are fully converted into outputs, with no unwanted material residuals along the way, and all final outputs are utterly destroyed in the process of consumption, or (2) property rights are so arranged that all relevant environmental