Policy Interactions within a Carbon-Pricing System

Robert N. Stavins
A. J. Meyer Professor of Energy and Economic Development
John F. Kennedy School of Government, Harvard University

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Institute of Energy, Environment, and Economy, Tsinghua University
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Sources & References

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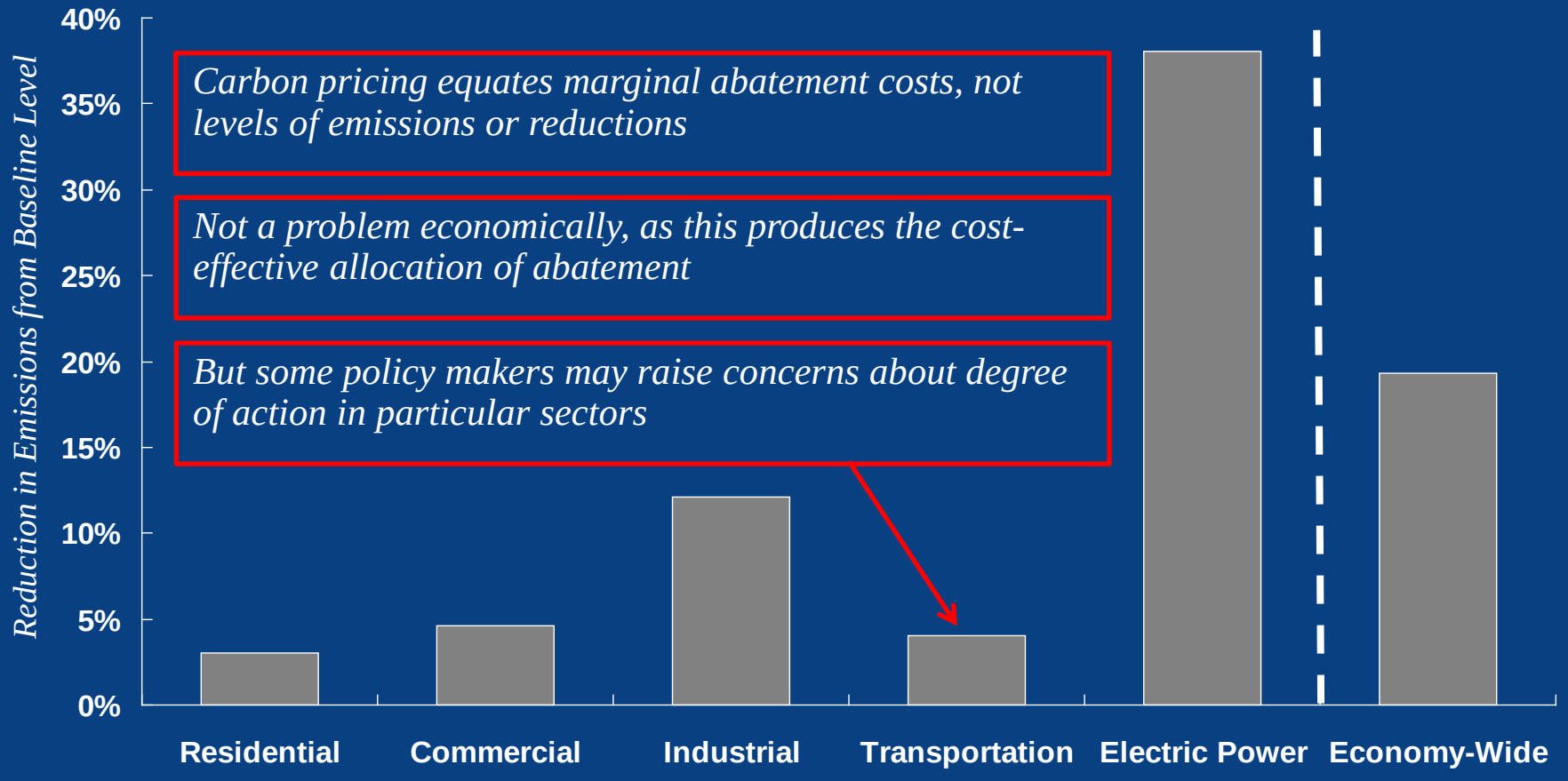
Why Policy Interactions are Important to Consider

- Wherever carbon-pricing systems (carbon taxes, cap-and-trade, tradable performance standards, etc.) have been implemented, it has been together with other ("complementary") climate policies:
  - *Sub-national* climate policies within a national system (or national policies within a regional system, such as EU)
  - *Sectoral or other policies* for the same geographic jurisdiction
- From an economic perspective, carbon pricing may be necessary, but will probably *not be* sufficient, due in part to other market failures
  - Principal-agent problem (renter-occupied buildings)
  - R&D spillovers
- So, specific non-pricing policies *can be* complementary
- But sometimes the motivation for complementary policies can be less clear economically …

Cost-Effective Economy-Wide Carbon Pricing Achieves Different Reduction Levels in Different Sectors (U.S. Example)

Percent Reduction in CO_2 Emissions by Sector in 2030 Under an Economy-Wide Emissions Cap Yielding a $35/ton Allowance Price in 2030 (EIA)



Interaction of Cap-and-Trade with Another Policy at *Same* Jurisdictional Level

- Example: California Low Carbon Fuel Standard (LCFS) for transportation sector emissions
  - *Consequences* of policy for sources *under the cap* of a cap-and-trade system
    - *Achieves no incremental CO_2 emission reductions* – relocates emissions (*unless* allowance price floor or ceiling is binding; acts as carbon tax)
    - *Drives up abatement costs* (marginal costs not equated)
    - *Suppresses allowance price* (by reducing overall demand for allowances)
  - So, some "complementary policies" can have perverse effects
- Motivation may also be policy makers wanting to keep allowance price low by having other policies do "heavy lifting"
  - And some claim that LCFS addresses information spillover/technology change market failure, but it is *not* a good instrument for that purpose.
- Policy interactions can also arise in case of sub-national policies …

Interaction of Cap-and-Trade with Another Policy at *Lower* Jurisdictional Level

- **Examples:**
  - EU ETS member state puts in place a more ambitious CO_2 policy
  - Province or state in a country with a national cap-and-trade system puts in place a more ambitious CO_2 policy
- **Can yield same perverse outcome as with "complementary policies"**
  - *Achieves no incremental CO_2 emission reductions* – relocates emissions to other jurisdictions
  - *Drives up* abatement costs
  - *Suppresses* allowance price
- **But, will these perverse outcomes necessarily arise?**
  - No, the interactions can be *problematic*, *benign*, or *positive*, …
  - *depending* on relative scope and stringency, and policy instruments used

Problematic Interactions

- If national policy limits emissions *quantities* or uses nationwide *averaging* of performance, …
  - Then, emission *reduction* by province with more stringent policy than national policy reduces pressure on other provinces,
    - thereby freeriding – indeed, *encouraging* (such as through lower allowance price) – emission *increases* in other states
- Result: 100% leakage, and loss of cost-effectiveness nationally
- Potential examples
  - State limits in USA on GHGs/mile *and* Federal CAFE standards
  - British CO_2 policies if under umbrella of EU ETS
- Partial solution: carve-out from broader policy (eliminates the 100% leakage, but still not cost-effective!)

Benign Interactions

- **Provincial climate policy less stringent than national policy**
  - Result: Provincial policy is non-binding and largely irrelevant

- **National carbon-pricing policy sets *price* with a tax (not quantity via cap-and-trade system)**
  - A carbon tax (or binding safety-valve/price collar in cap-and-trade)
  - More stringent actions in green provinces *do not lead* to offsetting emissions in other provinces induced by a changing carbon price.
  - So, potential for 100% leakage eliminated if policy at higher jurisdictional level is a price instrument – tax.
  - *However*, marginal abatement costs vary across provinces, and so aggregate reductions are *not* achieved *cost-effectively*.

Positive Interactions

- **Provinces (or sectors targeted by an additional national policy) can address *market failures* not addressed by national "carbon-pricing" policy**
  - Example: principal-agent problem re. energy-efficiency investments in renter-occupied properties → provincial or local building codes; also public-good nature of information (innovation market failure)
- **Provinces can be "laboratories" for policy design**
  - Six Chinese pilot systems can provide useful information for development of national policy
  - But will provincial authorities want their "laboratories" to be closed after experiment has been completed and the information delivered?
- **Provinces can create pressure for more stringent national policy**
  - Important example in USA: California motor-vehicle fuel efficiency standards and subsequent changes in national CAFE
  - Desirable if previous national policy is insufficiently stringent, … but that is an empirical question

Sub-National or Sectoral Policies Nested within a National Tradable Performance Standard (TPS)

- Consequences similar to cap-and-trade system, but more complex!
  - Same consequences for cases leading to Benign and Positive Interactions
  - Somewhat different consequences for cases leading to "Problematic" Interactions
- Reminder: With cap-and-trade, if nested (sub-national or sectoral) policy is more stringent, there is 100% leakage
- But under TPS, leakage due to complementary policy can exceed 100%.
  - How can this be?
  - Fundamental reason: Under TPS system, quantity of allowances distributed is endogenous to the compliance entities' outputs.
  - In general, the stringent sub-national policy causes a reduction in intended output of affected compliance entities, because of increase in marginal cost
  - But attendant increase in output price can lead to greater output more broadly, …
  - … and so total number of allowances and emissions can increase in aggregate.

Consequences of More Stringent Sub-National or Sectoral Climate Policy in National TPS

- If sub-national (SN) policy (or sectoral policy, SP) is more stringent for compliance entity (firm) than what national TPS would have done,
  - Firm must *reduce emissions intensity and/or purchase more allowances* per output unit
  - Either way, firm's *marginal cost* (of producing its output) increases, …
  - … and so if a profit-maximizing firm, its *output is reduced*.
- This reduction in output by the SN/SP source, can lead to an *increase in price of output* (throughout the economy, depending upon scope of market for the relevant commodity),
  - particularly significant if source faces inelastic demand (electricity market is an example)
- And in national market, this output price increase can lead to *greater aggregate output* – and so, given TPS constraint – *greater aggregate emissions*, …
  - particularly significant if national output supply is highly elastic.

Key Take-Aways

1. Everywhere carbon-pricing has been implemented, it has been together with other climate policies
2. Even if carbon-pricing is necessary, it will not be sufficient
3. Complementary policies can interact with cap-and-trade in perverse ways:
   - No incremental (aggregate) emissions reduction (100% leakage)
   - Increased costs
   - Suppressed allowance price
4. In tradable performance standard system, policy interactions can result in emissions leakage greater than or less than 100%, …
   - .. because allocation of allowances is endogenous (not fixed) under TPS.
5. Sub-national carbon-pricing policies can interact with a national policy in ways that are problematic, benign, or positive

For More Information

Harvard Project on Climate Agreements

www.belfercenter.org/climate

Harvard Environmental Economics Program

www.hks.harvard.edu/m-rcbg/heep

Website

www.stavins.com

Blog

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Thank You!