**Negative Externalities**

**Consumption**

**Production**

SMC

SMC

PMC

PMB

SMB

SMB

**Solutions to negative externalities**

1. Regulation (command and control)

Predominant method used to control externalities

Production examples:

1. 1970 Clean Air Act mandated new plants in polluted counties had to use technology that achieved lowest emission rate
2. An international agreement in 1987 banned CFC’s
3. California mandated that 10% of cars sold in the state had to be zero emission by 2003

Consumption examples:

1. Ban on indoor smoking
2. Ban on drinking alcohol while driving

**Cost/Benefit of Regulation**

**Benefit**

1. Clear cut rules that may be difficult to avoid
2. May spur innovation (example CA technology mandate for cars)

**Cost**

 In many cases does not explicitly consider economic cost

1. [Corrective Tax](http://milesfinney.net/434/handouts/aqmd_fees.png)

For Production externalities:

 SMC = PMC +MD

A per unit tax equal to MD could induce firms to recognize external cost

Industry supply:

 =PMC +t where t is per unit tax

 = SMC if t = MD

In this case total tax revenue would equal total external cost

Steel firm could be charged tax equal to economic cost of dead fish per ton steel output

Example of corrective tax for consumption externalities: gas tax/gallon in CA:

|  |  |
| --- | --- |
| State/local sales tax | 5.8 cents |
| State excise tax | 47.3 cents |
| Federal Excise tax | 18.4 cents |

**Cost/Benefit of Corrective Tax**

**Benefit**

 Takes in consideration economic incentives

**Cost**

1. Difficult to determine tax level
2. Imprecise instrument to address many consumption externalities

3. Market solution

The dead fish in the steel example considered externality because fishermen claimed right to use river

 Externality can be thought as a conflict of property rights

Various groups were using the same resource

Suppose fishermen owned river

 Steel industry couldn’t legally dump sludge on other party’s property

 Fishermen could force elimination of all emission (sludge) This may not be efficient!

 Steel firms could possibly negotiate with fishermen on use of river

**Coase Theorem:**

With well-defined property rights and costless bargaining, negotiation between parties may bring about social efficiency.

P

SMC

Fishermen estimate that

MD = $100

b

PMC

for every ton steel

produced, $100 in fish

a

is killed

D=PMB=SMB

Qb

Qa

Q

May agree to be compensated $100 (or more) for every ton steel produced

this will internalize externality

steel producers’ cost rises $100/ton equaling cost of externality

Move from point “a” to “b” – same effect as a corrective tax

Payment per ton of steel to fishermen would equal MD (marginal damage)

mutually beneficial exchange

Suppose property rights given to steel producing firms

negotiation may lead to same result

**Cost/Benefit of market solution**

**Benefit**

1. Efficiency may be reached without coercive action by government
2. Outcome of bargaining should be mutually beneficial

**Cost**

Market solution may be difficult to achieve

If there is a large number of users of common resource

1. Difficult to assign property rights
2. Difficult for users on either side to coordinate interests

**Application of theorem:**

1. Downtown Disney Center
2. Smoking in restaurant
3. Stereo in apartment

**Demand Curve for Pollution**

Demand to pollute thought in same terms as demand for an input such as labor

 wage↑ labor quantity demanded↓

 cost to pollute↑ pollution emitted↓

Cost/pound of sludge

a

$20

d1

b=100

60

Pounds of sludge emitted per period

d1 – demand by firm to emit sludge

downward sloping

 the higher per ton cost to firm of emitting sludge, the less it will emit

(interpret points a and b)

Point a is efficient if the social cost generated by each ton of emission in $20

Suppose we include 2nd steel firm with demand d2

Cost/pound of sludge

c

a

$20

d2

b=100

60

80

d1

Pounds of sludge emitted per period

Decreasing sludge would involve

1. Buying pollution abatement equipment
2. Decreasing output
3. Changing production process

**If both firms were charged $20 per unit of sludge (corrective tax per unit of emission)**

Firm 1 produce 60 pounds (reduce by 40)

Firm 2 produce 80 pounds (reduce by 20)

What is the total tax paid by each firm?

What are the possible reasons the firms behave differently in response to pollution charge?

Under what context would above scenario be considered efficient?

Corrective tax requires

1. Knowing the social cost of each unit of pollution
2. Monitoring of firms emissions by regulatory agency

**Suppose quantity control used instead**

 Each firm limited to 70 pounds/period

Cost/pound of sludge

$25=P2

g

c

a

$20

$15=P1

d2

f

60

80

70

d1

b=100

Pounds of sludge emitted per period

More costly for firm 2 to reduce emissions than firm 1

Quantity regulation is equivalent to

 Charging firm 2, P2 per pound sludge

 Charging firm 1, P1 per pound sludge

Firm 2 uses more resources to decrease emissions

Opportunity cost to firm and society of reducing pollution is higher

Even if 140 pounds (70 $×$ 2) is the correct total amount of sludge, the quantity regulation is inefficient

Possible to eliminate 60 pounds sludge at lower opportunity cost to society

**Suppose instead each firm given 70 pollution “rights” each worth one pound**

Firm allowed to trade rights

Marginal value firm 2 places on 70th pound is $25

Firm would have been willing to $25 for right to emit 70th pound

 Cost firm roughly $25 to eliminate the 30th pound of sludge

Marginal value firm 1 places on 70th pound is $15

 Cost firm roughly $15 to eliminate the 30th pound of sludge

Market for pollution rights

Firm 1 willing to sell rights to firm 2

For each exchange, total emissions would be unchanged. Why?

Why does each exchange lower the social cost of decreasing pollution?

Why is pollution trading considered a move toward efficiency?

[Application Coase Theorem](http://milesfinney.net/433/lecture/RECLAIM.pdf)