

Master's seminar: Topics in Macroeconomics

Macroeconomic Models of Climate Change

Winter semester 2021/22

- Summary:

Climate change poses an unprecedented challenge to humanity. This seminar adopts a macroeconomic perspective on the problem by discussing integrated assessment models (IAM) designed to incorporate the full interactions between the macroeconomy and the climate system. Modern IAMs employ dynamic general equilibrium theory defining an internally consistent framework in which producers and consumers respond to the incentives set by policy makers. These models can therefore be used to study the economic and environmental effects of alternative climate policies and to determine an optimal climate policy.

- Grading:

- To obtain 6 ECTS, participants

1. write a *seminar paper* (≈ 10 pages) on their topic assigned [40%]

2. deliver a *presentation* (≈ 45 min.) on their topic [40%]

3. serve as a *discussant* for another seminar paper (≈ 10 min.) and contribute actively to *in-class discussions*. [20%]

- The overall grade computes as a weighted average of 1.-3. based on the weights indicated in brackets.

- Seminar papers must be handed in 1 week prior to presentation.

- Course Meeting Times:

weekly on Wednesdays, 10-13 in lecture hall 3118 in KG I

Kick-off meeting: October 6th.

- Prerequisites: Successful participation in Advanced Macroeconomics I or II is required.

- Important notes:

- The number of participants is limited to 14.

- To apply for participation, please fill out the **registration form** available on our homepage and send it to marius.jaeger@vwl.uni-freiburg.de before **October 4th**.

- Please indicate your preferred topic along with two ranked alternatives, e.g., $1A \succ 3B \succ 4D$. We will assign the topics during the kick-off.

- While we will do our best to assign topics based on your preferences, we cannot guarantee that everybody will get their favorite topics.

- If you have further questions, please email Marius Jäger (marius.jaeger@vwl.uni-freiburg.de).

- Topics:

Climate change: The science background

- IPCC (2021), *Climate Change 2021 - The Physical Science Basis, Summary for Policymakers*.

This topic is mandatory reading for everybody and will be discussed in the kick-off.

1. A First-generation IAM: The DICE model

- [1A] Nordhaus (2018): *Projections and uncertainties about climate change in an era of minimal climate policies*. American Economic Journal: Economic Policy 10.3: 333-60.
- [1B] Dietz & Stern (2015): *Endogenous growth, convexity of damage and climate risk: how Nordhaus' framework supports deep cuts in carbon emissions*. The Economic Journal 125.583: 574-620.

2. Optimal climate policy in models of the global economy

- [2A] Golosov, Hassler, Krusell & Tsyvinski (2014): *Optimal Tax on Fossil Fuel in General Equilibrium*. Econometrica, 82(1), 41-88.
- [2B] Gerlagh & Liski (2018): *Consistent climate policies*. Journal of the European Economic Association 16.1: 1-44.
- [2C] Acemoglu, Aghion, Bursztyn & Hemous (2012): *The environment and directed technical change*. American Economic Review 102.1: 131-66.

3. Optimal climate policy in multi-region models

- [3A] Hillebrand & Hillebrand (2019): *Optimal climate policies in a dynamic multi-country equilibrium model*. Journal of Economic Theory 179: 200-239.
- [3B] Hassler, Krusell, Olovsson & Reiter (2020): *On the effectiveness of climate policies*. Working paper, Stockholm School of Economics.
- [3C] Van den Bijgaart (2017): *The unilateral implementation of a sustainable growth path with directed technical change*. European Economic Review 91: 305-327.

4. Climate policy in the presence of additional frictions

- [4A] Barrage (2020): *Optimal Dynamic Carbon Taxes in a ClimateEconomy Model with Distortionary Fiscal Policy*, The Review of Economic Studies, Volume 87, Issue 1, Pages 139.
- [4B] Carattini, Heutel & Melkadze (2021) *Climate policy, financial frictions, and transition risk.*, National Bureau of Economic Research working paper no. w28525.
- [4C] Sinn (2008): *Public policies against global warming: a supply side approach*. International Tax and Public Finance 15.4: 360-394.
- [4D] Gerlagh & Kuik (2014): *Spill or leak? Carbon leakage with international technology spillovers: A CGE analysis*. Energy Economics 45: 381-388.
- [4E] Böhringer, Carbone & Rutherford (2018): *Embodied carbon tariffs*. The Scandinavian Journal of Economics 120.1, 183-210.

- Background reading:

Hassler, Krusell & Smith (2016): *Environmental Macroeconomics*. Chapter 24 in Handbook of Macroeconomics, 1st Edition, published by Taylor, J. & Uhlig, H., Elsevier (North Holland Publishing Co.), Amsterdam.