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EEP 101/ECON 125
Spring Semester, 2002

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Chapter 22

On Economics, Ethics, Politics, and the Environment

The Assumptions Behind Economic Analysis

Economic perspective is humanistic; namely, it considers humans paramount. The utility function represents human preferences, and it is assumed that humans are able to make decisions that affect economic outcome. Of course, humans are not omnipotent; namely, their capacity to operate and make choices is affected by constraints. Some of these constraints are laws of nature or rules affecting behavior of ecological systems, and some are behavioral and institutional. Economics has a strong assumption about the underlying human nature that dictates constraints of certain behavioral rules. However, the basic emphasis is on analyzing or obtaining decision rules that are derived from human desires. In this regard, economics is different than, say, religion where to some extent the will of God is paramount and humans must behave in a way that is either prescribed by God or that adheres to God's preferences.

Similarly, in the case of the environment, some people's perspective may be animalistic, and they consider animals' well-being to have major weight in the decision-making criteria. This perspective can be accommodated by economics but within a humanistic framework (economic value of animals' well-being as long as it is part of humans' preferences). Economics is not nationalistic in a sense that the well-being of people as a whole is not in most cases introduced

explicitly as a criterion for a traditional economics model. The basic elements of economics are very simple. Human preferences have to be satisfied and yet take into account the constraints of technology, rules of nature, and human behavior. However, this simplicity also provides mechanisms for accommodating other perspectives.

Economics, Ethics, and Religions

Religious or ethical considerations can be easily incorporated into economic decision-making frameworks. This can be done by modifying both constraints and preferences. For example, the vegetarian principles can be incorporated to consumer behavior by imposing an upper bound of zero constraints on meats or some other products, and by having consumers make their choices within a constraint framework that includes a set of goods without meats. Similarly, economic analysis can examine choices of humans when, for example, other constraints on activities are introduced. For example, choices that result from imposing a ban on harvesting of old growth forests or certain species can be studied, and then the outcomes can be compared to those of systems without such constraints.

One interesting issue is the notion of sustainability. Sustainability may be interpreted as setting a minimum on resource depletion. For example, this minimum can be the level of resources at a given period (at the present or some benchmark period in the past). Alternatively, it can be a steady-state level of resources that is deemed desirable, and one can devise and analyze the optimal resource choices under different assumptions of sustainability.

When religious considerations or environmental preferences are expressed in terms of constraints, economic analysis can determine the cost of these constraints. In most cases the cost will be evaluated in monetary terms; but one can consider, for example, the trade-off among, say, constraints on food intake, health, consumption of other goods, etc., to compute the cost of food restrictions in terms of wealth.

Economics accommodates religious or ethical considerations by internalizing them either through preferences or constraints. The phrase, "small is beautiful," can be accommodated in two ways. The utility function of the consumer may have an element that assigns value to the size of farms or factories. Thus, there is a negative value in manufacturing let's, say, cars in large factories or, more realistically, animals in large farms rather than small farms. In this case an economic model that will determine production patterns including farm size will have an extra cost associated with size. Thus, the optimal size of a farm will take into account the marginal benefit associated with the scale effect minus the marginal cost of size. With the "small is beautiful" cost, the optimal size will be below what it would have been without it.

An alternative approach is to impose an upper bound on size. In this case, this bound will either constrain or not constrain the optimal size. If it constrains optimal size, then there is a shadow price of the "small is beautiful" constraint. Furthermore, one can also do the same analysis under different constraints and develop a marginal cost of the size constraint. These two lines of analysis basically show some of the possible adjustments and modifications of economic analysis to accommodate environmental concerns.

Incorporating religious or ethical principles to economics requires a clear quantitative definition of their meaning. In some cases it is obvious. "Thou shall not kill" means that there is a constraint of zero murders. But what does "honor thy father and mother" mean? Does it mean an extra element in the utility function of decision making when the well-being of a relative is included?

There are some economic models that actually introduce such an approach when individuals aim to maximize utilities including their own well-being and the well-being of others. These types of approaches may result in outcomes that are different from the standard model. It may also result in situations of "discrimination." By explicitly incorporating an alternative interpretation of ethical or religious perspectives into quantitative models, one can get a better feel of the implications and assessment of their "cost."

Economics and Human Nature

Social theories have implicit or explicit assumptions of human nature. Hobbs assumes that humans are egotistical and impervious to moral considerations and, from these assumptions, he developed a theory of a state that actually controls humans, thus allowing them to operate together. Others may assume that humans are "good" and that they help one another, do not ever cheat, or avoid actions that will hurt others. These assumptions result in a set of predicted outcomes and prescribed activities. Under these assumptions, when a society's environmental values are internalized and environmental costs are part of the private costs, there is no reason for intervention in terms of taxes or subsidies.

In a society where people are more concerned about their own well-being and are either unaware or don't care about environmental implications, one needs to interfere. Economic models obviously take the second approach, but economics is not that rigid. In some situations education modifies the individual production function, but most importantly from our perspective it leads to modification of preferences. One of the most interesting areas of research is the empirical understanding of how behavior can be modified by education, assessment of differences in patterns of behavior among individuals who have different perspectives, etc.

Heterogeneity

A major issue in establishing environmental policies is heterogeneity among individuals. Some individuals have environmental ethics and do not intentionally pollute, while others simply don't care. Since policymakers cannot differentiate between the two groups, uniform policies have been established. **Therefore, a tax on certain activities may negatively affect people who are environmentally conscious and who have internalized externality and behave optimally without the tax.**

One of the challenges of policymakers is building discriminatory policies that will identify the people who don't take into account social cost. One solution to this problem may be to introduce mechanisms where people are allowed to consume certain products or use chemicals, but must pay a higher price or a tax when consumption exceeds a level that is deemed to be socially optimally. While lack of information may cause issues of heterogeneity to result

in suboptimal outcomes, in some cases heterogeneity results in nonuniform solutions that reduce some of the conflicts associated with environmental values.

Obviously, differences in tastes and preferences result in self-selection. Vegetarians will not become butchers, and people who care about environmental amenities may elect to move to communities where those amenities are more available. However, there is a limit to what self-selection can do. One of the most difficult aspects of environmental ethics is that people like to impose their values on others. Individuals who oppose killing animals will likely ban hunting. Here the political process may play an important role.

Economic models also have institutional assumptions. Most of the analyses in economics are based on predicting outcomes under alternative market structures, e.g., monopoly, competition, etc. Economics also recognizes the importance that property rights play in the economy. If we are entitled to quiet time between 12:00 a.m. and 8:00 a.m., then noisy neighbors who disturb our sleep violate our property, and we are entitled to some compensation. Environmental ethics can provide the basis for establishing property rights or justifying legal intervention. For example, if certain species of animals are protected, then hunting them is illegal and hunters should be penalized. When the lives of animals are not protected, then hunting is a legal activity and people who are against hunting will resort to paying hunters not to hunt in order to preserve the rights of endangered species.

Intergenerational Equity

Many environmental and resource problems are inherently dynamic. Climate change is a process in which pollution is accumulated in the atmosphere.

Deforestation is a dynamic process of resource extraction. Most of the concerns about environmental quality are associated with conservation of natural resources. Many view the environment as an inheritance that our generation will be pass on to our children. How are these concerns about intergenerational equity expressed in economic analysis?

One approach is to set certain constraints by placing a limit on the amount that certain resources can be mined. For example, a lower bound can be set for resources that have to be perpetually preserved or for longer time periods, such as old growth forests, natural ecosystems, etc. Thus, policymakers who control forest resources or manage fisheries have to operate within these constraints and, when issuing harvesting permits, have to recognize the impact of harvesting on the dynamics of the resource and the likelihood that the constraints on the stock will be violated. Binding constraints on resource stocks may result in a shadow price that will be taxed to resource mining.

One of the major challenges of such an approach is determining the upper bound on a resource stock that will be preserved. In a democratic society, it will be left up to politicians to determine both the popular sentiment and the economic reality. Thus, environmental preferences will lead us to introduce a ban on, say, oil mining in Alaska. The extent that we will have to preserve these bans will depend on political-economic reality. Environmentalists, however, believe that their role is to fight for the ban now, and let future generations worry about resources as the circumstances evolve in the future.

One challenging question is how should society establish limits on resource harvesting or extraction? Limiting harvesting has economic implications that also affect the dynamics of other resources. Intertemporal

models of natural resources management take into account the future utilities from resource extraction, which are introduced through user costs. If, in addition, society decides to establish certain limits on resource harvesting, economists should assess the cost of various levels of constraints. Social debate and decision making are much more formal and rational when all parties are aware of the cost and the other impacts from the new regulations on natural resources management.

Complete assessments of intergenerational relations and equity have to take into account that, in addition to natural resources, each generation will transfer many other assets to the next generation. They include physical capital (machinery, buildings, pieces of art, infrastructure, etc.); intellectual capital (knowledge including environmental knowledge); social capital (institutions and mechanisms for conflict resolution and cooperation); and human capital (skills, knowledge, and abilities of individual members of society). Therefore, intergenerational policies cannot be established effectively and efficiently when there is concentration only on one aspect, such as natural capital. We have seen in the past that, as standards of living in certain places increase, environmental quality also increases. In some cases, it may be worthwhile to deplete resources or environmental quality for a while if it increases buildup of human capital, knowledge, or physical capital. Thus, the key in assessing resource management policies involves not only the impact of the cost of the resource itself, as well direct cost and benefits of resource consumption, but also the impact on other stocks that are of value to society.

Environmental Justice

One major issue of concern is that in many cases the poor are subject to much worse environmental conditions than the rich. In many cases recycling facilities, dumps, and disposal sites are in poor neighborhoods. Some of these are the result of economic reality. If a contaminating or externality-causing factory is built in a certain location, the area near it will decrease in value. Building owners in these areas will charge lower rent, which then attracts the poor. In this case, poor people have a choice to either live in expensive houses in more pleasant neighborhoods or cheaper houses in less attractive neighborhoods, and the selection of location represents an economic choice.

However, things are more intricate and complex when it comes to selecting disposal sites by the government, **using benefit-cost analysis.** Since land in poor neighborhoods is cheaper, when the public sector makes decisions about waste disposal facilities, they are more likely to select a location in poor areas than in rich ones and, by building these facilities, they will make the area even poorer. Thus, we have a vicious cycle in which areas that are inhabited by the poor will more likely attract negative externalities, causing facilities or plants to reduce the quality of life in their neighbors. In these cases, it is important to have a policy where generations of externalities are charged for the damages, and we actually apply the polluter pay principle. In addition, the victims of such activities are compensated. Obviously, developing appropriate and effective compensation schemes is quite challenging, and one of the most important environmental policy issues.

Political Economy and the Environment

Economic analysis can be used to assess the well-being of different groups (stakeholders). Consider the simple externality model in Figure 1.

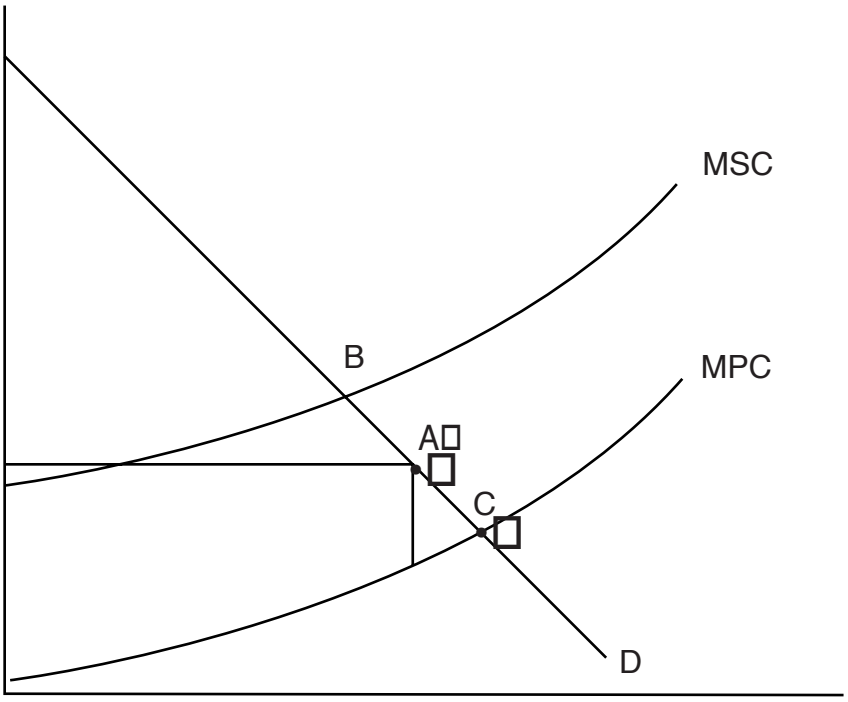

Figure 1

The model can be used to assess the impact of, say, a proposed tax resulting in outcome reflected in point A for consumers, producers, the environment, and overall social surplus. The analysis will compare such a tax with optimal policy (point B) or no tax, point C. Various groups will use economics to analyze alternative policies as well as their impact on these and other groups. The analysis will be crucial for political decision making.

Political-economic models will assess the implicit weight given to various groups in determining actual policies, for example, the extent to which environmentalists, farmers, or municipal groups have control of water regulation, air **quality control policies**, etc. The political power is shifting; there now seems to be greater awareness of environmental issues than 30 years ago.

Interest groups may form coalitions that will shape resource policies and environmental regulations. Some maintain that cities and farms have collaborated in the past to control water policies in California. In recent years we have seen coalitions established between environmentalists and farm groups (rice producers) or cities to achieve environmental objectives.

Economic analyses, combined with improved models of political systems, can provide a much better understanding of potential outcomes of political-economic systems. This is an area that holds much promise in future research. Both empirical and theoretical studies show that crises trigger reform. For example, the energy crisis led to regulations that increased **the miles-per-gallon requirements for cars,** and the drought in California resulted in water markets.

The Precautionary Principle

Since most environmental concerns are related to the introduction of new technologies, regulatory frameworks that led to the introduction of such technologies have been the subject of much debate. For example, the development of nuclear power has been curtailed because of environmental concerns, and some chemicals have been banned because of negative environmental side effects. The government assumes responsibility in licensing and regulating the use of new technologies.

The precautionary principle recognizes that there is a high degree of uncertainty about the impacts of new technologies, especially on the environment, and that new technology applications should be curtailed unless they are deemed to be safe. The question is: What is safe? Some may interpret this to mean that, when the technology is introduced, there is no contingency in which it may cause any harm. If C is the damage associated with a new technology, and Z is the random variable that assumes various values at a certain probability, then this perspective suggests that the technology shouldn't be allowed to operate or be introduced if the probability that $C > 0$ is greater than 0. While this perspective may present an ideal situation, many valuable technologies would never have been introduced if some risks had not been taken.

An alternative perspective is that technologies should be introduced if its net expected benefits are greater than the net expected costs including the environmental and health costs. Of course, implementation of these criteria may result in many different outcomes, especially when the assessment of nonmonetary costs is arbitrary and there is high uncertainty about both benefits and costs of nonmarket outcomes. Nevertheless, the government may take a more conservative approach in developing a formal constraint to introduce a policy based on risk alone. Namely, they may wish to contain both the maximum allowable damage (let's define it as $\overline{Z}$) and the likelihood that it will reoccur (let's call it α) and thus set a constraint on a new technology so that there is probability that $Z \geq \overline{Z}$ is smaller than α.

Under this approach, what will determine $\bar{Z}$ or α? One way economists can help is to calculate an assessment of the shadow prices of upper bounds on damage or degree of risk α. These shadow prices determine what will be the expected benefits to be gained from increasing either $\bar{Z}$ or α. In cases where a shadow price is very high, policymakers may increase the degree of acceptable risk, while in cases where the shadow price is low, the regulations may become stricter.

Reality becomes more complex as our knowledge improves with experience and time. Therefore, making a one-for-all decision about technologies may be suboptimal. The approach taken with respect to new technologies can be viewed as adaptive management. Firms that introduce new technologies that are considered to generate some measure of environmental or health risks first have to conduct tests to show that the technology meets various performance and environmental concerns. For example, in the case of pesticide chemicals, the attitude today is to move towards pesticides that cause minimal or no damage to any other organism besides the one that they aim to attack. Once the technology has been used, its outcomes are monitored and, whenever evidence of unexpected negative effects is discovered, its use is reevaluated. In using this approach, for example, DDT and other pesticide chemicals have been banned, and the government is constantly introducing regulations based on new knowledge that either bans or restricts chemical substances.

In spite of the attempts of many to introduce evaluation criteria based on risk alone, the magnitude of the benefits and especially who benefits has much impact on the future of technologies. How people evaluate medicines provides

some perspective on technology choices. People may tolerate medical treatments that will eliminate grave and dangerous medical situations, even though it may have some negative side effects. Similarly, they will tolerate use of certain chemicals that may be harmful if the loss associated with their elimination is very substantial. However, when the economic benefits from the use of chemicals do not seem to be very high, the public tolerance of side effects is very small.

One major element that affects the evaluation of risks and technologies is determining who possesses the benefits and costs. That largely depends on liability and other legal arrangements related to risk management. Chemical companies will be much less likely to introduce chemicals that may cause environmental and health risks and will be more supportive of a regulatory process that is strict in cases where they are liable for most of the damages. One has to note, however, that manufacturers of pesticides or other products that depend on repeat purchases will be somewhat concerned with side effects, even without strict liability and environmental regulation because of the desire to retain costumers. Obviously, strict liability rules that are enforced will induce more safety. The importance of benefits as well as cost of regulation is illustrated in the case of biotechnology. Many individuals who object to recent developments in agricultural technology feel that society is taking an ecological risk, while farmers and biotechnology companies reap most of the benefits. The introduction of genetically modified varieties that are yield increasing, for example, drought-tolerant or health-improving varieties, would probably have been much less resistant to the early introduction.