Discussion of: Optimal Climate Policy in a Global Economy

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Summary of the paper

Main paper points

1. Highlights the negative externality imposed by emissions ignored by firms in a competitive equilibrium by deriving a first best and market economy
2. Introduces a multiple-country setup to then explore a world with cooperative policy and one without
3. Cooperative policy in a multiple country framework, showing that global carbon tax is a generalised expression of the closed economy carbon tax
4. Considers a world beyond cooperation under a price-taking policymaker and a dynamic monopolist policymaker (acts as Home country)

High points of the paper

Multi-country framework

- Brings together Costinot et al. (2014) and Golosov et al. (2014) to extend to a multi-country framework.
- Carries out an interesting exercise without co-operation with a Foreign country that has business as usual and a Home country that exhibits market power.
- Home has incentives to price manipulate with direction depending on whether they are net buyers or sellers ($c_t^1 > Y_t^1$ and $c_t^1 < Y_t^1$ respectively).
- Shows by solving the uncooperative countries' problem that optimal consumption allocation is time-variant and dependent on price wedge χ_t, which in turn matters for the tax/subsidy on borrowing.

Areas for improvement

Energy Modeling part (1/2)

The author does not consider possibilities of abatement or substituting away from fossil energy. The tax incidence on fossil energy (dirty energy) will be substantially damaging.

- Two avenues:
  - Include abatement and abatement costs:

$$Y_t = (1 - \mu_t^{\text{abatement}})(1 - D(S_t))A_t F(n_t, E_t)$$

  - Consider a CES aggregator between fossil and renewable energy:

$$E_t = \left(E_t^{\text{Fossil}} \frac{\theta-1}{\theta} + E_t^{\text{Renewable}} \frac{\theta-1}{\theta} \right)^{\frac{\theta}{\theta-1}}$$

Energy Modeling part (2/2)

- Energy production does not incorporate capital. This is key and might have consequent impacts on the quantitative exercises and policy recommendations:
  - Interest rate dynamics will drive firms' decisions over labour and capital investment. Including capital is important:

$$E_t^k = z_t G(K_t^k, n_t^k)$$

  - Considering fossil energy as an exhaustible finite resource is also important from a social planner and energy price perspective:

$$\sum_{t=0}^{T} E_t^{\text{Fossil}} (= S^{\text{Fossil}}) \leq \bar{S}^{\text{Fossil}}$$

Climate Modeling part

The author uses an unconventional modeling choice for cumulative emission S_t:

$S_t = x_t + y_t$

$x_t = x_{t-1} + \phi_L E_t$

$y_t = (1 - \phi) y_{t-1} + (1 - \phi_L)\phi_0 E_t$

- The author could consider a simpler form (e.g. Matthews et al. (2009) Science):
  - $S_t = \phi S_{t-1} + E_t$
  - with ϕ very close to 1.

- Or build a 3/4 layer climate bloc relying on recent climate economics developments and have a modeling specification that better aligns with climate science:
  - Folini et al. (2024) REStud.

International Cooperation

- A key point to explore is commitment in the international cooperation scenario. For instance, the Paris Agreement witnessed countries, such as the US, withdrawing at later stages.
  - Thinking about commitment and free riding (e.g., Nordhaus (2015) AER)
- Implications of climate related policies in a world context.
  - Cross-country implications of climate-related mitigation policies (e.g., Ferrari and Pagliari (2023) JIE)
- The positioning of the paper within the literature.
  - A number of papers on CGE and climate cooperation (e.g., Kersting et al. (2017) Energy Policy)

POLICY SCENARIOS SUGGESTIONS

The author develops a global framework that could be used to conduct several significant policy scenarios (numerically):

- The dynamics of transfers (especially global North versus global South)
- The dynamics of the social cost of carbon
- A welfare analysis comparing the different scenarios

The author links countries via the interest rate (price of the bonds) which is assumed to be the same for all.

- Another avenue is to add trade (I understand that this could be more challenging however)