Economists Are SO Cheap... A Primer on Emissions Trading

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Roadmap

- **Context**
  - In what sense are economists cheap?

- **Meeting Environmental Policy Objectives**
  - Forms of policy intervention – “policy instruments”
  - Costs associated with these instruments

- **Does It Always Work?**
  - Some limitations…

- **Summary**
Context [1]

- **Starting point…**
  - Human activities generate flows of waste discharged into “environment”
    - “polluting emissions”
  - These emissions can create damage to ecosystems and / or human health
Context [2]

- **Fundamental issue...**
  - Unfortunately...some economics jargon

- **Polluting emissions are negative externalities**
  - Not all “costs” of activity borne by those directly involved – producers & consumers
  - Some of the costs borne directly by “innocent bystanders” – the rest of us...”society as a whole”
Context [3]

- **SO...**
  - In absence of any government intervention, letting consumers & producers do what they want to do yields a situation where, from point of view of society as a whole...
    - **T**OO **MUCH POLLUTING EMISSIONS ARE GENERATED**

- **IMPLICATION...**
  - There is an economic case for government intervention
**Context [4]**

- **IDEA...**
  - Possible to increase the overall “well-being” of society by reducing polluting emissions

- **Assume a GIVEN environmental policy objective...**
  - “reduce total emissions of a given pollutant by a set amount”
  - [aside: how is this “set amount” determined?]
Context [5]

- Remember...
  - NEED some form of government intervention to achieve this environmental policy objective...

- BUT...
  - Not all forms of government intervention are equally effective – some more costly than others
Context [6]

- **Economists are cheap?**
  - Because they think that the form of government intervention used should minimize cost of achieving a given environmental policy objective.

- **Why should we care?**
  - Because “resources” used to reduce pollution cannot be used to do something else…
If “more” resources than necessary used to achieve a given environmental policy objective…

Then **these additional resources are “wasted”** in the sense that…

- A different form of government intervention could have achieved given environmental policy objective at lower cost
- AND…these additional resources would then have been available to address other priorities of individuals / society…
  - Health care
  - Education
  - Welfare
  - …
Punchline...

- Economists ARE cheap...
  - And it is all about reducing waste...
  - Government intervention NECESSARY to meet given environmental policy objectives
  - Since not all forms of government intervention are created alike...
    - Adopt “least-cost” approaches to achieving given environmental policy objectives
    - Doing so means that “more” is available to address other priorities
Objectives & Instruments [1]

- Why do economists like emissions trading?
  - In many situations, emissions trading is a “least-cost” approach to achieving given environmental policy objectives
    - “in theory”
    - *BUT*... a growing body of empirical evidence in support
Objectives & Instruments [2]

- Let’s look at the “costs” of meeting a given environmental policy objective in a simple example
  - 2 firms – total emissions of pollutant: 22 units
    - Firm #1: 14 units
    - Firm #2: 8 units
  - Environmental policy objective:
    - Reduce TOTAL emissions of pollutant by 10 units
Objectives & Instruments [3]

- **BUT**... firms are different in terms of their abatement costs...
  - Costs of reducing polluting emissions DIFFER across firms...
  - Costs of reducing each additional unit of polluting emissions
    - “marginal abatement cost” - MAC
    - Pattern differs across firms...
## Objectives & Instruments [4]

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Marginal abatement cost (MAC) higher for firm #1 than for firm #2

**POLICY OBJECTIVE:** reduce TOTAL polluting emissions by 10 units

**WHICH instrument??**
Objectives & Instruments

- Let’s look at two instruments…

- “Emissions Standard”
  - Government tells each firm to reduce emissions by 5 units
    - TOTAL emissions reduction = 10 units
    - TOTAL emissions now allowed = 12 units
    - Environmental policy objective met
  - “command-and-control”
Objectives & Instruments [6]

“Emissions Trading”

- Government prints & distributes 12 emissions permits
  - Each permit allows firm to emit 1 unit of pollutant
  - Very large penalty if emit without permit
  - Each firm gets 6 permits from government (change later)
  - Firms can trade permits with each other
- TOTAL emissions now allowed = 12 units
  - TOTAL emissions reduction = 10 units
  - Environmental policy objective met
- “market mechanism”
### Emissions Standard

Each firm reduces emissions by 5 units

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What is TOTAL COST of abatement?
- Firm #1: $35
- Firm #2: $15

TOTAL COST = $50

“not available to do anything else”
In the beginning…each firm has 6 permits

How many units of emissions does each firm need to cut?

Firm #1: 14 – 6 = 8 units
Firm #2: 8 – 6 = 2 units

**What happens now?**
What if firm #2 were to “trade” one permit to firm #1?

Firm #2 would need some payment since its total abatement costs would RISE by $3

BUT…total abatement costs of firm #1 would FALL by $17

So there is a positive permit price at which this deal makes sense
### Emissions Trading [3]

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What if firm #2 were to trade ANOTHER permit to firm #1?

Firm #2 would need some additional payment since its total abatement costs would RISE by another $4

**BUT**...total abatement costs of firm #1 would FALL by another $15

Again, there is a positive permit price at which this deal makes sense.
**How Long Does This Trading Go On?**

As long as it is a “good deal” for both buyer & seller of permits!

As long as RISE in total abatement cost for permit seller is less than or equal to FALL in total abatement cost for permit buyer…

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### Emissions Trading [5]

This occurs when MAC of firm #1 = MAC of firm #2 = permit price

Firm #1 reduces emissions by 3 units
Firm #2 reduces emissions by 7 units

What is TOTAL COST of abatement?

Firm #1: $3+5+7 = $15$
Firm #2: $1+2+3+4+5+6+7 = $28$

TOTAL COST = $43$

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Standard vs Trading [1]

- Environmental policy objective attained in both cases...*but at a lower cost with emissions trading*
  - TOTAL abatement cost with standard = $50
  - TOTAL abatement cost with trading = $43
  - “not available to do anything else”

- 5 permits are traded from firm #2 to firm #1 – TRANSFER of $35 = 5 permits @ $7

- **NOTE**...available to firm #1 to “do something else”
Standard vs Trading [2]

- A few important benefits of trading...
  - COST EFFECTIVENESS through flexibility
  - Provides ongoing incentive for firms to reduce emissions
    - Encourages technological developments
  - Low information need on part of government
    - Firms need to know their abatement cost structure, but the government does not
  - Hard to make case that monitoring / enforcement costs higher than for standard
Standard vs Trading [3]

- **Conditions / situations where trading likely to work well…**
  - “uniformly mixed pollutants”
    - Don’t need to worry about localized areas of high pollution concentration – “hot spots”
    - Think of SO₂ and CO₂ - for example
  - **Abatement costs differ across firms**
    - Reasons for firms to trade
  - **Lots of buyers & sellers in market for permits**
    - High degree of “liquidity”
By extension, conditions / situations where trading **NOT** likely to work well...

- “non-uniformly mixed pollutants”
  - Need to worry about localized areas of high pollution concentration – “hot spots”
- **Abatement costs the same across firms**
- **Very few buyers & sellers in permit market**
  - Exercise of market power – permit price manipulation
Standard vs Trading [5]

- A few issues with trading…
  - How do transactions costs compare to “gain” in cost effectiveness?

- How to do “initial allocation” of permits?
  - Here: government *gives all* permits to firms
    - “gratis allocation”
    - Does this “discriminate” in favour of existing firms & against potential entrants?
    - Does it “reward” the worst polluters?
Standard vs Trading [6]

- How to do “initial allocation” of permits?
  - Another polar alternative
  - government sells all permits
    - Initial allocation through an “auction”
      - ALL revenues from permit sales go to government
        - Good bits: use these revenues to lower taxes; no discrimination – anyone can buy at market price
        - Less good bits: distributional concerns; competitiveness issues for some emissions-intensive firms
Standard vs Trading [7]

- QUESTION...
  - Is it possible to use standard to “replicate” pattern of emissions induced by permits?
    - In theory – Yes…
    - But, in practice – very, very unlikely
    - Basically, would need a different standard for every set of abatement cost conditions – every firm
      - HUGE informational requirements for government !!!
Summary

- **Economists ARE cheap…**
  - It is all about reducing waste
  - Seek to meet given environmental policy objectives by lowest-cost means
  - Emissions trading allows this to happen
    - Flexibility of responses by firms – emit, abate, use permit
    - Once environmental policy objective set, relatively low information need for government
Summary [2]

- Emissions trading will *NOT* provide desirable results in all situations
  - “Hot spots”
  - Liquidity concerns / price manipulation

- **BUT...**
  - an important instrument in the policy arsenal