Inefficient Policies in the Green Transition

Juan Dodyk

Harvard

Two Approaches to Climate Policy

Taxing Pollution

Subsidizing Green Technologies

Two Approaches to Climate Policy

Economists recommend taxing pollution

– Statically, it reduces emissions cost-effectively
– Dynamically, it encourages firms to invest if the environmental harms justify paying the cost of transition

Reality: only 1% of global emissions are taxed at the recommended level (World Bank)

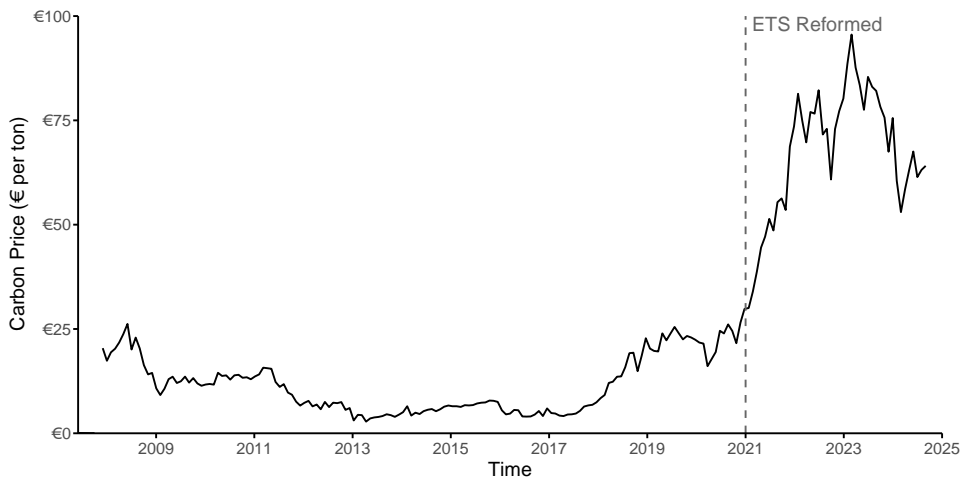Variation across country, and **within country** over time.

Pattern: subsidies + low taxes initially → high taxes later.

GERMANY – RENEWABLE ENERGY SOURCES ACT (2000)

Wind and Solar Energy Production Over Time
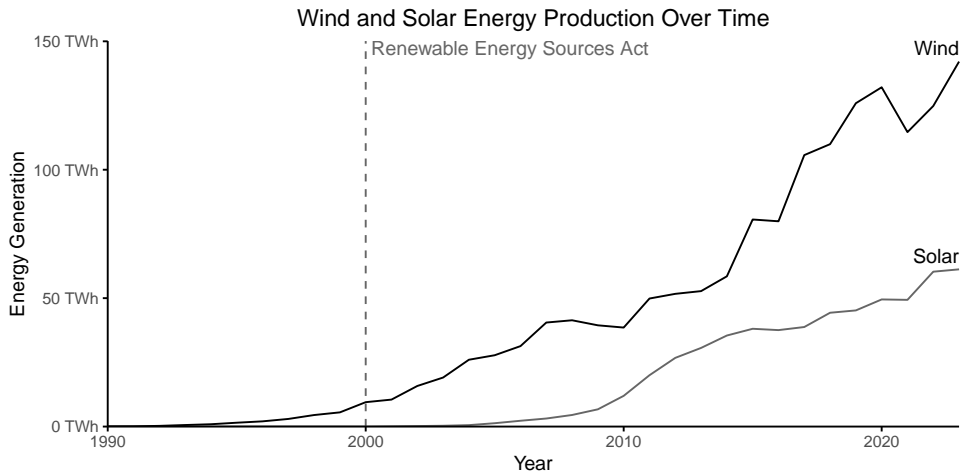
EU Emissions Trading System (ETS) starts in 2005, reformed in 2021

Germany prices carbon in the heating and transportation sectors in 2021

Burning Our Money to Warm the Planet

Canada's Ineffective Efforts to Reduce Greenhouse Gas Emissions

Mark Jaccard, Nic Rivers,
Christopher Bataille,
Rose Murphy, John Nyboer and
Bryn Sadownik

Canada – Federal Carbon Price (2018)

Canada passed a carbon tax that will give most Canadians more money

By rebating the revenue to households, disposable income rises, which can be a boon for the Canadian economy

Prime Minister Justin Trudeau answers a question on Parliament Hill in Ottawa on Thursday, Oct. 25, 2018. Photograph: Canadian Press/REX/Shutterstock

Why Subsidies?

Policy sequencing argument: subsidies serve to **build a coalition** today, and relax political opposition to carbon pricing tomorrow (Meckling et al 2015, 2017; Pahle et al 2018).

> "We need to **disrupt the political power of carbon polluters before** we can meaningfully reshape economic incentives" (Mildenberger and Stokes 2020).

Goal of this paper:

1. Study this argument in a political economy framework.

2. Determine under what conditions policy sequencing is feasible,

3. and whether it can explain empirical patterns of climate policies.

This is the first paper to provide a framework to study climate policymaking with microfounded political constraints that allows policy to alter these constraints over time.

QUESTIONS

1. Under what conditions is the policy sequencing strategy even feasible?

    – How do political and economic conditions, such as political polarization and the productivity of green technologies, affect the feasibility of the strategy?

2. Can it help us rationalize the dynamic path of pollution taxation?

My Approach

Two policies: a carbon tax and a subsidy for green investments.

Policy requires approval by a legislature.

Legislators represent constituencies that differ in how "easy to decarbonize" they are.

Polluter districts are initially a majority.

Risk of turnover: the policymaker can be replaced by an environmentally unfriendly politician in the future.

Key Tension

Distributive conflict creates a **tension**:

The proposer needs to win over pivotal polluting constituencies...

... without alienating existing green constituencies.

Why?

Subsidies help to get approval by pivotal polluting constituencies.

But they raise fiscal costs and shrink the base of pollution taxes. Green districts are eventually forced to pay for these subsidies that go to polluting districts.

PREVIEW OF RESULTS

1. Whenever the sequencing strategy is feasible, it generates the empirical pattern:

   subsidies + low taxes initially → high taxes later.

2. Policy sequencing is feasible if and only if:

   green technologies are sufficiently advanced and investment costs are sufficiently low,

   and the proposer is sufficiently concerned about mitigating climate change, but not too concerned.
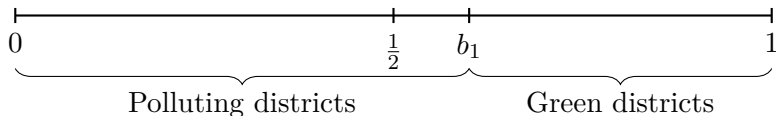
   The effect of polarization is ambiguous. Under some conditions it can help implement climate policy.

ROADMAP

1. The Model

2. Results

3. Extensions

4. Empirical Implications

THE MODEL

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

- Polluting technology produces y at cost $\frac{1}{2}y^2$.

- Green technology in district i produces $\boldsymbol{Ai}y$ at cost $\frac{1}{2}y^2$.

- $A > 1$ measures the productivity of green technology.

Polluting production generates carbon emissions: producing y units $\rightarrow$ emitting y tons.

Polluting district i can invest in green capital and transition at cost $c \geqslant 0$.

The Model – Policies

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

- Polluting districts pay τy.
- Green districts are not affected.

Investment subsidy $s \geqslant 0$.

Lump-sum transfer T.

THE MODEL – POLITICS

There are two proposers: G and B.

Initially taxes and subsidies are zero, and G is the agenda-setter.

In each period $t = 1, 2$:

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

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}.

Proposer P's payoff in period t is

$$W_P = \text{AGGREGATE CONSUMPTION} - \text{ENVIRONMENTAL DAMAGES}.$$

The Model – Preferences

Agents maximize discounted expected utility with discount factor δ.

Legislators only care about consumption π_{it}.

Proposer P's payoff in period t is

$$W_P = \underbrace{\int_0^1 \pi_{it}\, di}_{\substack{\text{Aggregate} \\ \text{Consumption}}} - 1_{P=G}\lambda \underbrace{\int_0^{b_t} y_{it}\, di}_{\text{Emissions}}\,.$$

λ is the **social cost of carbon**.

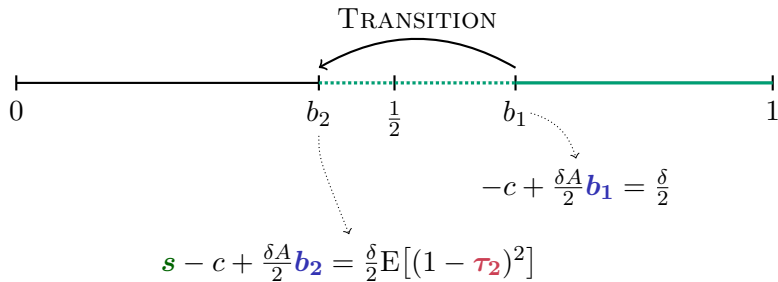# Results

Policy without Politics

> **Proposition**
> If the proposer is a dictator in both periods then carbon taxes equal the social cost of carbon and the subsidy is not used.

Why? Setting the carbon tax equal to the social cost of carbon

  – Statically, it reduces emissions cost-effectively
  – Dynamically, it encourages firms to invest if the social cost of carbon justifies paying the cost of transition

Subsidies are an **inefficient** instrument for reducing carbon emissions.

WHO TRANSITIONS?

TRANSITION

$0 \qquad b_2 \quad \frac{1}{2} \quad b_1 \qquad 1$

$-c + \frac{\delta A}{2} b_1 = \frac{\delta}{2}$
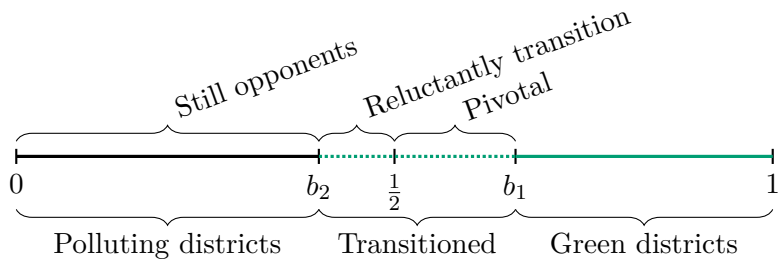
$s - c + \frac{\delta A}{2} b_2 = \frac{\delta}{2} \mathrm{E}\big[(1 - \tau_2)^2\big]$

Building a Coalition

Polluting districts are a majority, so a **winning coalition** must include some of them.
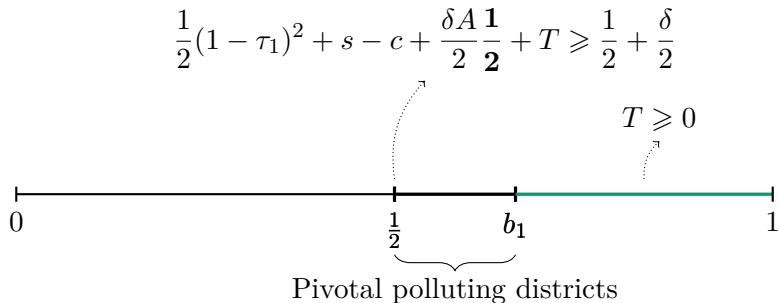
$$\frac{1}{2}(1-\tau_1)^2 + s - c + \frac{\delta A}{2}\mathbf{\frac{1}{2}} + T \geqslant \frac{1}{2} + \frac{\delta}{2}$$

$$T \geqslant 0$$

Pivotal polluting districts

POLITICAL CONSTRAINTS

$$\underbrace{\frac{1}{2}(1-\tau_1)^2}_{\substack{\text{PERIOD-1} \\ \text{INCOME}}} + \underbrace{s - c + \frac{\delta A}{4}}_{\substack{\text{NET BENEFIT} \\ \text{OF TRANSITION}}} + \underbrace{T}_{\text{TRANSFER}} \geqslant \underbrace{\frac{1}{2} + \frac{\delta}{2}}_{\substack{\text{INCOME IF} \\ \text{POLICY IS BLOCKED}}} \qquad \text{(Polluting Districts)}$$

(Green Districts)

Political Constraints

$$\underbrace{\frac{1}{2}(1-\tau_1)^2}_{\substack{\text{Period-1} \\ \text{Income}}} + \underbrace{s - c + \frac{\delta A}{4}}_{\substack{\text{Net Benefit} \\ \text{of Transition}}} + \underbrace{T}_{\text{Transfer}} \geqslant \underbrace{\frac{1}{2} + \frac{\delta}{2}}_{\substack{\text{Income if} \\ \text{Policy is Blocked}}} \qquad \text{(Polluting Districts)}$$

$$\underbrace{T}_{\text{Transfer}} = \underbrace{}_{\substack{\text{Carbon Tax Revenue} \\ \text{in Period 1}}} + \underbrace{}_{\substack{\text{Discounted} \\ \text{Carbon Tax Revenue} \\ \text{in Period 2}}} - \underbrace{}_{\substack{\text{Fiscal Cost} \\ \text{of Subsidies}}} \geqslant \underbrace{}_{\substack{\text{Transfer if} \\ \text{Policy is Blocked}}} \qquad \text{(Green Districts)}$$

24

POLITICAL CONSTRAINTS

$$\underbrace{\frac{1}{2}(1-\tau_1)^2}_{\substack{\text{PERIOD-1} \\ \text{INCOME}}} + \underbrace{s - c + \frac{\delta A}{4}}_{\substack{\text{NET BENEFIT} \\ \text{OF TRANSITION}}} + \underbrace{T}_{\text{TRANSFER}} \geqslant \underbrace{\frac{1}{2} + \frac{\delta}{2}}_{\substack{\text{INCOME IF} \\ \text{POLICY IS BLOCKED}}} \qquad \text{(Polluting Districts)}$$

$$\underbrace{T}_{\text{TRANSFER}} = \underbrace{b_1 \tau_1 (1 - \tau_1)}_{\substack{\text{CARBON TAX REVENUE} \\ \text{IN PERIOD 1}}} + \underbrace{\delta b_2 \mathbf{E}[\tau_2 (1 - \tau_2)]}_{\substack{\text{DISCOUNTED} \\ \text{CARBON TAX REVENUE} \\ \text{IN PERIOD 2}}} - \underbrace{s(b_1 - b_2)}_{\substack{\text{FISCAL COST} \\ \text{OF SUBSIDIES}}} \geqslant \underbrace{0}_{\substack{\text{TRANSFER IF} \\ \text{POLICY IS BLOCKED}}} \quad \text{(Green Districts)}$$
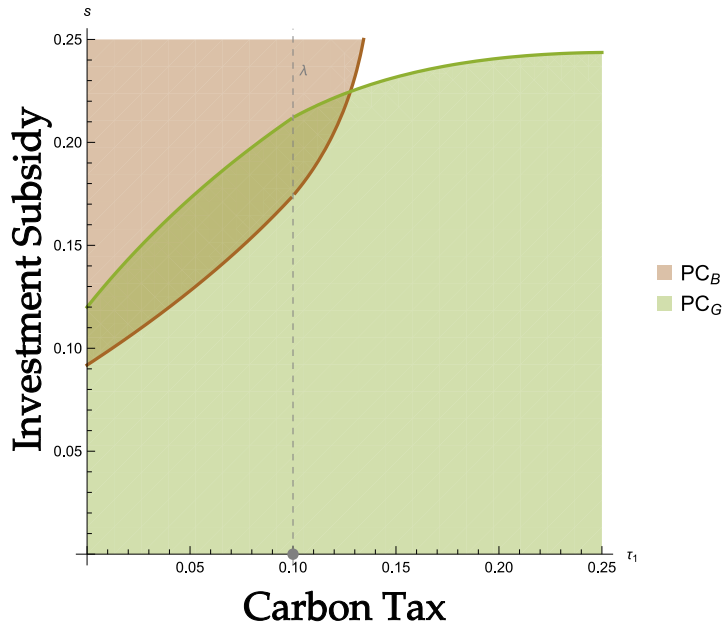
Political Constraints
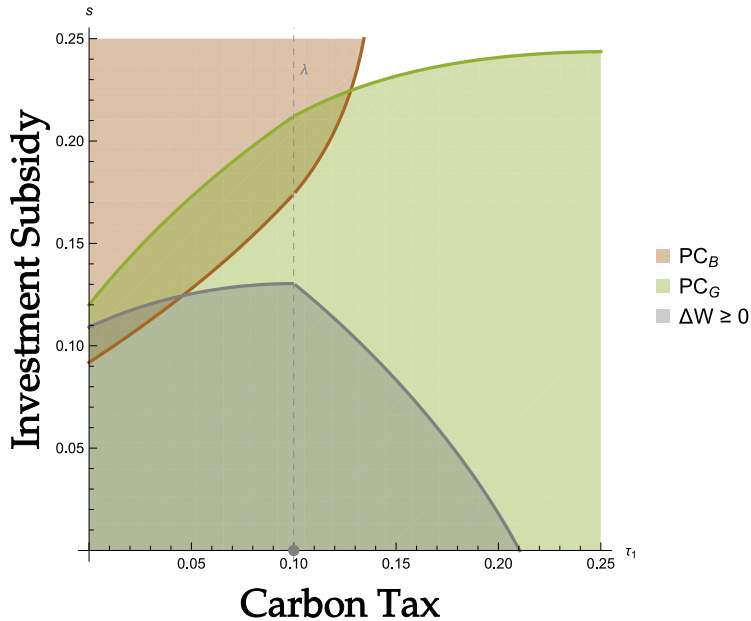
Key distributive tension:

Polluting districts demand low taxes and generous subsidies.

Green districts demand high taxes if subsidies are generous.

POLITICAL CONSTRAINTS

POLITICAL CONSTRAINTS

Why Are Carbon Taxes Low?

> **Proposition**
> In equilibrium either the first-period carbon tax is below the social cost of carbon and the subsidy is positive, or no climate policy is enacted, i.e., $\tau_1 < \lambda$ and $s > 0$, or $\tau_1 = s = 0$.

Why? Political constraints make taxes and subsidies **complements**.

Imposing costs on polluters today requires more subsidies as compensation: $\tau_1 \uparrow \Rightarrow s \uparrow$.

Summary of Results

1. Under what conditions is the strategy feasible?

   – Carbon abatement technology needs to be sufficiently advanced.

   – The social cost of carbon cannot be too low nor too high.

   – The effect of polarization is ambiguous. The risk of the opposition taking agenda-setting power in the future can relax the political constraints today.

2. Can it help us rationalize the pattern of pollution taxation?

   – Yes. Carbon taxes are initially too low because there is a tradeoff between carbon prices and inefficient compensation.

EMPIRICAL IMPLICATIONS

Main causal claim

Subsidies $\rightarrow$ investments $\rightarrow$ preferences for climate policy $\uparrow$ $\rightarrow$ carbon pricing.

Empirical Implications

Industry level predictions

Subsidies break the "fossil fuel coalition" into three types:

"Pivotal", "Reluctant" and "Hard to abate" industries.

Exciting research agenda: study the effects of green industrial policies in real time.

IRA, EU Green Deal, South Korea's Green New Deal, Sweden's Green Industrial Leap.

Main question: do green industrial policies reduce opposition to carbon taxation?

Firm-level analysis: look at lobbying and campaign contributions.

Individual-level analysis: look at voters' preferences over time.

Empirical Implications

Country level predictions

Subsidies $\rightarrow$ investments $\rightarrow$ preferences for climate policy $\uparrow$ $\rightarrow$ carbon pricing.

Mediators: structure of the economy and political institutions.

Structural version of the model $\rightarrow$ testable predictions.

Broader Contribution

Theoretical contribution: incorporating political economy into climate policymaking.

– Microfounded and dynamic political constraints.
– The political power of industries is not fixed and policy can reduce it.

Broader Contribution

Theoretical contribution: incorporating political economy into climate policymaking.

– Microfounded and dynamic political constraints.
– The political power of industries is not fixed and policy can reduce it.

Political economy creates a **linkage between taxes and subsidies**:

– Taxing pollution requires green industrial policy to relax political constraints.
– Green industrial policy is affected by expectations of future pollution taxation.

Broader Contribution

Theoretical contribution: incorporating political economy into climate policymaking.

– Microfounded and dynamic political constraints.
– The political power of industries is not fixed and policy can reduce it.

Political economy creates a **linkage between taxes and subsidies**:

– Taxing pollution requires green industrial policy to relax political constraints.
– Green industrial policy is affected by expectations of future pollution taxation.

Policy implications:

– *Some* inefficient policies are good because of their policy feedback effects.