Chapter 6

Property Rights and Political Economy

Contents:

General Overview

Property Rights and The Coase Theorem: If property rights are well defined and transactions costs are very low, then it may be possible for the parties involved in an externality situation to reach an efficient solution by bargaining amongst themselves.

The Economics of Environmental Restoration and Clean-Up: Given a limited amount of financial resources, it is important to determine the optimal amount of pollution to clean up.

Uncertainty and the Weitzman Model: Uncertainty about the demand for environmental amenities and the costs of environmental protection may make standards preferable to taxes in certain situations.

Limited Information and Second-Best Outcomes: A complete lack of knowledge of environmental costs or benefits will lead to the development of second-best sub-optimal policies.

The Political Economy and Externality Policy Choice: Many special interest groups attempt to influence the formulation of regulatory policy through political contributions. The theory of political economy attempts to capture such notions as:

- Regulators capture (regulators may be controlled by producer/consumer groups).
- Rent-Seeking (special interest groups may seek to acquire the rents associated with certain regulations).

Legal Aspects of Environmental Policy & Coase Theorem

Property rights define entitlements which holders cannot be forced to give up. The notion is a legal definition.

For example in a production externality situation such as water pollution:

- a chemical plant may have the property right to pollute a river.
- swimmers and bathers may have the property right to clean water.

Coase Theorem: When property rights are clear and enforceable, when all economic agents have full information, and when transaction costs are low, there is no need for government intervention to correct externalities, because the economic agents can bargain to achieve a Pareto optimal allocation of resources. Further, the ability of economic agents to achieve the Pareto optimal allocation does not depend on which economic agent is given the property rights.

For example:

> What the Coase Theorem has to say about the case of water pollution above is that government regulation is not necessary to achieve the social optimal level of water quality provided that someone owns the property right to all river resources. Even more surprisingly, the same optimal allocation of water quality, Q*, will be obtained regardless of whether the chemical plant or the swimmers are given ownership of the river.

The Coase Theorem Depends on Bribery:

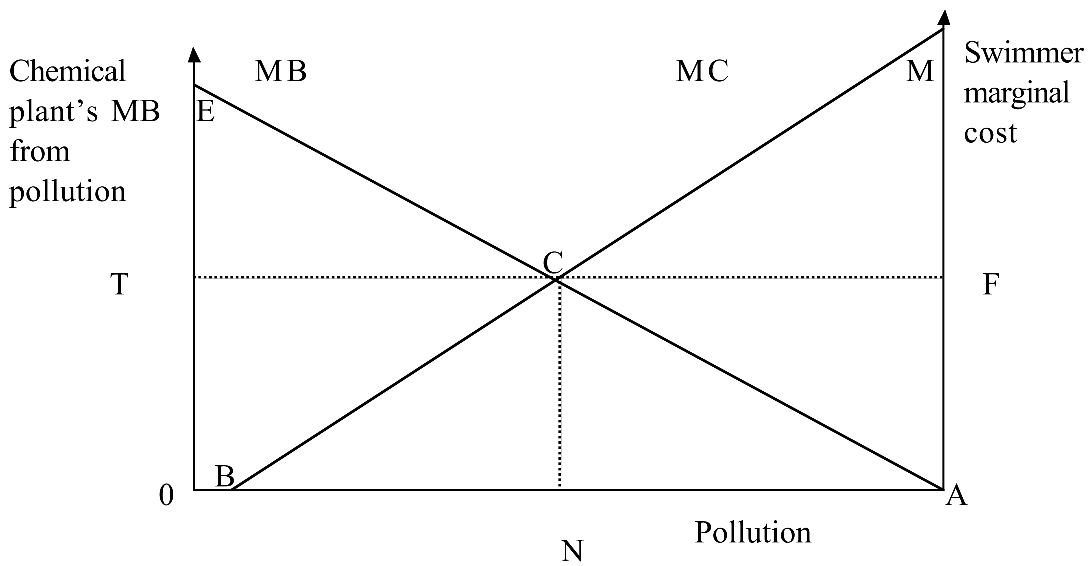
If swimmers have the right to clear water, the chemical plant will bribe them to be able to pollute provided the Marginal Benefit of pollution exceeds the Marginal Costs of pollution to swimmers.

If the chemical plant has the right to pollute, then swimmers will bribe the manager to not pollute provided the MC of the pollution exceeds the MB to the chemical plant.

Note: In order for the Coase Theorem to hold, it is important that property rights owners be able to sell or transfer their rights (or part of them) to other users. Obviously, if the chemical plant is managed by a large board of trustees, or if swimmers do not form a swim club to negotiate as a single entity, it will be difficult for any form of bargaining arrangement to succeed.

Figure 6.1

Graphical Depiction of the Coase Theorem



Case 1: The chemical plant has the Right to Pollute:

Initial Outcome:

- Pollution occurs until MB pollution = 0 to the polluter (Length 0A).
- Chemical plant surplus = Area 0EA
- Swimmer Welfare = - MBA (negative surplus)
- Social Welfare = 0ECB - MCA

Outcome after Negotiation: (swimmer pays the chemical plant $F per unit pollution reduction)

- Pollution = 0N
- Chemical plant surplus = OECN + NCFA
- Swimmer Welfare = - BCN - NCFA
- Social Welfare = 0ECB

Case 2: The swimmer has the Right to No Pollution:

<u>Initial Outcome:</u>

- Pollution = 0
- Chemical plant surplus = 0
- Swimmer Welfare = 0
- Social Welfare = 0

<u>Outcome after Negotiation</u>: (chemical plant pays the swimmer $T per unit pollution emitted)

- Pollution = 0N
- Chemical plant surplus = ECT
- Swimmer Welfare = 0TCB
- Social Welfare = 0ECB

Why The Coase Theorem May Not Apply: The Coase Theorem applies best in cases involving small numbers of conflicting parties (i.e., low transaction costs) with easily observable externalities (little uncertainty regarding the benefits and costs of pollution and those that can be easily monitored) and where there are no wealth effects from the initial distribution of property rights.

Transaction Costs: Transaction Costs are the costs of monitoring, enforcing, and negotiating. Low transaction costs allow parties to easily negotiate among themselves to reach an efficient (Pareto optimal) allocation. When transaction costs are high, obstacles exist that hinder private parties from reaching an agreement. With zero transaction costs, the parties will negotiate outcomes that maximize joint net benefits.

Profit maximization considerations suggest that cost-less negotiation will lead to optimal resource allocation. However, the distribution of benefits may be different, depending on which party is given the property right. Also, distributional outcomes can differ depending on relative bargaining skills. Game theoretical consideration may be needed to pinpoint distributional effects when the two parties differ in bargaining abilities.

Observability (uncertainty) regarding environmental Benefits and Costs:
In order to have effective bargaining outcomes, each party must have full knowledge of their benefit functions. Commonly, pollutees know that pollution is detrimental to their health, but they may not be fully aware of the consequences. Environmental damages typically occur infrequently (i.e., illness) and over long periods of time (i.e., morbidity). Similarly, the benefit firms receive from polluting, or the cost of controlling pollution, might depend on alternative technologies or methods of production.

By the very definition of externalities, there is no “price” on units of pollution to reflect the MB.

Inalienability: While many property rights can be bought or sold, some rights are inalienable. Inalienable rights are rights which cannot be sold or transferred, for example, rights to freedom and to life itself.

Several reasons why law-makers impose inalienable rights:

• **Cognitive Dissonance**: A psychological notion representing the idea that people tend to think nothing bad will happen to them. Cognitive Dissonance may cause people to work against their own self-interest; for example:

1) People may refuse to wear seatbelts
2) Motorcyclists may refuse to wear helmets
3) Farm workers may not wear safety gear when spraying pesticides
4) Alcoholics and drug addicts may refuse to accept treatment

• **Morality**: Society may decide that some behavior will simply not be tolerated, regardless of the desires of individuals to buy and sell the property right. For example, many countries prohibit individuals from selling themselves or others into slavery. Yet laws prohibiting slavery take away individuals’ rights to form a contracts binding themselves to lifetime servitude.

Determination of Property Rights Allocation

Property Rules:

Laws that determine the allocation and prohibit the violation of property rights. That is, they grant private ownership of a resource to a certain individual. As the Coase Theorem demonstrates, when property rules can be established to clearly define property rights between competing resource users, assigning ownership of the resource to an economic agent can lead to efficient outcomes. The most obvious example of a property rule is the *legal sale of land*. Yet, when the requirements of the Coase Theorem are not met, alternative rules such as liability rules and negligence rules may provide an attractive alternative to property rules.

Liability Rules:

Allow a violation of property right to occur, but assess penalties for doing so. Under a system of liability rules, it is left to legal channels to determine liability when one's entitlement is violated. Common liability rules include, “restoration to previous situation,” and “just compensation for damages.” Pollution taxes are a form of liability rule, since pollution is permitted provided that the polluter pays a penalty in the form of a pollution tax for each unit emitted.

Negligence Rules: Penalize individuals for not exercising sufficient care in an action. Negligence Rules prevent irresponsible behavior, especially under uncertainty.

An example of a negligence rule is Retroactive Liability, in which polluters are liable for the clean-up of pollution caused by past activities, even though there may not have been laws against the action at the time of offense. Full Retroactive Liability requires that new owners accept clean-up responsibility (i.e., become liable) for existing environmental conditions when purchasing an asset.

<u>A Comparison of Alternate Legal Arrangements</u>

In order to compare alternative forms of property rights, it is helpful to first distinguish between point and non-point source of pollution.

Point Source Pollution: Refers to pollution created at an easily identifiable source.

Non-Point Source Pollution: Refers to pollution from hard to identify sources, such as runoff of nitrates and pesticides from dispersed agricultural lands into a water table. With non-point source pollution, the exact source of the pollution is often not identifiable.

Liability for Non-Point Source Pollution: In the case of non-point source pollution,

- Liability for cleanup costs are often shared among all likely polluters.
- Liability may be difficult to implement, because it may require identification of past polluters and establishment of a liability sharing agreement based on proportional damage and ability to pay.

Some Important Legal Issues:

Land Values: Under a negligence rule, such as full retroactive liability, the price of an asset will reflect the expected liability cost. For example, suppose the value of land without liability problems is $8,000/acre. If the expected liability cost = $3,000/acre the price of the land will be $5,000/acre.

When there is a lot of uncertainty about past contamination of the drinking water, negligence rules may discourage land transactions, reducing productivity and creating inefficiency by removing acreage from production. Insurance against retroactive liabilities may mitigate this impact on land prices and improve efficiency.

Super Fund Sites: Superfund is a government program designed to clean up toxic waste sites; it is operated by the Environmental Protection Agency. From an economic perspective, it is important to determine the optimal amount to clean-up. Yet, legal costs of determining who should pay for Superfund clean-up are a huge expense that are often not considered. In an attempt to establish retroactive liability, government lawsuits to determine who should pay have made the program very costly and have led to long delays in clean-up. (Note: this is an example of transaction costs).

Clean-Up of Polluted Sites In Eastern Europe and Russia: Establishing arrangements to finance clean-up activities in Russia and Eastern Europe is a major challenge to reforms and privatization efforts. Decades of pollution have left many countries highly contaminated with toxic waste. As a result, clean-up needs to be integrated into programs designed to rebuild these economies. Clean-up efforts may vary across countries according to preferences, income, and the extent of potential damages. Often, preferences for the environment are highly income elastic, so that clean-up efforts are much larger in richer countries. Certain clean-up activities may not be undertaken today, but will intensify as a country gains national wealth. An important question that will need to be answered in former Eastern Block countries is "Who will be liable for the clean-up?" Negotiating this issue is an extreme transaction cost associated with doing business in Russia and Eastern Europe. Also, assuming liability for toxic sites can be established, how will expensive clean-up be financed in poor countries?

Another related issue is the fact that property rights tend to vary between countries. Many Eastern European countries do not currently have liability rules. It is an interesting research question to consider the effect of liability rules in Western countries on global environmental quality. It is possible to have an outcome in which one country strengthens existing liability rules in order to discourage pollution, but global pollution may go up if polluting firms re-locate in countries with less stringent legal regulations. This may be a serious detriment to strengthening liability rules in Eastern European countries, for two reasons. First, countries may not be willing to unilaterally impose environmental laws for fear of losing national employment and tax revenue from polluting firms. Second, most externalities are transboundary in nature and do not recognize national boundaries so that unilateral legal controls can lead to perverse results such as higher levels of pollution.

Acid rain is a good example of a regional externality. There are many legal issues involved in establishing an international legal framework for pollution control.

- Who should establish rules for global, national, and regional air quality standards?
- Most acid rain in Europe is caused by pollution from poorer countries. Should rich countries (e.g., Sweden) pay poorer countries (e.g., Poland) not to pollute?

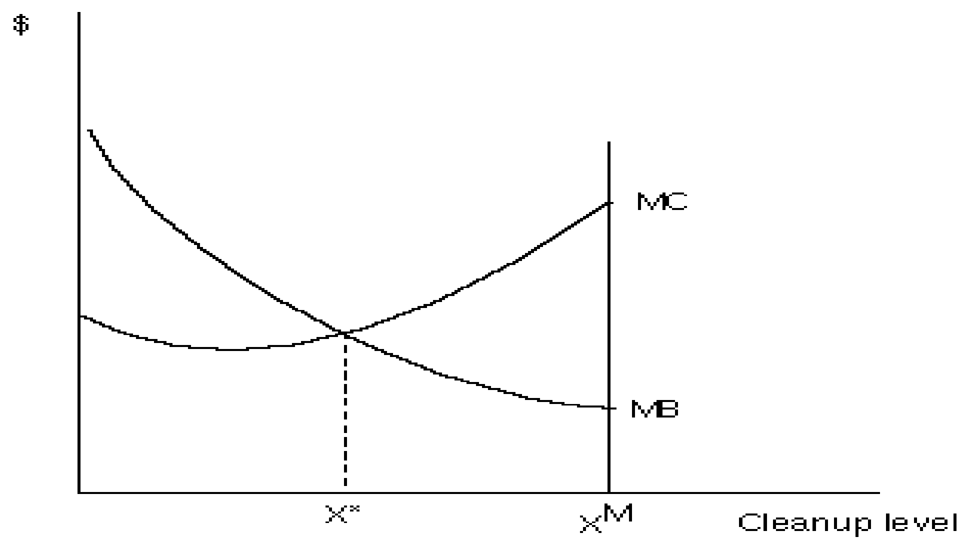
Economics of Environmental Restoration

Cleanup: Many problems of toxic contamination and environmental degradation are due to past pollution activities. For example, Toxic Waste Dumps, Land-Filled Wetlands.

Policy Questions: Given that most toxic contamination and environmental degradation problems are extremely complex and costly to correct, an important economic question is, with a limited budget, how much should be cleaned up?

Figure 6.2

The Optimal Cleanup Level



MB = Marginal Benefit of environmental clean-up
MC = Marginal Cost of environmental clean-up

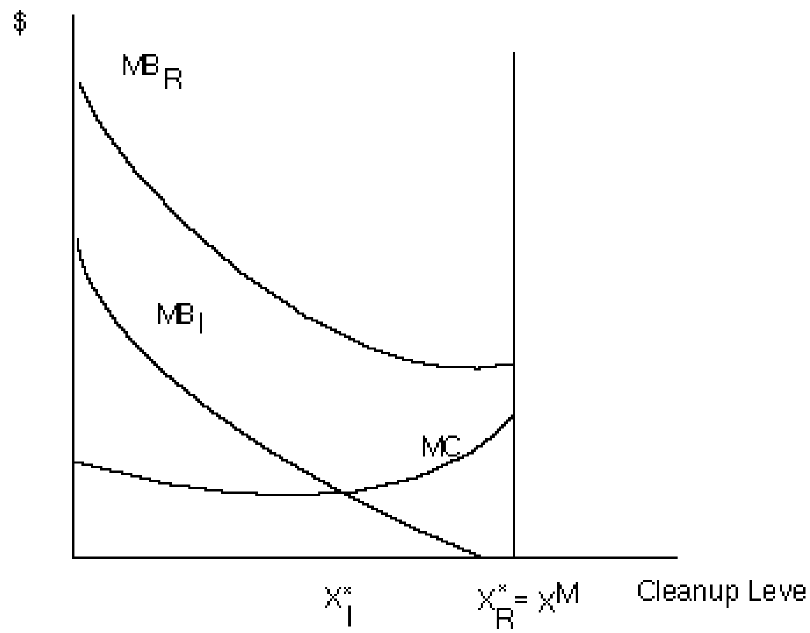
Note: The marginal cost of environmental clean up includes the opportunity cost of other projects *not* undertaken due to a limited budget. For example, the money spent on cleaning a Superfund hazardous waste dump cannot be used for clean air, clean water, reforestation, or endangered species programs. The net benefits forgone as a result of not pursuing these alternative programs are part of the marginal cost of environmental cleanup.

X^M = complete cleanup
X^* = optimal cleanup

Policy Conclusion: Complete cleanup may not be optimal.

Figure 6.3

The Effect of Heterogeneous Land Uses



MB_R = marginal benefit of cleanup in residential use
MB_I =marginal benefit of cleanup in industrial use
MC = marginal cost of cleanup
X^*_I = optimal cleanup of industrial uses
$X^*_R = X^M$ = optimal cleanup in residential uses.

Notice that $X^*_R = X^M$, but $X^*_I < X^M$. X^*_R . X^*_I, because the marginal benefit of clean up on residential land is higher than the MB of cleanup on industrial land.

- This is generally true even though industrial land has a greater value, because of the consumer health effects of hazardous waste dumps in residential areas.

Thus, heterogeneity in land use may cause the optimal level of cleanup to differ across land-use types.

Similar models can also be used to explain the placement of hazardous waste dumps such as Nuclear Waste Disposal in areas with a low MC of waste, such as buried under oceans and deserts or jettisoned into the atmosphere. It can also explain why sewage waste in New York is taken to the Texas desert to be disposed of.

Uncertainty and Policy Choices

Often, policymakers do not have complete information about the marginal benefit of environmental amenities to society. Uncertainty may also exist regarding the cost of abating pollution. Both these types of uncertainty can affect the choice of externality policy. As is often the case, supply and demand elasticities can greatly influence the policy choice. Specifically, market elasticity can have strong implications on the relative optimality of taxes and standards.

Let:

X = Level of Pollution
D = Demand or Marginal Social Benefit of Pollution (i.e., the value of output from polluting activities)
MSC= Marginal Social Cost of Pollution

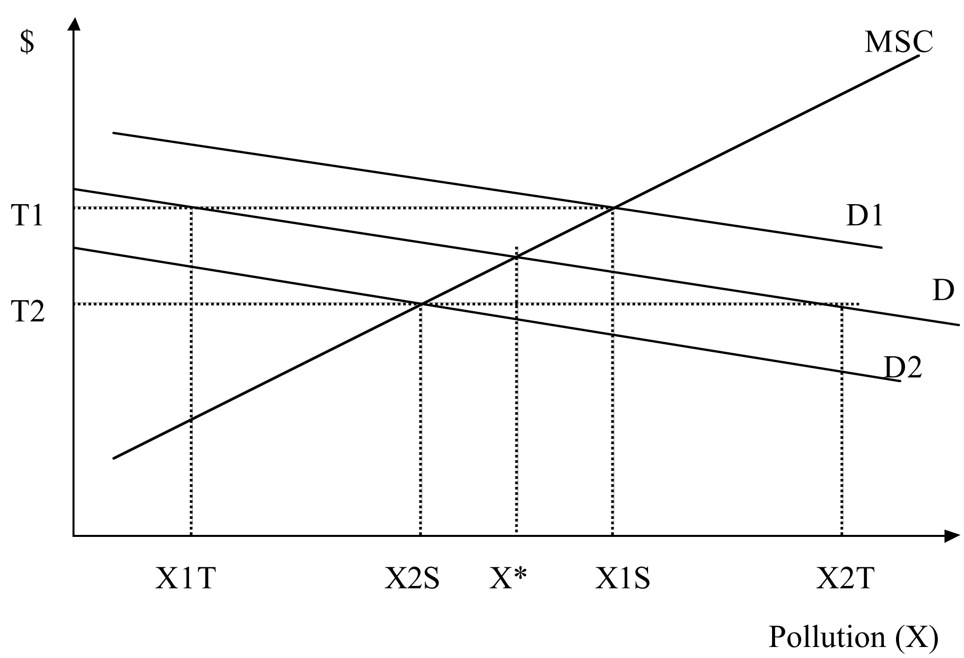
Consider the case in which the regulator has full knowledge of MSC, but is uncertain about the true value of D. Suppose that the true Demand is D, but that:

- 50 percent of the time policymakers overestimate the demand at D1, and
- 50 percent of the time they underestimate it to be D2.

Case of Elastic Demand:

Figure 6.4

Weitzman's (1974) Model Under Elastic Demand



When demand is elastic, standards perform better than taxes, because standards lead to a smaller deviation from the true social optimum, X*.

- If policymakers think demand is D1, they will set the tax t*=T1, or, alternately, the pollution standard X1S.

    - the pollution standard achieves the pollution level X1S
    - since true demand is D, the pollution tax achieves pollution level X1T

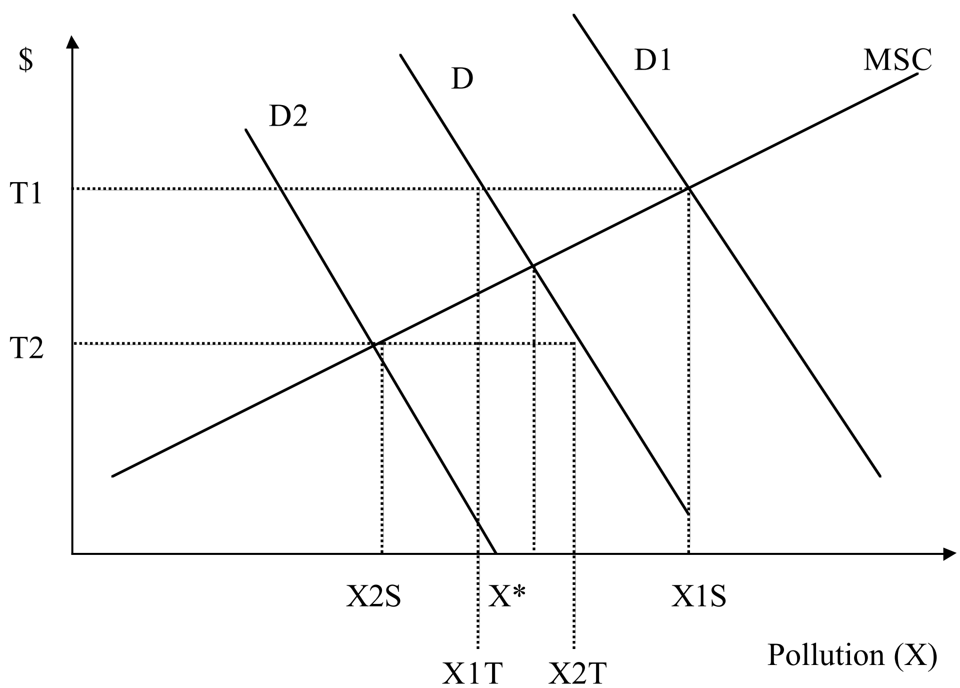
- If policymakers think demand is D2, they will set the tax t*=T2, or, alternately, the pollution standard X2S.

    - the pollution standard achieves the pollution level X2S
    - since true demand is D, the pollution tax achieves pollution level X2T

Although the government fails to achieve the social optimal allocation, X*, under conditions of uncertainty, notice that regulation is closer to the X* with standards than with taxes, regardless of whether true demand is overstated or understated. Thus, when demand is elastic, standards perform better than taxes and may be the preferred policy instrument. Direct regulation may be preferred, because it leads to less variation from optimal policy.

Figure 6.5

Weitzman's (1974) Model Under Inelastic Demand



When demand is inelastic, taxes perform better than standards, because taxes lead to a smaller deviation from the true social optimum, X*.

- If policymakers think demand is D1, they will set the tax t*=T1, or, alternately, the pollution standard X1S.
    - the pollution standard achieves the pollution level X1S
    - since true demand is D, the pollution tax achieves pollution level X1T
- If policymakers think demand is D2, they will set the tax t*=T2, or, alternately, the pollution standard X2S.
    - the pollution standard achieves the pollution level X2S
    - since true demand is D, the pollution tax achieves the pollution level X2T

Notice that, under conditions of uncertainty, regulation is closer to the X* with taxes than with standards. When demand is inelastic, the outcome under a tax is superior to that under a standard regardless of whether demand is underestimated or overestimated (thus, taxes are the preferred policy instrument).

Intuition: We get such a result because elastic demand curves are highly price-responsive. Thus, a small mistake in the price of a good (i.e., the tax) leads to a much larger change in the quantity of pollution controlled. Conversely, inelastic demand curves are not very responsive to changes in price. Therefore, under uncertainty taxes perform better when demand is inelastic, since even a very large deviation from the optimal tax rate may not create a significant divergence from the optimal quantity.

Limited Information and Second-Best Policy

Measures and assessments of the cost of externalities are difficult. For example, estimates of health effects or environmental effects of low water quality are subject to much uncertainty. Evaluation of the harm caused by diseases or the loss of species diversity is also difficult. When policymakers have only limited information regarding environmental costs or benefits, they may lack sufficient knowledge to design optimal, or first-best outcomes (i.e. a policy which ensures that MSB=MSC). Instead, they may be forced to develop a second-best policy.

For example, when the benefits of reducing pollution are uncertain, it may be impossible to design a policy to equate MSB and MSC. As a second-best policy alternative, a regulator may decide to minimize the cost of achieving some target level of pollution. Such a target may be set by experts who might make educated guesses as to the optimal level while further research is being done. Or, perhaps, the target is based on political goals, such as achieving a 20% reduction in current emission levels.

The Following Model is Due to Baumol and Oates.

The goal is to minimize the cost of reducing regional pollution to a point at or below a target threshold. That is, we will solve the second-best problem of maximizing profits from production subject to the constraint that an environmental pollution standard is met.

Let:

Y = output
P = output price
Z = pollution
$\bar{Z}$= pollution target (standard)
X = input
W = input price
Y = f(X) is a production function
Z = g(X) is a pollution generation function
(i.e., the case of a polluting input)

The second-best policy is derived by solving:

$$\max_{x} Pf(X) - WX$$

s.t. $g(X) \leq \bar{Z}$.

The Lagrangian expression for this problem is:

$$L = \max_{X,l} Pf(X) - WX + \lambda\left[\bar{Z} - g(X)\right].$$

And the FOCs are:

$$(1)\ L_x = Pf_x - W - \lambda g_X = 0$$

$$(2)\ L_\lambda = \bar{Z} - g(X) = 0$$

where λ is the shadow price of pollution associated with the target level, $\bar{Z}$. Equation (1) states that:

- Marginal Revenue product - Wage = (Shadow Price)(Marginal Emission Rate)

An unregulated firm does not pay shadow prices and will set:

$$\text{MRP - Wage} = 0.$$

A unit *pollution tax* (i.e., a per unit charge on pollution) that would achieve the second-best target level would be, $t^* = \lambda$. Alternatively, the second-best optimal *input tax* would be,

$$t = \lambda g_X(X^*).$$

The interpretation of the λ parameter, in all economic models, is the shadow price of the constraint. A *shadow price* is defined as the imputed value of a commodity or service that has no market price. The concept of a shadow price is important in environmental economics, since externalities, by definition, do not have market value. In the example above, the shadow price associated with the standard, $\bar{Z}$, is thus the imputed price that would lead to a market outcome of $\bar{Z}$, which is the optimal pollution tax.

Political Economy and Externality Policy

Economist George Stigler (1971) argued that producers or consumers may desire regulation because they believe that they can capture the regulators. By capture, we mean that the producers or consumers can influence the regulators, either directly or indirectly, to enact regulations that advance the interests of their respective group. One prime motivation for an interest group to capture regulators is to influence the regulators to create rents through regulatory activities and to then distribute those rents back to the interest group. Rents are economic profits, i.e., profits above opportunity costs.

For example, some regulations generate rents in the form of tax revenue. In order to prevent inefficiency created by removing money from the economic system, regulators must then determine how the tax revenue is to be returned to the economy. If a particular interest group stands to receive this tax revenue, then it might lobby to get the regulation enacted. A less direct example of rent generation concerns regulations that limit entry by new producers into a market. Such regulations can generate market power for the original producers, such as in monopolized industries, creating rents in the form of extra profits. In this case, producers may lobby for regulations to be placed on their industry if they stand to gain more in an indirect fashion through rents then they stand to lose directly through regulation.

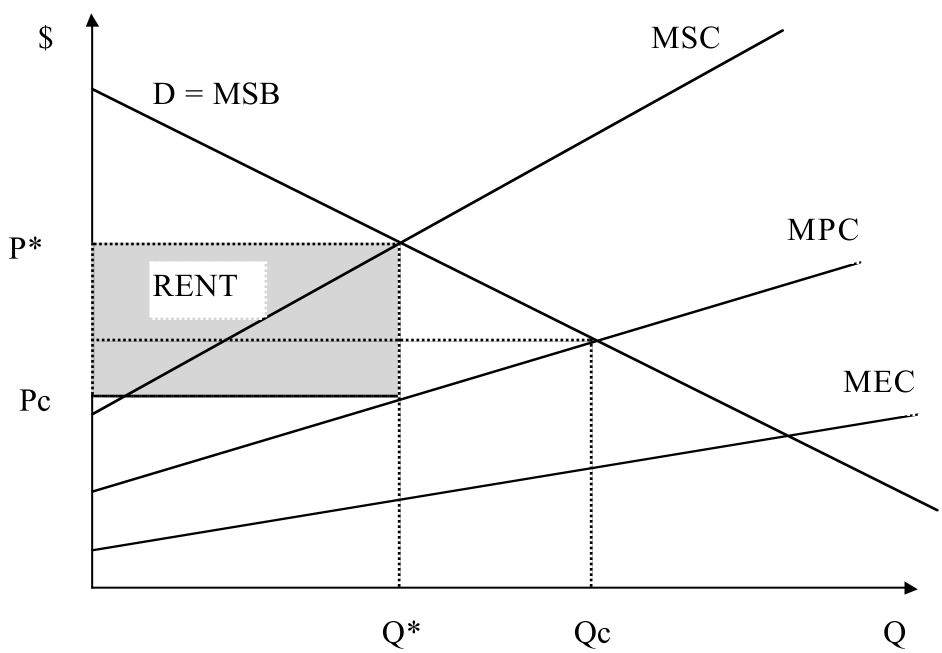
Stigler has argued that interest groups will spend resources in an attempt to gain access to the rents created by regulations, i.e., that interest groups will spend resources in an attempt to increase the probability that they will be given a large rent. The probability of receiving a rent can be increased by lobbying regulators, to get sympathetic regulators elected or appointed, or, more directly, to influence regulators with monetary bribes. So, if you believe this theory, do not be fooled when politicians complain about low salaries.

In cases where resources are spent to gain access to rents, these expenditures represent deadweight losses to society, because these resources do not contribute to the production of any valuable good or service. Economist Richard Posner (1975) has argued that a large part of the rents from regulation may in fact be dissipated through rent-seeking expenditures by various interest groups and may never be actually realized by the economy.

Buchanan and Tullock (1975) argue that although either taxes or standards could be used to regulate externalities, producers often influence regulators to choose standards, because standards generate larger rents for producers. Rents arise because the imposition of regulatory standards decreases supply, and this enables producers to charge higher prices for their products, thereby creating "monopoly rents". For example, in the figure below a polluting industry is initially producing output Q at level Qcomp and charging market price P_{comp}. If regulators impose a standard which forces a reduction in production to the point where MSB = MSC, i.e., point Q*, then producers would be able to raise the price to P*, thereby earning additional rents (producer surplus) equal to the shaded area.

Figure 6.6

Rents Can Be Generated By Environmental Standards



Note that in the case of environmental externalities, environmental groups may choose to ally themselves with producers to influence regulators to impose standards on the producers. Environmental groups participate in such alliances because they lead to the optimal amount of environmental cleanup, Q*, even though consumers may indirectly pay for environmental cleanup through paying higher prices for the producers' products. In this example, both producers and environmental groups are attempting to gain rents by influencing, or capturing, regulators.

Regulators are more likely to be captured by small, organized groups like industry associations, labor unions or environmental groups than by relatively large, unorganized groups like taxpayers. The transactions costs associated with organizing a small group are less than the transactions costs associated with organizing a large group. Regulators are also more likely to be captured by the regulated group rather than by other types of groups, because the regulated group has the most to lose from regulation and thus has the highest incentive to attempt to influence the formulation of regulatory policy.