Inefficient Policies in the Green Transition

Juan Dodyk

Harvard

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- US: Inflation Reduction Act of 2022 → carbon pricing in the future?

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Theoretical questions:

- Under what conditions is this strategy feasible?
- How is this affected by polarization?

This Paper

Dynamic model of climate policymaking.

- Two instruments: carbon tax and a green investment subsidy.
- Policy requires approval by a legislature.
- Legislators represent constituencies that differ in how much they are impacted by decarbonization.
- The policymaker cannot commit, and can change in the future.

The Model – Economy

Districts $i \in [0, 1]$.

Invested in either green or brown sector: $\chi_i = 1$ if brown, $\chi_i = 0$ if green.

- Initially $[0, b_1]$ are brown, $(b_1, 1]$ green, with $b_1 > \frac{1}{2}$.
- Brown district i can invest in green capital and transition at cost $c \geqslant 0$.

One good in the economy besides capital.

Production function is Cobb-Douglas with $\alpha = \frac{1}{2}$ using final good and capital.

- Brown district uses $\frac{1}{2}y^2$ units to produce y.
- Green district i uses $\frac{1}{2}y^2$ units to produce Aiy.
  - Consumption: $y - \frac{1}{2Ai}y^2$.
- $A > 1$ measures the productivity of green technology.

Brown production leads to carbon emissions: producing y units $\rightarrow$ emitting y tons.

The Model – Policies

Carbon tax $\tau \in [0, 1]$.

- Brown districts pay τy, so their income is $\frac{1}{2}(1-\tau)^2$.
- Green districts are not affected, and their income is $\frac{1}{2}Ai$.

Investment subsidy $s \geqslant 0$.

Lump-sum transfer T.

The Model – Politics

The districts are represented in a legislature.

Initially no climate policy, and the proposer is G.

In each period $t = 1, 2$:

1. (Second period only.) The proposer is replaced with probability ρ by B.
2. Proposer chooses a carbon tax τ_t; in the first period, also a subsidy s.
3. If a majority of districts prefer it to the status quo, it is implemented, and becomes the new status quo.
4. Districts make production and investment decisions.

In the second period T is automatically determined to balance the budget.

The Model – Preferences

Agents maximize discounted expected utility with discount factor δ.

Legislators only care about consumption π_{it}.

Agenda-setter P's payoff in period t is

$$W_P = \int_0^1 \pi_{it}\, di - 1_{P=G}\lambda \underbrace{\int_0^1 \chi_{it} y_{it}\, di}_{\text{emissions}}.$$

λ is the social cost of carbon.

Benchmark – Unconstrained Proposer

If the proposer decides policy in both periods,

- **carbon tax equals the social cost of carbon**: $\tau_1 = \tau_2 = \lambda$,
- investment subsidy not used: $s = 0$. It's an **inefficient instrument** for reducing emissions.

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Turnover explains the use of subsidies, but not the sequencing.

Legislative Bargaining

Brown districts are a majority, so a **winning coalition** must include some of them.

- Strategy: use the subsidy to induce the pivotal districts $[\frac{1}{2}, b_1]$ to accept policy today and transition.
- In the second period there is a green majority, so a green policymaker can implement an optimal carbon tax.

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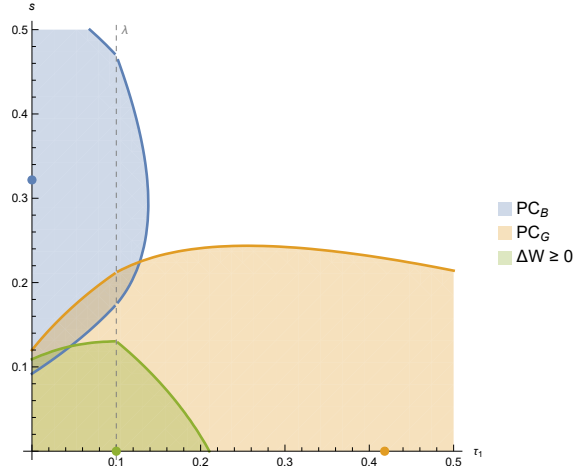
The need to build a coalition imposes two **political constraints**:

- Brown districts demand subsidies as compensation for the costs of transition.
- Green districts demand intertemporal budget balance.

Political Constraints



Results

Key trade-offs:

- Imposing costs on polluters today requires more subsidies to provide compensation: $\tau_1 \uparrow \Rightarrow s \uparrow$.
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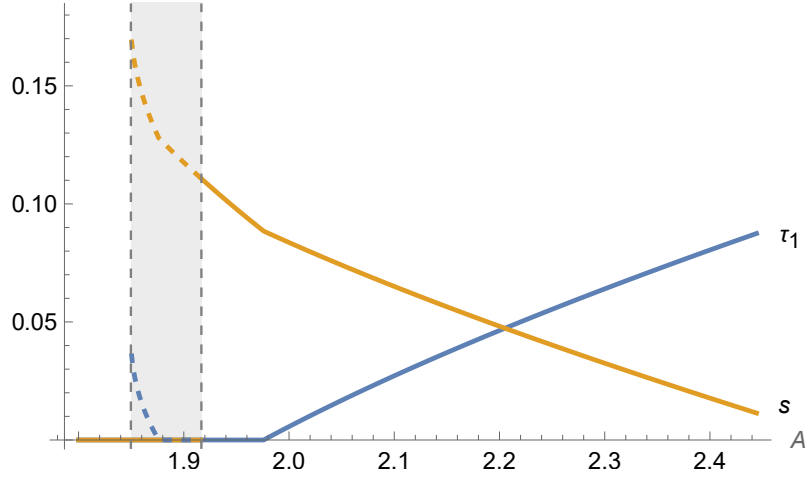
Why?

- The subsidy is necessary to get support from brown districts.
- An optimal carbon tax in the first period requires a large subsidy – a small reduction has a second-order effect on welfare, but allows the proposer to reduce the subsidy, which has a first-order positive effect.

Equilibrium Policies



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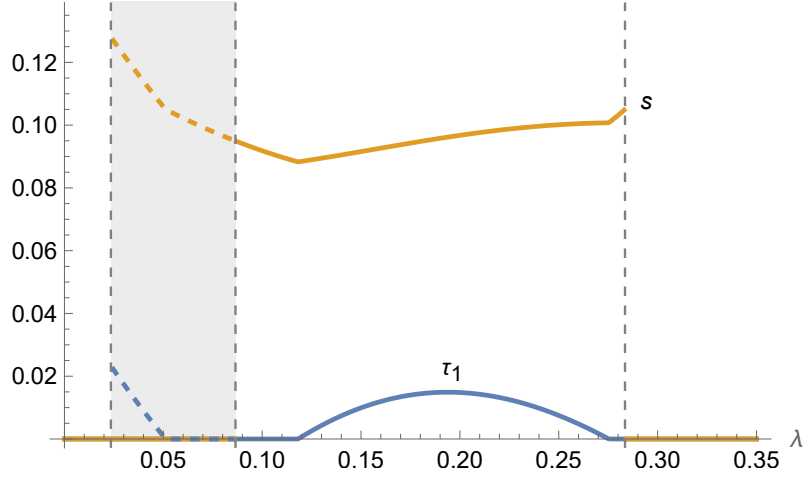
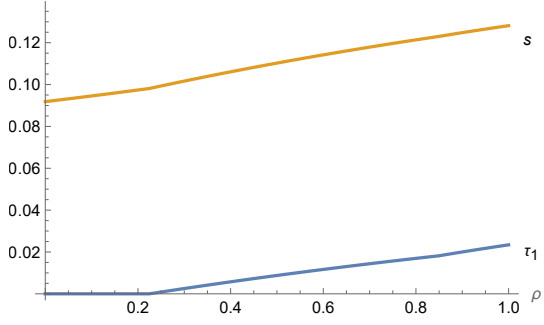
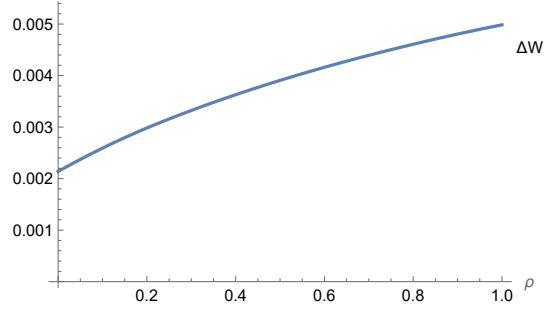


Political Turnover





Soft Commitments

There are two equilibria if initial political opposition is not too strong.

- If the initial policy proposal fails, but agents expect that a green proposer will implement an optimal carbon tax in the second period, some will invest in green capital.
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$$b_1 \leqslant \frac{1}{2} + \frac{(1-\rho)\lambda(2-\lambda)}{A}.$$

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Rationale for soft commitments such as net-zero targets or NDCs.

- But this logic only works under some conditions, and equilibrium policies are still not first-best.

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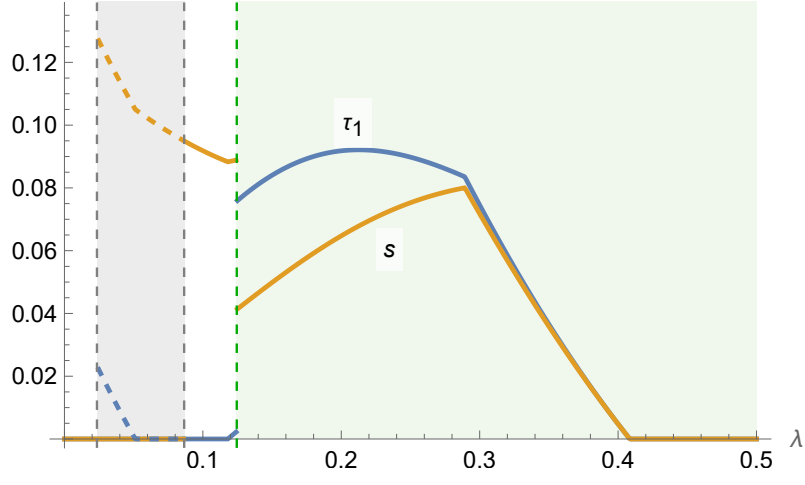

Conclusion

Dynamic model of climate policy:

- Analysis of the political logic of green industrial policy.
- Conceptual takeaways: there are trade-offs, and political feasibility is not guaranteed.
- Counter-intuitive results:
  - The ambition of policymakers can make the political constraints harder to satisfy.
  - Polarization can help start the policy sequence.
- The model provides a rationale for the use of soft commitments:
  - They can work by shifting expectations to a better equilibrium.
  - This only works if initial political opposition is not too strong and policymakers are sufficiently concerned about climate.

Manuscript in my webpage: `juandodyk.github.io`