"Welfare Consequences of Sustainable Finance" by Harrison Hong, Neng Wang, Jinqiang Yang

Discussion by Toàn Phan (FRB Richmond)

Bundesbank May 2023

Overview

- How valuable are sustainable finance mandates in addressing environmental externality?
  - E.g., Renewable Portfolio Standard: States require investor-owned electricity suppliers to produce $\geq m\%$ of electricity with renewable.
- This paper: very.
  - AK model where cumulative emissions increases risk of tipping natural disaster processes
  - Firms can divert some capital investment into decarbonization to reduce their emissions
  - Incentive: decarbonizing firms may qualify to tap funding from an (exogenous) fraction α of investors with preferences for "sustainability"
  - To qualify, firms must sufficiently invest in decarbonization above a threshold determined by government mandate m.
    - They trade off lower returns & cash flows to tap sustainable investors.
  - Quantitative exercise: Welfare under optimally chosen m can approximate first best.
  - Implication: in absence of carbon tax, sustainable welfare mandates can achieve a lot.
- My plan: Instead of detailed comments, let's use the paper (forthcoming in RFS) as a springboard for new research ideas.

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- Suppose firms have heterogeneous decarbonization productivity, unobserved by policymaker.
- How effective is mandate?
    - Qualitatively, generally not as effective as carbon tax.
    - "Mirrleesean intuition": taxing pollution (an "output") generally leads to less distortion than regulating decarbonization (an "input").

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(Paper assumes $N \to D$ directly.)

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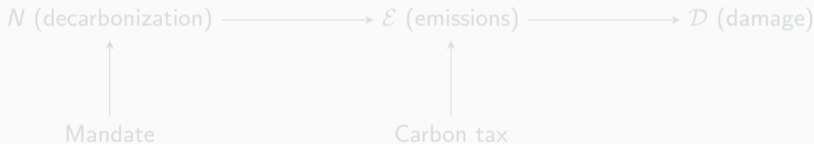
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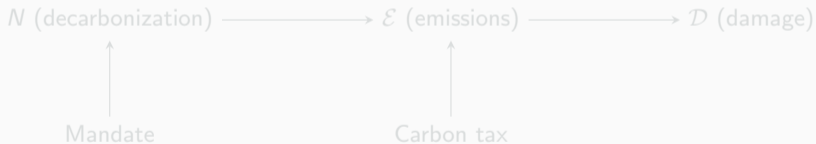
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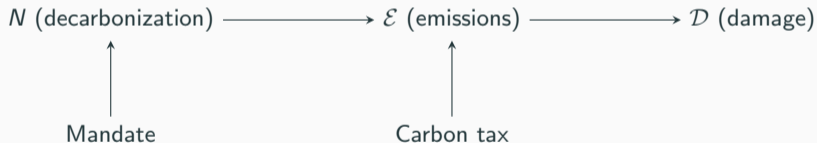
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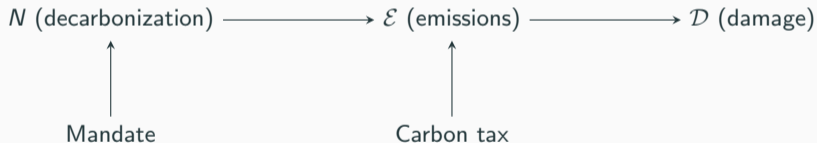↑   ↑

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Toy two-period model (where mandate is less effective)

- Planner: $\max_{\{k^i\},\{n^i\}} u\left(1 - \int \phi(k^i) - \int \psi(n^i)\right) + \beta u\left(\int Ak^i - \mathcal{D}(\mathcal{E})\right)$.
  - "Damage function" $\mathcal{D}(\mathcal{E}) = \delta\mathcal{E}$.
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- Proposition: Welfare ranking: $W_\mu \leq W_\tau = W_{planner}$.
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Some open questions

- How big or small is $\Delta = W_{tax} - W_{mandate}$ (or $W_{firstbest} - W_{mandate}$)?
  - Weitzman revisited: How does Δ depend on uncertainty of decarbonization costs (e.g., future technological breakthroughs) and uncertainty of climate damages (e.g., regarding damage elasticity, climate sensitivity, tipping point sensitivity)?

- Role for disclosure mandates?
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- When is sustainable finance mandate needed on top of other policies (e.g., carbon tax/ETS)?
    - My guess: When $\exists$ "green investment externality," e.g., when
        - decarbonization productivity θ depends on aggregate $\int n^i$ (endogenous growth), or
        - $\exists$ R&D spillover (direct technical change à-la Acemoglu et al 2012), or
        - $\exists$ multiple equilibria (Buera Hopenhayn Shin Trachter 2023), possibly necessitating a "big green push."

- Coasian "green theory of the firm" question: When is decarbonization done inside a firm v.s. via markets (for carbon offsets/credits)? How does that affect policy design?

- Empirically, how sensitive are firms to mandates?
    - Great application: Effects of Renewable Portfolio Standards for electricity providers in several U.S. states (Hong Kubik Shore 2023).

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Conclusion

- Once you start thinking about the economics of decarbonization (and the immense global financing required), it is hard to stop.

- This paper helps the literature (and certainly me) take the first step in formalizing and analyzing the challenges.