EUROFRAME 2021: Strategic Interactions in Climate Policy

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June 18, 2021

Why is regulation of climate change externalities difficult?

- We live in a world with multiple countries/regions (EU/US/China)
- The literature agrees that no cooperative equilibria exist (Nordhaus 2015)

"If we do something, the others will just free ride"

- BUT. Are we sure about that?
- We nuance the existing literature: binary problem (cooperate/free-ride) (e.g. DeCanio and Fremstad (2013))

The concept of strategic complementarity

The terms *strategic substitutes* and *strategic complements* were first introduced by Bulow et al. (1985) and subsequently by Cooper and John (1988).

- Strategic substitutes: policy actions are mutually negating
- Strategic complements: policy actions are mutually reinforcing

The mechanisms of strategic complementarity

- Tax competition: When a trading partner increases tax rate, it gives the other country room to increase theirs as well
- Free rider effect: if we take climate action, the other country's marginal gain of taking climate action declines
- General equilibrium effects

How are we investigating this?

- Two identical countries
- Two-period OLG model
  - Households get utility from consumption, public goods and the climate
- Two goods - one polluting, one less polluting - government chooses climate tax or abatement expenditures
- Country-specific goods are perfect substitutes
- Exogenous labour supply (endogenous allocation)
- Integrated capital markets

Modelling the climate

- The flow of emissions, e, is proportional to the capital stock.
- The stock of emissions, E

$$E_{t+1} = (1 - \varepsilon) \cdot E_t + \sum_i e_t^i \cdot (1 - \Psi_t^i)$$

- The government spends the tax revenue on either investments in public welfare or abatement expenditures, A

$$A_t^i = \lambda \cdot (\Psi^i)^\phi \cdot e_t^i$$

The policymaker and best responses

- The policymaker maximises his own country's social welfare (in steady state) by choosing the climate tax rate, τ, subject to
  - Optimal behaviour by individuals
  - The government budget
  - A given foreign climate tax
- Countries choose their climate policies without coordinating with or caring about the interests of their trading partner.

The policymaker

Because of interdependence between the two countries, the optimal climate tax in country i, $\left(\tau^i\right)^*$, becomes a function of the climate tax chosen in country j

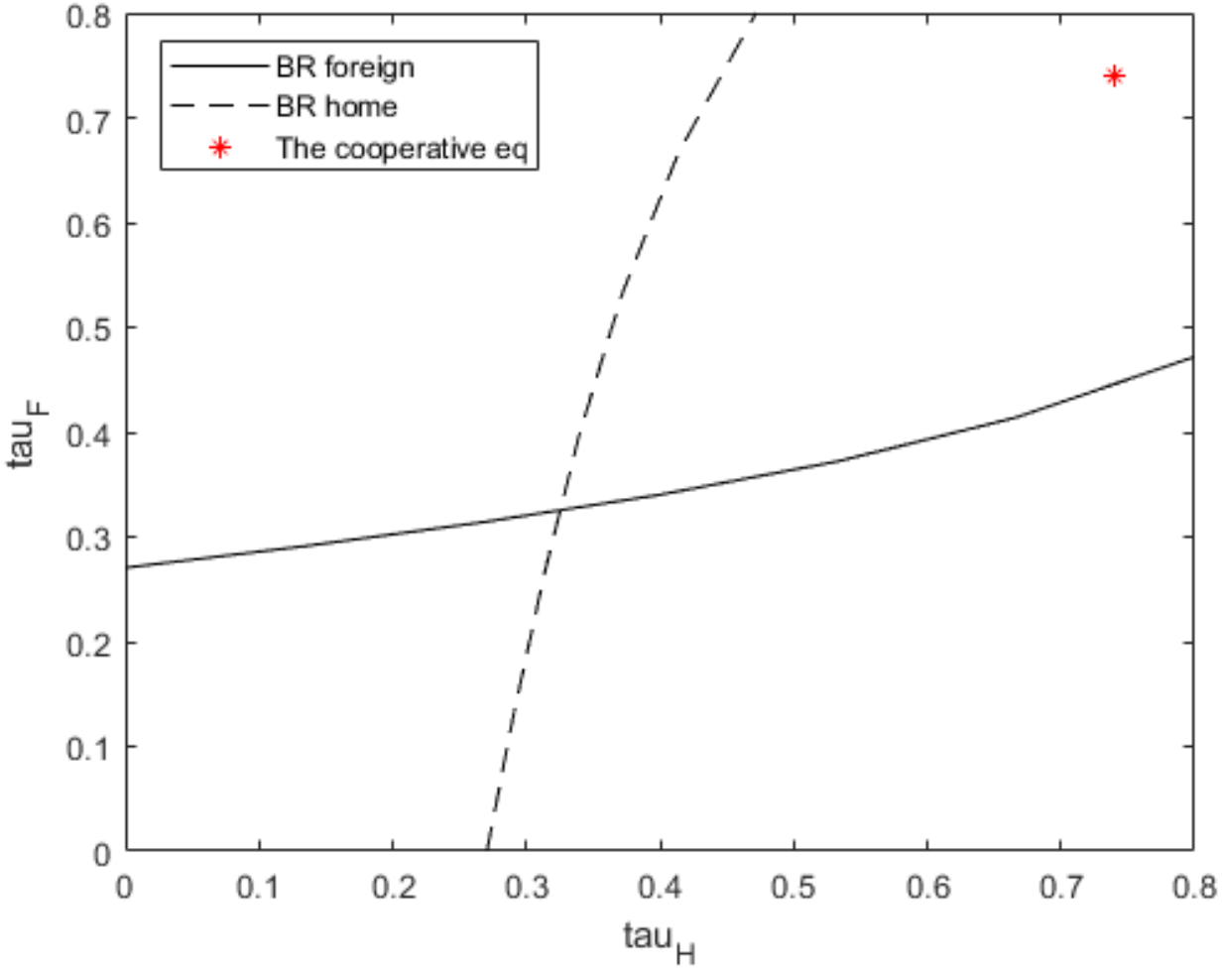
$$\left(\tau^i\right)^* = h^i\left(\tau^j\right),\ i = H, F,\ j \neq i$$

What we are ultimately interested in are the slopes of the best respond functions in the Nash equilibrium!

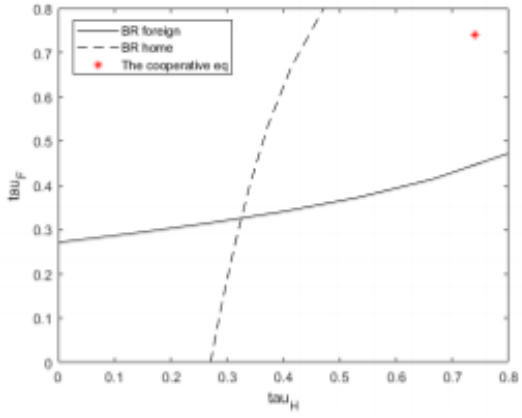
Policy

- Two policy tools: taxes and abatement
- Baseline: Government spends all its revenue on general spending
- Nothing on abatement

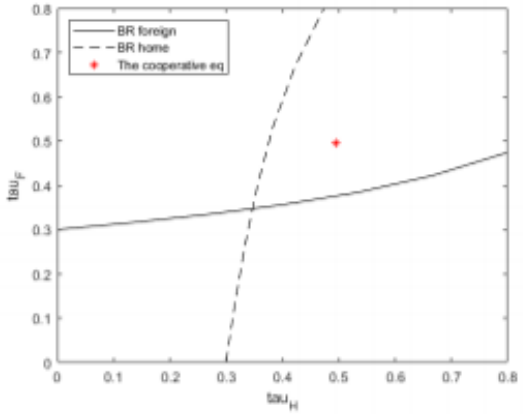
Main result - baseline calibration



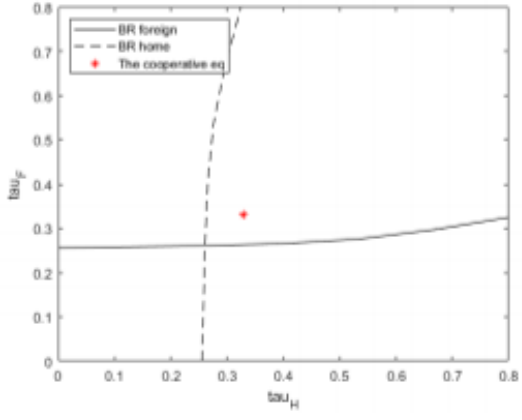
Results - abatement



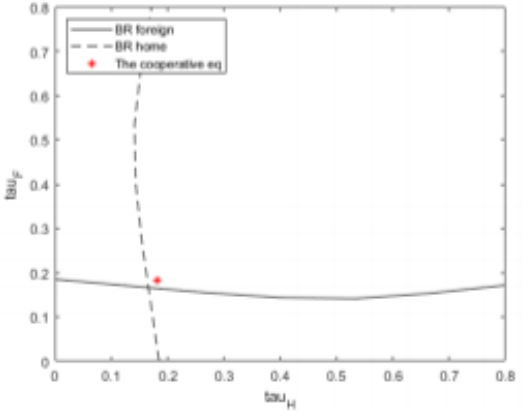
(a) Government spends 0% of tax revenue on abatement



(b) Government spends 10% of tax revenue on abatement

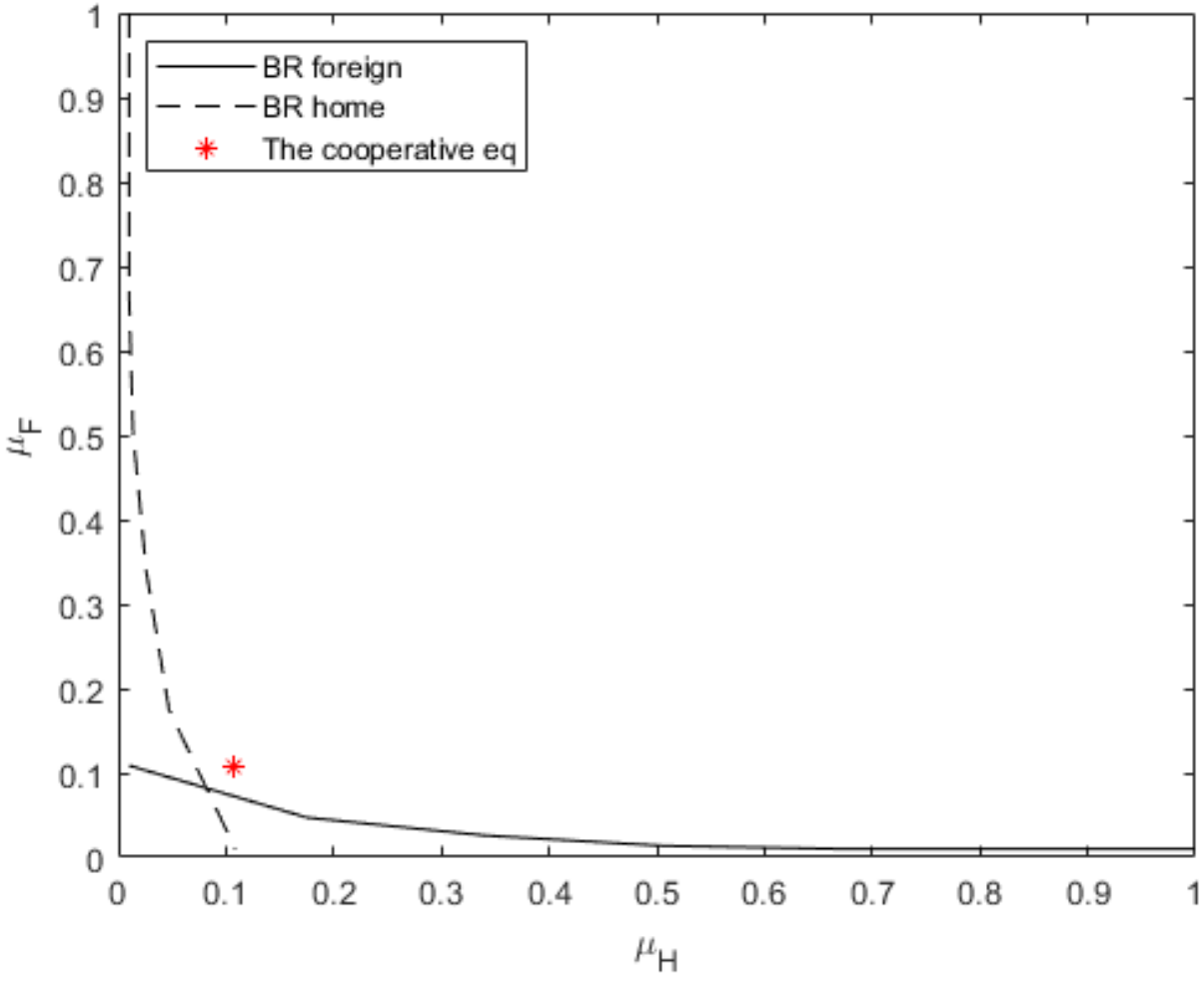


(c) Government spends 30% of tax revenue on abatement



(d) Government spends 50% of tax revenue on abatement

Endogenous abatement



Conclusion

- When we extend on the standard prisoners' dilemma framework of climate change mitigation, we get different predictions
- We could in fact imagine a world where free-riding is dominated by counteracting mechanisms
- The strategic complementarity depends on what governments spend their tax revenue on

References

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- Cooper, Russell and Andrew John (1988). "Coordinating coordination failures in Keynesian models". In: *The Quarterly Journal of Economics* 103.3, pp. 441–463.
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