ENFORCING EMISSIONS TRADING PROGRAMS: THEORY, PRACTICE, AND PERFORMANCE

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1. Motivation and Objectives.

♦*Motivation.*

- El uso de instrumentos de Mercado para controlar contaminación es una de las mayores innovaciones en política ambiental.

- Efficiency gains realized by emissions trading programs (ETP's) will depend on the rate of compliance, which in turn will depend on the enforcement processes.

- A critical component has not been adequately addressed: How ETP's should be enforced to achieve high rates of compliance in a cost-effective manner?

- Administrative and legal systems have been built in the past to enforce command-and-control environmental policies, but the problem of enforcing ETP's is different.

♦*Objectives*:

- Examine the structure of compliance incentives faced by firms in a transferable emissions permit system.

- Study actual enforcement and compliance records in two major U.S. market-based pollution control programs:

  - Sulfur Dioxide (SO_2) Allowance Trading.
  - Regional Clean Air Incentives Market (RECLAIM).

    (a) Basic program structure.

    (b) Market performance.

    (c) Enforcement strategies (monitoring and penalties).

    (d) Compliance records.

- Developing practical guidelines for enforcing ETP's.

2. Compliance Incentives in a Transferable Emissions Permit System.

♦ **If the authorities wish to have complete compliance, there are two conditions that must be satisfied:**

$$(1)\ p \leq \pi \times [f + g]$$

$$(2)\ p \leq f$$

where:

p: market price of permits;

π: the probability that a source will get audited;

f : the per unit fine levied for emissions violators, and

g: the per unit fine for under-reported emissions.

♦ **Why does this work?**

♦ Compliance incentives:

- In a reasonably competitive environment the permit price completely summarizes each facility's benefit of non compliance.

- To induce full compliance, enforcement instruments (monitoring and marginal penalties) should be tied directly to the equilibrium permit price.

♦Should enforcement be targeted?

- Considering a situation where all firms face the same price, targeted monitoring is not necessary.

- In imperfectly competitive environments prevailing prices may not convey all the necessary information about facilities' marginal benefit of non-compliance.

♦How should penalties be set?

- Setting a gain-based penalty implies tying marginal penalties directly to the equilibrium permit price. Doing so can stabilize the monitoring requirement in the face of permit price fluctuations.

3. Enforcing the SO_2 and RECLAIM Programs.

♦Enforcement provisions.

- Monitoring

  System in place to track permit holdings.

  Emissions monitoring relies on self-reporting.

  For accurate emission reporting there are stringent (and expensive) technological requirements.

- Sanctions

  Offset penalties in both programs.

  SO_2 penalties are fixed per-unit monetary sanctions that are imposed automatically.

  RECLAIM penalties are more complicated administrative monetary sanctions based on the factors of the particular case.

4. Compliance in the SO_2 and RECLAIM.

♦Compliance in the SO_2 program

- Aggregate over-compliance.
- Perfect individual compliance.
- The per unit of emissions violations penalty has always been many times higher than prevailing allowance prices.

Consider as example the 1998 compliance year:

Effective penalty (per ton of excess) (f) = $ 2,700
Allowance price (per ton) (p) = $ 150

♦Compliance in the RECLAIM program

- Aggregate over-compliance and high individual compliance
- RECLAIM has experienced non-compliant firms from its inception.

-Initially lack of experience with rules

-RTC's prices are high and increasing :

Price per ton NO_x-RTC in 1999 = $ 1,827

Price per ton NO_x-RTC in 2000 = $ 45,609

-Monetary penalties are not fixed or automatic

5. Conclusion: Principles for Enforcing Emissions Trading Programs.

♦ **Taken together the elements of our analysis we offer several guidelines for enforcing ETP's**

- The incentive approach stress the importance of prevailing permit price in the firm's compliance decision.
- To stabilize enforcement efforts unit penalties for emissions violations should be tied directly to prevailing permit prices.
- Penalties should be substantially higher than prevailing permit prices.
- Penalties should be applied automatically in cases of non-compliance.
- Continuous and reasonably accurate estimates of emissions are only useful if facilities provides truthful reports of these emissions.
- Critical areas were our knowledge is lacking:

  -dynamic aspects of compliance and enforcement

  -monitoring accuracy

  -enforcement problems in new ETP's