Environmental Economics for Environmental Sciences (ENR-21306)

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Pollution control: Instruments II (Perman sections 6.4-6.6)

Two questions on pollution and damages

- How much pollution (emissions) should be *targeted?*
  - Lecture 4a
- What policy tools can *achieve* those targets?
  - Lecture 4b... continuing to 5a
  - Market based instruments (MBIs), such as cap and trade or pollution pricing (taxes)
  - Institutions such as informal, social norms (Ostrom) or formal, legal rules (Coase)
  - Command and control regulations
  - Each tool has different costs and benefits, i.e., choose two from cheap, accurate, and fast.

Criteria that may matter...

➢ Dependability	To what extent can the instrument be relied upon to achieve the target?
➢ Cost-effectiveness	Does the instrument attain the target at least cost?
➢ Enforceability	**How much monitoring is required, and can compliance be enforced?**
➢ Long-run effects	Does the influence of the instrument strengthen, weaken or remain constant over time?
➢ Dynamic efficiency	Does instrument create continual incentives to develop emission reducing technologies?
➢ Equity	What implications does the use of an instrument have for the distribution of income or wealth?
➢ Costs under uncertainty	How large are the efficiency losses when the Instrument is used with incorrect information?

Cap and trade

- Last time: two polluters with different marginal abatement costs (MACs):
  - They should not be required to reduce pollution by the same amount
  - They could be "required" to pollute by different – efficient – amounts, if the regulator KNEW their amounts
  - Cap and trade would reveal those MACs by making it profitable for them to trade according to efficiency.

More on C&T later...

Institutional approaches

- Formal property rights (Coase Theorem) sets a starting point for negotiations between polluter and pollutee that can succeed if transaction costs (TCs) are small:
  - Cost to define, monitor and enforce limits/permits
  - Cost of finding a trade partner and concluding a trade
  - Mostly applies with large ("point source") polluters
- Liability assigns right to NOT be polluted, but
  - Does the State represent the victims?
  - If not, TCs may be high
  - If so, victims may not get compensation

Institutional approaches

- Social responsibility (Ostrom)
  - Awareness or education can reduce non-point harm
  - Beware propaganda, e.g., voluntary recycling that increases net pollution (vs. caveman recycling)
  - Labelling as marketing (e.g., “fair trade, organic, locally produced”) may produce net harm. No substitute for accurate pricing (Hayek).
- Informal negotiations can link vague costs and benefits, e.g., water boards in polders

Command and control (CAC) instruments

- Direct controls target certain steps in production, but can mistarget, so businesses may substitute from regulated to a worse good, e.g., NG cheap in US **not EU**, so US exports coal to EU, where permits are cheap
- Effective with high TCs (e.g., NP polluters), but not if MACs differ (e.g., WFD)
- Information may be necessary to understand net impacts. Mandatory labelling as a *baptist and bootlegger* outcome, e.g., water footprints or corn ethanol (consultants and farmers with enviros)

CAC instruments

- Non-transferable licenses to pollute to a maximum amount require monitoring
- Minimal technological requirement ('Best Available Technology') can deliver large reductions (at large costs) when change in techniques may be cheaper
- Spatial planning can be rigid
- EU and US CAC policies can impose pollution limits or require technologies
- "Poorly implemented" policy (NOT an accident!) may induce adverse outcomes, e.g., "grandfathering" old coal plants

Market based instruments (MBIs)

- Alter incentives so individuals or firms “voluntarily” change their behaviour.
- Price of dirty stuff (inputs, outputs, technologies) increases relative to clean stuff
- Set prices (Q changes) or set limits (P changes)
  - Emissions taxes and pollution abatement subsidies
  - Tradable emission permits

Emissions tax

- Emission abatement subsidy reduces cost of a technology that reduces pollution impact
- NB: 'green' subsidies (e.g., wind power) supposedly reduce emissions by displacing dirty power, but they may just encourage MORE production and consumption
- Pollution tax (Pigouvian) increases private cost of production to match social cost. See 4b (chalk board)
- NB: tax targets aggregate supply curve. Some businesses will produce the same q, others shut down.
- Taxes raise money; subsidies spend. Guess which is more popular and which goes wrong more often?

Emissions tax

- Tax levels can rise/fall, depending on response
- Examples:
  - Wastewater fees per m^3
  - NO_x tax
  - CO_2 tax

- Does a tax always work?
  - Netherlands has tax on coal for many years!
  - But it exempts coal for power plants (=99%)
  - Dutch GW tax (v. provincial fee) repealed

Tradable emission permits

- Limited emissions permits (known) can be traded at an (ex-ante unknown) market price ('cap and trade')
  - Cap on emissions of pollutant for a group of firms assures that total emissions are reduced
  - Firms have a permit to pollute – for free or through auction – and can trade those rights with other firms
  - Price < MAC: buy permits to continue emissions
  - Price > MAC: reduce emissions and sell permits

Tradable emission permits

- Necessary conditions:
  - Government monitors emissions of firms
  - Government monitors whether firms have sufficient number of permits/allowances (e.g. 1 permit gives right to emit 1 ton)
  - Firms have to pay stiff penalty if they emitted more than covered by permits
  - Allow permit trade
- Pay for permits or get them for free?
- Pass on cost? (Easyjet charges for free carbon)

Permits vs. Taxes

- Tax and cap-and-trade are theoretically equivalent, but unknown MAC means that:
  - Taxes: Price/cost known, but quantity discovered
  - Cap & trade: Emissions known but price discovered

- Show equivalency on D and S (private and social) curves

Permit examples I

- U.S. Acid Rain Program:
  - Started in 1995
  - Tradable allowances for SO2 emissions
  - Prices around $300/ton
  - Successful in emission reductions
  - Market crashed with change in regulation
- California just started to auction CO2 permits; Australia has laws in place. China?

Permit examples II

- EU Emissions Trading System:
  - Tradable allowances for greenhouse gas emissions (ton CO_2-eq.)
  - Phase I (2005-2007): prices crashed; unclear whether emissions were reduced (why?)
  - Phase II (2008-2012): current price is below €7/ton; emissions have probably been reduced
  - Phase III (2013-2020) may never happen...
- Lots of problems with CDM and fraud
- What about everyone else?

Comparing instruments

- **CAC**: Results at high opportunity cost (wrong choices), pleases "do something" crowd, but may be ineffective in short and long run (farmers with nonpoint pollution)
- **Institutions**: Can be very effective but volunteers are tricky. Coasian bargaining works with low TCs
- **Taxes**: Transparent and direct (good incentives for new T&T, but people hate paying them)
- **Subsidies**: Rarely better than taxes, except for those who get paid
- **Cap and Trade**: Seems "controlled" but hard to deal with overallocation and fraud.