## II - February 4, 2021 [Reading Group]

**Paper:** Barrage (2020) - [Optimal Dynamic Carbon Taxes in a Climate–Economy Model with Distortionary Fiscal Policy](https://academic.oup.com/restud/article-abstract/87/1/1/5587774?redirectedFrom=fulltext), *Review of Economic Studies*

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* What is the optimal tax on carbon in an economy where there is a distortionary fiscal policy?
* Assumes temperature anomaly from pre-industrial levels is a sufficient statistic for climate change
  + Key to keep in mind this is a global representative agent model (though it does have extensions)
  + Damages enter only as level effects
  + Damages from production + utility loss not particularly large and very much at variance with what other scientific literature on climate change has to say (for example, impact of 5 degree warming above preindustrial levels on welfare still relatively minimal).
* Model assumes perfect foresight of agent and planner
  + How might adding in uncertainty change our analysis here?
* Difficult to do theories that have clear and crisp comparative statics
  + Idea: we need to take fiscal policy into account. How can we take these mechanisms into account and turn them into a paper?
    - Macro papers enable you to make these points without having amazing identification and theory
  + Acemoglu: we want a carbon tax on top of a directed subsidy
* Chamley-Judd result on zero capital taxation: Straub & Werning (2017) shows this is wrong
  + What would incorporating this into the model mean for a change in predictions on optimal carbon tax?
  + What if we relax the representative agent assumption and introduce some country heterogeneity with low vs high capital countries? Might this warrant an optimal redistribution between the two, especially if there is equal heterogeneity on how climate impacts outcomes by countries?
* Does not include the ability for substitution in energy technologies: carbon taxes do not need to necessarily raise costs; renewables are cheaper than many fossil alternatives even without pricing in the externality
* Pushing forward:
  + Add IAMs to a heterogeneous agent framework that is used on the macro frontier
    - How do the distributional consequences of climate change and fiscal policy interact?
    - Would you get strange results where a ‘vulnerable but small’ agent is happy to make lump sum transfers to ‘rich but large’ countries which emit a lot of emissions in order to avoid future climate damages?
  + Big asymmetry between OVER taxing carbon vs UNDER taxing carbon
    - Per Krussel: Over taxing is much less welfare harming than undertaking. Overtaxing only creates a fiscal externality. Though he only has a first best framework
  + Transfer resources to areas that have the lowest marginal abatement cost and have them mitigate
* Tipping points:
  + Lemoine and Traeger paper on optimal policy with tipping points <https://www.aeaweb.org/articles?id=10.1257/pol.6.1.137>
  + Pindyck & Wang paper on economic and policy implications of catastrophes: <https://www0.gsb.columbia.edu/faculty/nwang/papers/Pindyck_Wang_AEJ_2013.pdf>
  + Weitzman: if we are concerned about this extreme tipping points the optimal policy would be a tax of - infinity. Anything times -infinity = -infinity! So in some sense trying to model all of this closely isn’t that valuable
    - ON MODELING AND INTERPRETING THE ECONOMICS OFCATASTROPHIC CLIMATE CHANGE <https://www.mitpressjournals.org/doi/pdfplus/10.1162/rest.91.1.1>
  + Rudrik (2020) optimal climate policies when damages are known (<https://www-aeaweb-org.gate3.library.lse.ac.uk/articles?id=10.1257/pol.20160541>)
  + Seems like there are important interactions between (a) tipping points/discontinuities/etc and (b) uncertainty. For example, in the Barrage paper, if we add a damage function with a tipping point a temperature level above the maximum temperature obtained under the standard damage function, this will not affect the optimal tax or path of emissions in the model. If, however, uncertainty about the potential future path of economy/climate is added along with such a tipping point, this would presumably push up the optimal tax and reduce optimal warming. Similarly, uncertainty about the location of the tipping point would also have this effect so long as the tipping point could lie somewhere in the range of the previously assumed optimal temperature increase.
* Add in more realistic constraints on how factors of production can move across space. Labour is much less mobile and likely to be impacted.
* Consider the growth effects (e.g. repeated losses each year because you fall behind the growth channel)
* Damage functions:
  + Suppose we block borders and don’t let anyone leave following a climate crisis. This could spur conflict and chaos, with huge costs. Would this enter in the current damage function?
    - Core idea: need to think about modeling these frictions and the role of borders
* Adding in inequality into the model:
  + Government may need to engage in more redistributive fiscal transfers when we add in inequality. One could imagine that this increases the marginal cost of public funds due to a larger wedges between MRS and MRT of agents; however, accounting for inequality may also lower the marginal cost of public funds once inequality concerns are embedded in the social welfare function via Paerto weights on agents.
  + Increases these climate-fiscal interactions
* Stern: getting out of climate change is not only about getting the carbon price right
  + Very concerned about the extreme outcomes
  + Much more about how we design cities, build resilience, etc