Chapter 14
Compliance Costs, Uncertainty, and Information

Learning Objectives

- LO1 Compare and contrast graphically and algebraically the social and private compliance costs of standards versus incentive-based policies, incentives to innovate, and informational demands.

- LO2 Explain which policies will minimize social losses when their is uncertainty about the MAC curves.

- LO3 Describe the polluter's incentive to reveal truthful information about its MAC curve under different policies.

Costs of Compliance

- Private compliance costs measure the total costs of abatement incurred by the polluter
  - Polluter's total abatement costs (TAC) plus any taxes paid or transferable emissions permits (TEP) purchased (a cost) or sold (a revenue)
- Social compliance costs: the private compliance costs borne by the polluter net of any redistribution back to polluters of tax or discharge permit revenues collected by the government
- From society's viewpoint, social compliance costs are what matters

Social Versus Private Costs of Emissions Taxes

- **Private Costs vs. Social Costs**
  - From society's perspective, tax payments are a transfer, and therefore have no "cost" to society
  - When the company pays $1000 in taxes, the government gains $1000 in revenue to provide services
  - But to the company the taxes paid are real costs – therefore the private costs differ from the social costs

Costs of Compliance

- A cost-effective equilibrium is found where two conditions are met:

$$E_L + E_H = 84$$
$$MAC_L = MAC_H$$

Where:

84= Target level of 40% reduction in emissions
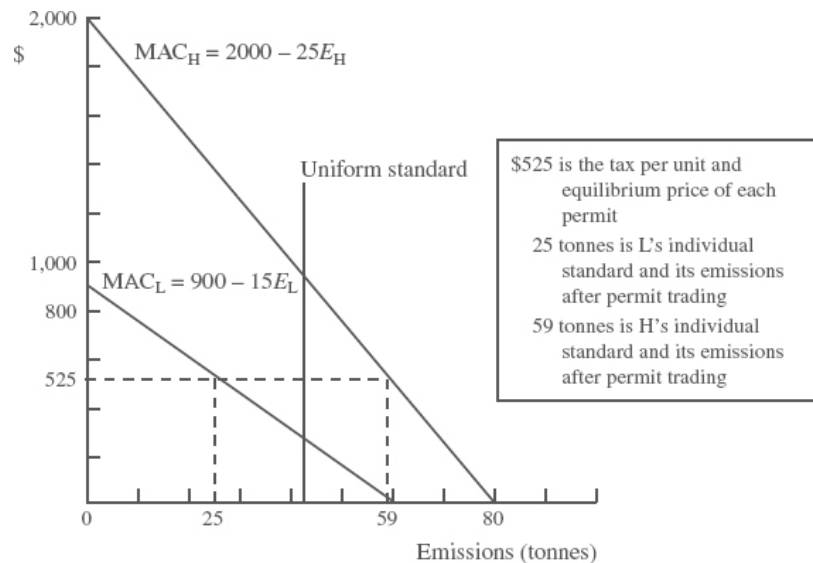
E_L = Firm L's emissions

E_H = Firm H's emissions

MAC_L = Firm L's marginal abatement costs

MAC_H = Firm H's marginal abatement costs

Costs of Compliance

Figure 14-1 Cost-Effective Emissions

- The cost-effective equilibrium for two polluters with different MACs is shown where the MACs are equated. The high-cost polluter (H) reduces emissions from 80 to 59 tonnes, while the low-cost polluter's emissions fall from 60 to 25 tonnes. Both face a MAC $525. The tax, TEP policies, and individual standards are cost-effective. A uniform standard set at 42 tonnes is not cost-effective because the MACs are not equal at the margin.

Costs of Compliance

- Which of the policies can obtain this cost-effective equilibrium?
  - The only policy that fails to achieve cost-effectiveness is the uniform standard
  - At emission levels of 42 units each, $MAC_L = \$270$ and $MAC_H = \$950$
    - Not cost-effective, the two firms MACs are not equal
  - An individual standard set at the efficient levels of emissions, a tax set at the efficient price, and both TEP systems are all cost-effective.

Costs of Compliance

Table 14-1 Compliance Costs, Incentives, and Information Requirements of Pollution Policies

Policy	Private Compliance Costs	Social Compliance Costs	Technological Incentives	Information Required
Uniform standard				
Low-cost polluter	2,430.00	2,430.00	weak	low
High-cost polluter	18,050.00	18,050.00	weak	low
Total costs	20,480.00	20,480.00		
Individual standard				
Low-cost polluter	9,187.50	9,187.50	weak	high
High-cost polluter	5,512.50	5,512.50	weak	high
Total costs	14,700.00	14,700.00		
Uniform tax				
Low-cost polluter	22,312.50	9,187.50	strong	high/medium
High-cost polluter	38,487.50	5,512.50	strong	high/medium
Total costs	58,800.00	14,700.00		
TEPs (given away)				
Low-cost polluter	262.50	9,187.50	weak	low/medium
High-cost polluter	14,437.50	5,512.50	strong	low/medium
Total costs	14,700.00	14,700.00		
TEPs (auctioned)				
Low-cost polluter	22,312.50	9,187.50	strong	low
High-cost polluter	36,487.50	5,512.50	strong	low
Total costs	58,800.00	14,700.00		

Social Costs versus Private Costs

- The uniform standard achieves the emission target at total costs in excess of all other policies.

- For the low-cost polluter, the preferred policies in order from lowest to highest cost are
    a)   TEP that is initially allocated without any charge,
    b)   the uniform standard,
    c)   the individual standard, and
    d)   a tie for the uniform tax and TEP that is auctioned by the government

- For the high-cost polluter, the ranking is
    a)   the individual standard,
    b)   the TEP that is not auctioned,
    c)   the uniform standard, and
    d)   the tax and auctioned TEP

Incentives

- All standards provide weaker incentives to invest in R&D than do the other policies

- Each polluter even has an incentive to misreport its abatement costs, hoping to convince the regulatory authorities that they are higher than these costs actually are

- For all the other policies, there are strong incentives to invest in abatement equipment, because for each unit of pollution reduced the total private costs of the policy decline.

- Auctioned TEPs and tax would most likely provide the strongest incentives to seek a lower MAC curve

Information

- Regulators need information to determine the target level of emissions
- Uniform standards and auctioned TEPs require the least amount of information
- If a uniform standard, the regulator does not need to know anything about individual firms
- The same is true for TEPs that are auctioned
  - The regulator simply announces an auction and the market takes care of the rest
- The allocated TEPs are rated low to medium
  - This is because some means of initially distributing the permits must be established

Information

- Uniform taxes are rated medium to high
  - Regulator must know the MACs for all polluters to have a cost-effective solution
  - If there are many polluters, the information costs are high
- The individual standard requires a large amount of information
  - MACs of all polluters must be known to determine each polluter's individual standard
  - Unlike the tax, there is no way to iterate to the cost-effective solution

Uncertainty and Information

- In practice, it is likely that information about the MD and MAC curves will not be known with certainty.

- A second-best decision rule for regulators when there is uncertainty about the MAC or MD curve is to minimize the social loss associated with the choice of policy.

  – Social loss is the area between the MD and MAC curves from the actual pollution level to the socially efficient level.

Uncertainty and Information

- If there is certainty about the MAC curve but uncertainty about the MD curve, no policy dominates another in terms of minimizing social losses.
- If there is certainty about the MD curve but uncertainty about the MAC curve:
  - A uniform standard or TEP will minimize the social losses
  - The equilibrium under a tax is less predictable than with a standard or TEPs
    - tax may lead to too high a level of emissions and large social damages
    - tax may overcontrol emissions and will lead to large social losses due to too little production of pollution-generating goods
  - In the extreme case where the MD curve is vertical, it is obvious that the socially efficient policy is a standard or TEP
- If MD curve is flat relative to the MAC curves. In this situation, the tax is the policy that minimizes the social losses of failing to be at the socially efficient equilibrium

Standards and Information Revelation

- The policy chosen affects the polluter's information revelation incentives
  - A standard reveals no information to regulators about the location of the MAC curve.
    - Polluters will have an incentive to try to convince the regulator that their MAC curve is higher
    - Leads to much less stringent standards than are socially efficient

Taxes and Information Revelation

- Under a tax, the polluter has no incentive to reveal an excessively high MAC
  - This would result in a very high tax rate and thus tax bill and more emissions controlled than if the true MAC curve was revealed
- Polluters may have an incentive to mislead regulators into thinking that their MAC is lower
  - If lying lowers the polluter's tax bill by more than it increases its total abatement costs, the polluter will pretend to have a lower MAC and emit less pollution rather than set the tax equal to its true MAC curve
- If polluters set the estimated tax equal to its true MAC, the savings in abatement costs exceed the savings in the tax bill

TEP and Information Revelation

- There is no incentive to reveal a MAC that is higher than the true MAC, for this would simply raise the permit price the polluter would have to pay.

- If one polluter pretends its MAC is lower than the true one and others don't, the one that revealed false information won't be able to buy sufficient permits in the market to cover its emissions.

- It appears that TEPs, if used in perfectly competitive markets, are likely to reveal information that results over time in the attainment of a socially efficient equilibrium.

Chapter Overview

- Regulatory policies are compared using a simple algebraic model of two polluters with different MACs
- All policies have the potential to achieve a socially efficient equilibrium
  - All are cost-effective except for the uniform standard
- We also discussed the incentives created by each policy to invest in pollution abatement equipment, and the information required by regulators to implement the policy
- When uncertainty exists about the MAC and MD curves, regulators may no longer be able to reach a socially efficient level of emissions
  - Can enact policies that minimize the social losses
- Incentive-based policies reveal information about the MAC curve of the polluter, while standards do not

Chapter 15 will give an overview of environmental policy and institutions in Canada.