Barcelona School of Economics

COURSE SYLLABUS | 23IO53

The Energy Transition and Climate Change

3 ECTS | TERM 2 | MANDATORY

Professors

Prof. Humberto Llavador and Bruno Conte

Prerequisites to enroll

None

Overview and objectives

Climate change is arguably the most complex and pressing challenge the world has ever faced. This course attacks this problem from the perspective of economics. It will cover both the science and the economics of climate change, with a combination of positive and normative economic analyses of this problem. The aim is to provide a broad understanding of the relevant economic issues on climate change, the existing debates on the potential mitigating policies to address this issue, and the underlying trade-offs behind them. Hopefully, it will expand your view of economics and climate change.

Course outline

1. Climate change for economists (climate science, CO2 cycle, and aggregation, IPCC reports, and RCP scenarios)

2. Climate change in economic models (social and economic impacts of climate change, climate models in economics, and Integrated Assessment Models)
3. Ethics, sustainability, inequality, and climate change
4. The economics of mitigation and international environmental policies (cap-and-trade policies, CO2 taxes, green subsidies)
5. Globalization, climate change, and the low CO2 transition (leakage, CBAM, Kuznetz environmental curve: scale, composition, and technical effects)

Course (tentative) schedule (TBD)

This is a tentative course schedule that would mix sessions between the instructors:

Week 1 (Jan 9): Part 1.1; Humberto **Climate Science**

Introduction. Climate science for economists.

Week 2 (Jan 16): Part 1.1/1.2; Humberto **IAMs**

Climate change in economic growth models: Integrated Assessment Models.

Week 3 (Jan 23): Part 1.2; Humberto (impacts of climate change) **Impacts**

Impacts of climate change.

Week 4 (Jan 30): Part 1.2; Bruno **Adaptation**.

Here we cover adaptation mechanisms (and the associated trade-offs or frictions) for both developed and developing economies. For the former, this means A/C investments, sea walls against coastal flooding, and decongestion policies (with trade-offs, respectively, of higher energy demand, moral hazard on real estate, and political backlashes). For the latter, this means the adoption of adaptation technologies in agriculture (e.g., irrigation), switching economic activities and sectors, and (permanent and temporary) migration.

Week 5 (Feb 6): Part 1.3; Humberto **Inequality and ethics**

Inequality and ethical aspects of climate change economics. The concept of sustainability.

Week 6 (Feb 13): Part 2.4-2.5; Bruno **Global and local mitigating policies**

Here, we cover standard mitigating policies from local (e.g., pollution or water extracting regulation) and global perspectives (e.g., emission credits, carbon taxes, international treaties, and clean subsidies). This session requires a brush-up on environmental externalities and how these policies internalize them. It concludes with issues on global coordination (e.g., the green paradox behind subsidies and carbon leakage resulting from carbon taxes).

Week 7 (Feb 20): Part 2.4-2.5; Bruno **Environ. policies in the global economy**

Here, we cover the challenges of the low CO2 transition in the global economy. Building upon the leakage discussion of 2.4, we discuss the limitations of the Kuznets environmental curve concept applied to the global economy (i.e., scale, technique, and composition effects of economic growth and trade).

Week 8 (Feb 27): Part 2.5; Bruno **Environ. footprint in the global economy**

Here, we dig deeper into the nuances of the climate-globalization relationship. Focusing on the global footprint concept of local consumption choices, we discuss the micro-foundations of how global supply chains allow clean economies to outsource pollution to other countries – the pollution havens. We will cover empirical facts on this topic as well as policies proposed to counteract these forces (e.g., tariffs and climate clubs).

Week 9 (Mar 5): Presentations

Week 10 (Mar 12): Presentations

Required activities

Class attendance and participation in the presentation of a paper. See below the instructions for the presentation and the list of suggested papers.

Evaluation

Evaluation will be based on a presentation (40%) and a final exam (60%).

Instructions for presentations (DISCUSS AFTER DECIDING ON THE ACTIVITIES)

All students enrolled in the course must join a team to present a paper that either deepens on the material covered during the course or introduces a new topic. If you have a particular interest, there is the possibility to present a paper outside the list of suggestions provided below. Any proposal requires my prior approval to make sure it fits within the theme of the course.

Guidelines for student presentations

Presentations will be organized **in teams** (whose size will be decided based on the number of students). Whether you choose one of the papers in the list of suggestions, you need to **send an email to humberto.llavador@upf.edu, with all members of the team in cc, no later than Friday, February 17th.** Papers will be assigned on a first-come, first-serve basis. You should receive a message acknowledging that I got your petition and that I assigned the paper to your team. Otherwise, contact me again.

Presentations will take place during the last two sessions. You must attend all sessions and be ready to present at any time, as the calendar may be altered. There will be 5 presentations for the session and **each team will have 20 minutes** to present, including questions. At the beginning of the session, **one member of each team will be randomly selected to make the presentation.**

The presentation should contain both methodology and results in a (perhaps unbalanced) combination depending on the nature of the paper. You should motivate the paper, present the model and/or empirical strategy, and highlight the tightness between results and claims made in the introduction and conclusions. You should highlight the main contributions, methodological novelties, and their relevance, and may elaborate on possible limitations of the analysis, indicating directions in which it could be extended, with an emphasis on questions that remain unanswered. You are encouraged to complement your understanding of the paper with related literature.

Keep in mind that the rest of the students in the course are the audience who must be persuaded of the clarity of your presentation and the relevance of the paper. The team is responsible to have all members ready to make a good presentation.

List of papers for the presentations:

1. Aghion, P., Dechezleprêtre, A., Hémous, D., Martin, R., & Van Reenen, J. (2016). "*Carbon Taxes, Path Dependency, and Directed Technical Change: Evidence from the Auto Industry*". **Journal of Political Economy**, 124(1), 1–51. https://doi.org/10.1086/684581
2. Andersson, Julius J. (2019). "*Carbon Taxes and CO2 Emissions: Sweden as a Case Study.*" **American Economic Journal: Economic Policy** 11 (4): 1–30. https://doi.org/10.1257/pol.20170144
3. Antweiler, Werner, Brian R. Copeland, and M. Scott Taylor (2001). "*Is Free Trade Good for the Environment?*" **American Economic Review**, 91 (4): 877-908. https://www.aeaweb.org/articles?id=10.1257/aer.91.4.877
4. Borenstein, S., Bushnell, J., Wolak, F. A., & Zaragoza-Watkins, M. (2019). "*Expecting the unexpected: Emissions uncertainty and environmental market design*". **American Economic Review**, 109(11), 3953–3977. https://doi.org/10.1257/aer.20161218
5. Calel, R., & Dechezleprêtre, A. (2016). "*Environmental Policy and Directed Technological Change: Evidence from the European Carbon Market*". **Review of Economics and Statistics**, 98(1), 173–191. https://doi.org/10.1162/REST_a_00470
6. Campiglio, E., Dietz, S., & Venmans, F. (2022). "*Optimal climate policy as if the transition matters*". Grantham Research Institute on Climate Change and the Environment WP. https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2022/12/working-paper-387-Campiglio-et-al.pdf
7. Carattini, Stefano, Steffen Kallbekken, and Anton Orlov. (2019). "*How to Win Public Support for a Global Carbon Tax.*" **Nature** 565 (7739): 289–91. https://doi.org/10.1038/d41586-019-00124-x [See also Hagmann, David; Emily H. Ho and George Loewenstein. 2019. "Nudging out Support for a Carbon Tax." Nature Climate Change, 9(6), 484-489.]
8. Castro-Vincenzi, J., (2023). "*Climate hazards and resilience in the global car industry*". Working Paper. https://castrovincenzi.com/s/castrovincenzi_jmp.pdf
9. Chancel, L., & Piketty, T. (2015). "*Carbon and inequality: from Kyoto to Paris*". Paris School of Economics, November, 48pp. https://doi.org/10.13140/RG.2.1.3536.0082

10. Copeland, Brian, R., and M. Scott Taylor. (2004). "*Trade, Growth, and the Environment.*" Journal of Economic Literature, 42 (1): 7-71. https://www.aeaweb.org/articles?id=10.1257/002205104773558047
11. Conte, B. (2023). "*Climate Change and Migration: The Case of Africa*". CESifo WP 9948. https://www.cesifo.org/DocDL/cesifo1_wp9948.pdf
12. Conte, B., Desmet, K., & Rossi-Hansberg, E. (2022). "*On the Geographic Implications of Carbon Taxes*". NBER Working Paper No.30678. http://www.nber.org/papers/w30678
13. Farrokhi, F. and Lashkaripour, A., 2021. Can trade policy mitigate climate change? https://www.dropbox.com/s/y4qmsband2b24qy/Farrokhi_Lashkaripour_Climate_Policy.pdf?raw=1
14. Fleurbaey, M., Ferranna, M., Budolfson, M., Denning, F, Mintz-Woo, K., Socolow, R., Spears, D., and Zuber, S. (2019). "*The Social Cost of Carbon: Valuing Inequality, Risk, and Population for Climate Policy*." The Monist 102(1):84–109. https://doi.org/10.1093/monist/ony023
15. Goulder, Lawrence H., Marc A.C. Hafstead, Gyu Rim Kim, and Xianling Long. (2019). "*Impacts of a Carbon Tax across US Household Income Groups: What Are the Equity-Efficiency Trade-Offs?*" **Journal of Public Economics** 175 (July): 44–64. https://doi.org/10.1016/j.jpubeco.2019.04.002
16. Hänsel, M. C., Franks, M., Kalkuhl, M., & Edenhofer, O. (2022). "*Optimal carbon taxation and horizontal equity: A welfare-theoretic approach with application to German household data*". **Journal of Environmental Economics and Management**, 116(September), 102730. https://doi.org/10.1016/j.jeem.2022.102730
17. Hsiang, S., Kopp, R., Jina, A., Rising, J., Delgado, M., Mohan, S., Rasmussen, D. J., Muir-Wood, R., Wilson, P., Oppenheimer, M., Larsen, K., & Houser, T. (2017). "*Estimating economic damage from climate change in the United States*". **Science** (New York, N.Y.), 356(6345), 1362–1369. https://doi.org/10.1126/science.aal4369
18. Hsiao, Allan. (2022). "*Coordination and Commitment in International Climate Action: Evidence from Palm Oil*." https://allanhsiao.com/files/Hsiao_palmoil.pdf
19. Hsiao, A., (2023). "*Sea Level Rise and Urban Adaptation in Jakarta*". Working Paper https://allanhsiao.com/files/Hsiao_jakarta.pdf
20. Nath, I.B., (2023). "*The food problem and the aggregate productivity consequences of climate change*" (NBER WP number w27297). National Bureau of Economic Research. https://www.ishannath.com/s/Nath_ClimateChange_FoodProblem_JPE_Resubmission_9_2023.pdf

21. Nordhaus, W. (2019). "*Economics of the disintegration of the Greenland ice sheet*". **Proceedings of the National Academy of Sciences**, 116(25), 12261–12269. https://doi.org/10.1073/pnas.1814990116
22. Ohlendorf, Nils, Michael Jakob, Jan Christoph Minx, Carsten Schröder, and Jan Christoph Steckel. (2020). "*Distributional Impacts of Carbon Pricing: A Meta-Analysis*". **Environmental and Resource Economics**. Vol. 78. Springer Netherlands. https://doi.org/10.1007/s10640-020-00521-1
23. Reis, L. A., Drouet, L., & Tavoni, M. (2022). "*Internalising health-economic impacts of air pollution into climate policy: a global modelling study*". The Lancet Planetary Health, 6(1), e40–e48. https://doi.org/10.1016/S2542-5196(21)00259-X
24. Renner, S. (2018). "*Poverty and distributional effects of a carbon tax in Mexico*". **Energy Policy**, 112, 98–110. https://doi.org/10.1016/j.enpol.2017.10.011
25. Ricke, K., Drouet, L., Caldeira, K., & Tavoni, M. (2018). "*Country-level social cost of carbon*". **Nature Climate Change**. https://doi.org/10.1038/s41558-018-0282-y
26. Scovronick, N., Budolfson, M. B., Dennig, F., Fleurbaey, M., Siebert, A., Socolow, R. H., Spears, D., & Wagner, F. (2017). "*Impact of population growth and population ethics on climate change mitigation policy*". In **Proceedings of the National Academy of Sciences** (Vol. 114, Issue 46). https://doi.org/10.1073/pnas.1618308114
27. Shapiro, Joseph S. (2021). "*The Environmental Bias of Trade Policy*." **The Quarterly Journal of Economics** 136 (2): 831–86. https://doi.org/10.1093/qje/qjaa042
28. Shapiro, J.S., (2023). "*Institutions, Comparative Advantage, and the Environment*" https://www.nber.org/system/files/working_papers/w31768/w31768.pdf
29. van der Bergh, J. C. (2017). "*A third option for climate policy within potential limits to growth*". **Nature**, 7(2), 107–112. https://doi.org/10.1038/nclimate3113
30. van der Ploeg, F., J. Emmerling and B. Groom (2022) "*The Social Cost of Carbon with Intragenerational Inequality Under Economic Uncertainty*". CESifo Working Paper No. 9777 http://dx.doi.org/10.2139/ssrn.4127664
31. Zhao, J., & Mattauch, L. (2022). "*When standards have better distributional consequences than carbon taxes*". **Journal of Environmental Economics and Management**. https://doi.org/10.1016/j.jeem.2022.102747