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# Some Thoughts on Climate Federalism

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# State & Local Roles in U.S. Environmental Policy



- Relevant state & local activities are extensive (land use, transportation planning, permitting, standards, etc.)
- But these functions are excluded from economic models of climate policy
- “Environmental federalism” is often misused to mean the policy dregs left behind once Uncle Sam has had his fill
- Responsibilities are overlapping and constantly changing



# What is federalism?

- Layers of embedded geographies
- Overlapping authorities and competencies
  - Must have: elected officials and the power to tax
- Constitutional and traditional division of powers
- US: from confederation to federation (to Leviathan?)
  - Carefully considered but intentionally vague
  - Perpetual tension between the central and the local
- EU: the unknown future of subsidiarity



# Advantages of allocated powers

- Subnational allocation:
  - Better information about local conditions/preferences
  - Diversity of policy experimentation
  - Actions conforming to local interests
- National allocation:
  - Avoid economic leakage and destructive competition
  - Uniform national price for CO<sub>2</sub>e helps minimize cost
  - Identify a unified national purpose



# Intellectual history of (economic) environmental federalism

- Fiscal federalism and jurisdictional competition:
  - Tax immobile resources, use benefit taxes
  - Provide services (public goods) at the jurisdictional level most closely matching the geographic extent of the service
  - Move redistribution up a level
- Environmental federalism
  - Match the jurisdiction to the extent of the spillovers
  - Climate: pure global spillover (No matching jurisdiction)



# Global scope argues for *national* policy

- Should achieve sufficient GHG reductions
- Is cost effective and administratively feasible
- Minimizes the cost of achieving the reductions
- Takes advantage of opportunities for state and local contributions



# Federalism as a *constraint on national climate policy*

- Constitutional and traditional constraints
- Political constraint: states in political competition with the national government
- Practical constraint: states in economic competition with each other
- Advantage of federalist policy: state participation takes the heat off of Uncle Sam



# Climate policy research must go ‘federalist’

- Assumption of harmonization *as if* in a unitary model of government is unhelpful.
- In a federal union, cost effective federal policy requires support and cooperation from the states. How to elicit that?
- Three ways national government affects state policy:
  1. Command
  2. Bribe and subsidize
  3. Markets (no Pigouvian taxes yet)
- Sub-national gov'ts will make their best strategic response:
  - They have many policy levers
  - Some of which may be constrained by constitutional limits



# Setting the national goal

- Aggregation of preferences by individual or by state?
- States will have a say on the target
- States will have a role in the solution
- In what ways will states be able to affect the national emission path?
- You can't preempt *everything*, you can't control *everything*



# A special interest in markets (incentives)

- As a national policy, price is a cost-effective policy tool
- Caps and taxes affect local policies differently
- In a federal union, how is the price signal passed through various layers of government?
  - Subnational governments do have incentive to keep costs low
  - Will this operate to lower the cost of meeting national goals?
- If the price signal is muted, then is there a role for supplementary policies?
  - Can national policy encourage local policies to be cost effective?



## An illustrative example

Suppose we model the CO<sub>2</sub> problem as follows:

Each locality,  $i \in 1 \dots N$  has emissions  $e_i$

Local emissions contribute to a global pollution stock,  $E = \sum_i e_i$ .

Damages arise both from local exposure to own emissions,  $D_i(e_i)$ , and from exposure to the global stock of emissions,  $S_i(E)$ .



If each jurisdiction,  $i$ , minimizes its costs:  $C_i(e_i) + D_i(e_i) + S_i(E)$

then it follows trivially that there would be too little emission control, since each jurisdiction ignores its own effect on the costs to other places.

We know that a social planner would choose tighter emissions in each locality.



But what if we are stuck, not with a social planner, but with a national government?

Then, the national government will set some objective while, presumably, taking into account the likely response of the states.

To see how tricky this can be, let's follow Williams (JPubEc 2013) and suppose that the national government seeks to use a set of state-specific emission taxes,  $T_i$ , to minimize the sum over all localities of pollution damages plus control costs:

$$\min \sum_i [C_i(e_i) + D_i(e_i) + S_i(E)]$$

Localities, in turn, choose their own emission tax,  $\tau_i$ , in response. Their problem is different from before because they must take into account the national emission tax and the lump-sum tax revenues,  $r_i$ , returned from the national government:

$$\min_{\tau_i} C_i(e_i) + D_i(e_i) + S_i(E) + T_i e_i + r_i \sum_j T_j e_j$$



Given these assumptions and the equilibrium requirement that emitting firms will set  $MAC = T_i + \tau_i$ , it is straightforward to show that:

$$T_i = \frac{1}{1-r_i} \sum_{j \neq i} \frac{\partial S_j}{\partial E}$$

and

$$\tau_i = \frac{\partial D_i}{\partial e_i} + \frac{\partial S_i}{\partial E} - \left( \frac{r_i}{1-r_i} \right) \sum_{j \neq i} \frac{\partial S_j}{\partial E}$$

It appears to imply that the national government sets its tax to internalize costs imposed on other jurisdictions and the localities take care of local damage.



There is a difficulty that you only discover when you add the two taxes together to get the MAC in each jurisdiction:

$$-\frac{\partial C_i}{\partial e_i} = \tau_i + T_i = \frac{\partial D_i}{\partial e_i} + \sum_j \frac{\partial S_j}{\partial E}$$

If any 2 localities,  $i$  and  $j$ , have  $\frac{\partial D_i}{\partial e_i} \neq \frac{\partial D_j}{\partial e_j}$ , then marginal costs of control will be

different as between the two localities, which is not a regional economic equilibrium and does not minimize the cost of control across the country. Capital will migrate from regions of high MAC to regions with low MAC until the marginal costs of control are equalized. Once this occurs, the first order conditions no longer hold. The locality losing capital cannot apply another instrument, as Williams suggests it might. The locality does not have any other policy instruments. If it did, it would have used that additional instrument in its original optimization (before the national policy) and again in response to the national government policy.



Suppose we replace the national government objective function with something less paternalistic, that is, leaving local damages to local decision and using a national abatement cost function:

$$\min \left[ C(E) + \sum_i S_i(E) \right]$$

Now, the national emission tax is damages to others net of local damages and the local tax is commensurately greater:

$$T_i = \left( \frac{1}{1-r_i} \right) \left( \sum_j \frac{\partial S_j}{\partial E} - \frac{\partial D_i}{\partial e_i} - \frac{\partial S_i}{\partial E} \right)$$
$$\tau_i = \frac{\partial D_i}{\partial e_i} + \frac{\partial S_i}{\partial E} - \left( \frac{r_i}{1-r_i} \right) \left( \sum_j \frac{\partial S_j}{\partial E} - \frac{\partial D_i}{\partial e_i} - \frac{\partial S_i}{\partial E} \right)$$

Adding the national and local taxes gives a MAC that is constant across jurisdictions even if local damages are different.



# The regional equilibrium is critical

- Results are sensitive to model specification
  - Objectives of the decision makers
  - Instruments available to different jurisdictions
  - Movements of resources
  - Constraints on choices
    - In the Williams model, many jurisdictions apply a negative tax on CO<sub>2</sub> emissions
    - Can the national government preempt this?



# State policy laboratories: a hopeful critique of local innovation

- The public good of policy innovation
- Is there learning from mistakes?
- Local interests, local politics, local policies
- Creation of entitlements and sticky state policies
- How do innovations spread?
  - Emulation of neighboring states (Is this innovation or reciprocal protectionism?)
- Can Uncle Sam encourage effective experimentation?



# The importance of ownership

- Historical perspective: who owns the rents?
  - State determination of infrastructure
  - State regulation of health, environment, and energy
  - State issuance of permits for construction, operation
- Share of state budgets
  - Emissions @ \$20 = \$150 billion
  - State tax revenues = \$800 billion



# Building a ‘federalist’ climate policy

- Give unto Caesar and all that, but...
- Acknowledge:
  - states’ role in setting and implementing policy
  - state ownership interest in resource rents
- Design a national policy that maximizes the value of state and local actions (how to do this...?)
  - Encourage cooperation vertically and horizontally
- Mitigation (national) versus adaptation (local)



# Unanswered design questions

- Should the states be given a share of the cap or a share of revenues? Can they retire allowances?
- Should states be compensated for doing more or should they be preempted?
- What state actions need to be encouraged beyond a price for CO<sub>2</sub>e?
- How does local policy autonomy affect commitment to a national GHG policy?



# Do subnational prerogatives raise or lower the cost of climate policy?

Recap three aspects:

1. National policies change local incentives. How does this affect costs and the emission path?
2. How effectively do national incentives percolate through the federalist layer cake?
3. How can we allocate actions so that they are taken at the most efficient level?



# The modern consensus redux

- Any successful global warming policy must exploit the authority of subnational governments over activities within their jurisdiction
- Subnational activity contributes to the formation of a national consensus.
- But, how to channel it to be cost effective?