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Decision-Making Tools for Environmental Policy

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«DECISION-MAKING TOOLS»

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In this brief talk I will set out the fundamentals of an overview of the conceptual basis of how one can think of environmental protection from the perspective of economics. My hope is that by providing a conceptual or analytical framework, a way of thinking about the issues, I can help to sharpen our focus to define what the questions are and, sometimes, reveal what the appropriate questions are not.

A Framework for Environmental Economics

Two questions seem fundamental in environmental policy, both of which can be informed by economics. The first question is, "What is the appropriate goal?" By this I am referring to the question of the desirable degree of environmental protection. How clean is clean? Is a 10 million ton reduction in sulphur dioxide emissions sufficient? Should it be only 8 million tons? Perhaps it should be 12 million tons.

A conceptually distinct question, although interrelated in terms of how we actually formulate our policies, is the question of the means. Once we have established the goal or the standard, there are alternative means by which we can try to achieve that goal. The question might be: "Is the best public policy a liability scheme, is it a tax approach, or is it a conventional standards approach?"

Economic thinking can help to inform answers to both the question of goals and the question of means. Today I will concentrate on the former.

Of course, this may beg still another question: what does economics have to do with the environment? As Secretary Narbona said, the question on the table might be thought of as, "Are economics and environment mutually exclusive, or are they compatible? And can one help us to think about the other?" In terms of answering this question of what economics has to do with the environment, I want to make two assertions to which I will then attempt to give some credence as I proceed. The first assertion is that the causes of environmental problems in our market economies are fundamentally economic. And the second is that the consequences of environmental problems have exceptionally important economic dimensions.

Let me turn to the first: "What is the cause of environmental pollution?" In other words, why do firms simply not control pollution on their own? The quick answer from some environmentalists, 30 or 40 years ago, might have been that the people within private industry were somehow ethically impure. But now, in the 1990s when we are all part of the environmental problem, that is clearly not a useful answer. So we have to go a bit deeper. What we begin to find is that private firms in a market economy do not control pollution to the levels that we might wish them to do on their own because the environmental consequences —these costs or social damages— do not show up in the "bottom line" of the firms' financial statements. Yes, there are public relations impacts, and those are implicit in the bottom line. But most of the damage is external to the firm. This is why economists think of this entire area of environmental problems as a problem of "externalities."

Now let's think a little bit further about the economic consequences of pollution. The first point I want to make is that the economic consequences of environmental pollution are not simply financial. It bothers me when I hear people talk about the loss of Amazon rainforest in terms of the economic consequences such as lost pharmaceutical products that we might be able to produce. That is only a small part of the story, there being a difference between economics and accounting. Accounting is about dollars and cents, and economics is about human welfare under conditions of scarce resources.

Measuring the Benefits of Environmental Protection

Take a specific question: "What is the economic measure of the human health impacts of environmental pollution?" To start with the obvious, the accounting approach, we could say that the health care costs of people getting sick from environmental pollution would be one measure. And we could go a little further, as economists have for forty or fifty years now, and observe that since those people are no longer working, we must also include in the costs the lost wages, or lost productivity, to the economy. That is still the accounting part. The lawyers would tell us that there is something else: pain and suffering. The economic answer is not to separate out such a factor, but to recognize that the true economic measure of those health damages is however people really value their health. I said how they <u>really</u> value their health, I did not say what people would tell you if you were to ask them how they value it. That is a very important distinction in economics, and one to which I now turn.

What are the benefits of environmental protection? They are the value of the environmental damages that are avoided. Remember: damages in economic terms are however people really do value them. That means that the benefits of environmental protection are equal to the sum of the sacrifices that people would actually make. Economists talk about willingness to pay for environmental protection, or willingness to

accept compensation to tolerate a lack of environmental protection. In other words, it is the sum of the way people actually evaluate environmental quality.

That might not sound like an operational definition: how can we possibly measure it? Over a period of 50 years economists have devised, and have been applying around the world, a series of methods for determining the true value of environmental degradation. There are strange names for some of these methods: the hedonic property method, the hedonic wage method, the travel cost method, and lastly, contingent valuation methods. Some of these are controversial, some are not. None are perfectly precise; uncertainty is involved. But these methods provide ways of beginning to understand the benefits of environmental protection in somewhat rigorous, economic terms.

When we move from looking at the benefits of environmental protection to determining who the beneficiaries of that protection are, we confront additional complexities. The direct beneficiaries, those directly affected by environmental pollution or environmental degradation, may be only a small part of the story. For example, if we lose a species in the wild, such as the Bengal tiger, very few of us will have our welfare directly affected in terms of not being able to see it, or photograph it, or hear it. That use value is very small. But many people will lose the option to do that in the future, should they care to. Many people, perhaps many people in this room and certainly many around the world, derive some benefit today just from knowing these animals exist in the wild. Economists call these option value and existence value. Again, they are measurable and quite real. If you look at the court cases surrounding the Exxon Valdez accident in Alaska, the parties were measuring existence value.

When we turn from theory to practical empirical matters, we find that with higher levels of pollution, not only do the damages increase, but the incremental damages increase. The first bit of pollution may simply have aesthetic consequences: my car is getting dirty as a result of suspended particulates. If we increase pollution, the most sensitive members of the population may

become ill. If we increase pollution still more, everyone becomes ill. If we increase it even more, people can obviously begin to die. So the key factor to look at is the increase in marginal or incremental damages. That turns out to be important because it means that the marginal benefits of controlling pollution are decreasing, as we take it down to a zero level. We get the most return from controlling pollution when things are worst, we still get benefits when we cut it additionally, but those benefits become smaller. That turns out to be important: in devising public policy, it is the marginal benefits that matter, not the total benefits.

The Costs of Environmental Protection

But before I pursue that point, I want to turn to the other side of the ledger, the costs of environmental protection. If we were to ask the general public what the economic costs of environmental protection are, people would respond in terms of what shows up in the budgets of government, primarily the monetary enforcement costs. However, except for a rare number of public policies, those turn out to be a trivial part of the cost, anywhere from 2 to 5 or sometimes 10 percent of the costs. More important are the private sector costs, that take the form of new capital required, augmentations of capital, or additional operating costs. These constitute 80-90 percent of the true cost of environmental protection. These costs, of course, are passed on to consumers, in amounts depending on the relevant elasticities involved. Being sensible, we tend to clean up first, that which is easiest to clean up, or (to put it in economic terms), that what is cheapest to clean up. As we move to higher and higher standards, we find that not only are the total costs of environmental protection increasing, but the marginal, or incremental, costs of environmental protection are also increasing. The cost to go from a 10 to a 12 million ton reduction of sulphur dioxide for acid rain prevention in the United States is five times greater than the incremental cost to go from an 8 to a 10 million ton reduction. And it is the marginal cost that matters for public policy.

That takes us to the point: if the marginal costs are increasing, and if the marginal benefits are decreasing, it means the difference between benefits and costs — the surplus or the net benefit — is going to be at a maximum at some intermediate level. Therefore we face a difficult and important question in public policy: "How much pollution control is optimal, how clean is clean enough?"

Consider environmental policy decisions that each of us makes in our home when we decide about environmental control — for example, how often to sweep the floor in the kitchen. I don't keep my floor in an infinitely clean state, I don't invest all of my resources in keeping the floor clean. I strike some kind of a balance in terms of how clean I will keep the floor. On the other hand, I tend to want to make sure that the floor of a surgical theater in which I might have an operation, or my family or friends might, is going to have imposed upon it a much higher standard of cleanliness. The reason, of course, is that the marginal benefits of pollution control, i.e., preventing infection, are much greater in the surgical theater where there is a risk of infection than in my own kitchen where I tend not to carry out open heart surgery.

Decisions for Public Policy

Thus, when we observe people's behavior and we observe people's collective decision-making in their communities, what we often observe is that they are doing a sort of balancing of benefits and costs. The question is: how can or should we do it in terms of public policy? There is one particular criterion that utilizes everything we have been talking about in terms of benefits and costs: the efficiency criterion, the notion of maximizing net benefits. This notion is not simply that benefits are greater than costs. Rather, the rule is that the difference between benefits and costs should be as great as possible. We may find a program that has benefits greater than costs, but it could be that by making the standard more strict, or by relaxing the standard, the difference between benefits and costs could be increased.

I hasten to add that efficiency is only one of many criteria. Another, of course, is equity: how are these benefits and costs distributed? We might develop an environmental policy that is efficient in terms of maximizing net benefits in the aggregate, but that had unacceptable consequences for particular income classes or geographical areas.

Finally, I want to turn very briefly to what I said was the other big question for environmental policy — putting aside now the goals — and that is the question of the means. Even after we decide what the goal is — whether we decide on the basis of economic criteria, political criteria, scientific criteria, or simply guess and go blindly ahead — we face the decision of how to achieve that particular environmental goal. Here economic analysis is a very powerful tool to enable us to choose the least cost means of achieving the goal. If we decide that our goal is a 10 million ton reduction in sulphur dioxide, whether that is efficient or not, we can then attempt to reach that goal as cheaply as possible. That is the criterion of cost effectiveness.

There are two principal types of environmental policy instruments that people have talked about, some of which are cost effective and some of which are not. The set of regulatory approaches sometimes called command-and-control, or conventional regulatory approaches that have been used in all of the industrialized countries and in virtually all of the developing countries since the beginning of the modern era of environmental protection (perhaps around 1970), is a set of approaches in which governments tend to dictate to individual firms how much to clean up, and how to clean up. These are uniform performance standards or technology standards, and they tend to be excessively costly, since they lock in existing technology rather than provide true dynamic incentives for providing better and cheaper pollution control technologies over time.

More flexible approaches that are now getting a great deal of attention, sometimes only lip-service but sometimes real consideration, are so-called market-based, or economic incentive, approaches. The idea is to harness market forces to protect the environment. These include tradable permits, pollution charges or taxes, deposit refund systems and others.

Conclusion

I will leave you with this thought: there is no panacea. It is not the case that market-based approaches are always appropriate, or that market-based approaches are never appropriate. The real challenge in this area of policy instrument choice is to select the right pollution policy instrument for each specific problem that we face.