

Environmental Economics: Climate Change

2020-2021 Academic Year
Master of Research in Economics, Finance and Management

1. Description of the subject

1. Environmental Economics: Climate Change
2. Code: 32589
3. Total credits: 3 ECTS Workload: 75 hours
4. Term: 3rd
5. Type of subject: Optative
6. Department of Economics and Business
7. Teaching team: Humberto Llavador. humberto.llavador@upf.edu

2. Teaching guide

Introduction

Climate change is arguably the most complex and pressing environmental problem the world has ever faced. This course attacks the problem of climate change from the perspective of economics. It combines an introduction to the economics of climate change with an emphasis on specific topics, like the social cost of carbon, international climate negotiations, or distributional equity issues. The aim is to provide you with an understanding of what are the relevant economic issues on climate change and the existing debates. Hopefully it will expand your view of economics and stimulate your own research ideas.

The course is open to all MSc students, but enrollment is limited to 15 students, with priority for MRes students, students in the Economics Program, and those aiming at a Ph.D.

Teaching methodology

The course comprises an introduction to climate change economics and then focuses on specific topics. It is structured around 5 lectures and 5 *topics* sessions. During each *topics* session, there will be a brief introduction and then we will discuss two-three papers presented by students around a specific topic. The list of topics and papers is subject to change.

Contents

1. Introduction. Climate Change and the Economics of Climate Change
 - Dietz, S. & Venmans, F. (2019) "Cumulative carbon emissions and economic policy: In search of general principles." *J. Environ. Econ. Manage.* 96, 108–129.
 - Hsiang, S., & Kopp, R. E. (2018). An economist's guide to climate change Science. *Journal of Economic Perspectives*, 32(4), 3–32. <https://doi.org/10.1257/jep.32.4.3>
 - IPCC, AR5 Synthesis Report: Climate Change 2014 <https://www.ipcc.ch/report/ar5/syr/>
 - IPCC, Special Report: Global Warming of 1.5°C <https://www.ipcc.ch/sr15/>
 - Nordhaus, W. Climate Change: The Ultimate Challenge for Economics. *Am. Econ. Rev.* 109, 1991–2014 (2019).
 - Stavins, R.N. "The Problem of the Commons: Still Unsettled after 100 Years" *American Economic Review* 101(1):81-82, 96-103 (2011).
2. Integrated Assessment Modeling
 - Golosov, Mikhail, John Hassler, Per Krusell, and Aleh Tsyvinski. 2014. "Optimal Taxes on Fossil Fuel in General Equilibrium." *Econometrica* 82 (1): 41–88. Doi:10.3982/ECTA10217
 - Nordhaus, W. Integrated economic and climate modeling. in *Handbook of Computable General Equilibrium Modeling* 1, 1069–1131 (Elsevier B.V., 2013).
 - Nordhaus, William, and Paul Sztorc. 2013. "DICE 2013R: Introduction and User's Manual (Second Edition)," no. April: 1–102. dicemodel.net.
 - Nordhaus, W. Evolution of modeling of the economics of global warming: changes in the DICE model, 1992–2017. *Clim. Change* 148, 623–640 (2018).
3. Tipping Points in the Economics of Climate Change
 - Lenton, Timothy M., Hemann Held, Elmar Kriegler, Jim W. Hall, Wolfgang Lucht, Stefan Rahmstorf, and Hans Joachim Schellnhuber (2008): "Tipping elements in the Earth's climate system", *Proceedings of the National Academy of Sciences*, 105(6): 1786-1793.

Nordhaus, William (2019): "Economics of the disintegration of the Greenland ice sheet", *Proceedings of the National Academy of Sciences*, 116(25): 12261-12269.

4. Carbon Markets and the EU Emissions Trading System

Martin, Ralf, Mirabelle Muûls, and Ulrich J. Wagner (2016): "The Impact of the European Union Emissions Trading Scheme on Regulated Firms: What Is the Evidence after Ten Years?", *Review of Environmental Economics and Policy*, 10(1): 129-148.

PMR (Partnership for Market Readiness) - ICAP (International Carbon Action Partnership) (2016): *Emissions Trading in Practice: A Handbook on Design and Implementation*, Washington, DC: International Bank for Reconstruction and Development / The World Bank.

5. Sustainability and the discount rate

Broome, J. The ethics of Climate Change. *Scientific America*, June, 96–102 (2008).

Llavador, H., Roemer, J. E. & Silvestre, J. Sustainability for a Warming Planet, Harvard University Press (2015).

Nordhaus, W. *A Question of Balance*, Yale University Press (2008)

Stern, N. The Stern Review: *The Economics of Climate Change*, Cambridge University Press (2007)

6. Inequality and climate change

Bowen, A., Campiglio, E. & Martinez, S. H. An 'equal effort' approach to assessing the North–South climate finance gap. *Climatic Policy* (2015).

Chakravarty, S. et al. Sharing global CO₂ emission reductions among one billion high emitters. *PNAS*. 106, 11884–11888 (2009).

Dennig, Francis, Mark B Budolfson, Marc Fleurbaey, Asher Siebert, and Robert H Socolow. 2015. "Inequality, Climate Impacts on the Future Poor, and Carbon Prices." *Proceedings of the National Academy of Sciences* 112 (52): 15827–32. <https://doi.org/10.1073/pnas.1513967112>.

Llavador, H., Roemer, J. E. & Silvestre, J. North–south convergence and the allocation of CO₂ emissions. *Climatic Change* 130, 383–395 (2015).

Llavador, H., Roemer, J. E. & Silvestre, J. *Sustainability for a Warming Planet*, Harvard University Press (2015). Chapter 5

7. International agreements and cooperation

Gollier, C. and Tirole, J. "Negotiating effective institutions against climate change", *Economics of Energy and Environmental Policy*, vol. 4, n. 2, June 2015, pp. 5–27.

Keohane, R. O. & Victor, D. G. Cooperation and discord in global climate policy. *Nat. Clim. Chang.* 6, 570–575 (2016).

Llavador, H. and Roemer, J. Global Unanimity Equilibrium on the Carbon Budget. Cowles Foundation Discussion Paper No. 2172

Nordhaus, B. W. Climate Clubs : Overcoming Free-riding in International Climate Policy. *Am. Econ. Rev.* 105, 1339–1370 (2015).

Weitzman, M. L. Can Negotiating a Uniform Carbon Price Help to Internalize the Global Warming Externality? *J. Assoc. Environ. Resour. Econ.* 1, 29–49 (2014).

8. Social Cost of Carbon

Cai, Yongyang, and Thomas S. Lontzek (2019): "The Social Cost of Carbon with Economic and Climate Risks", *Journal of Political Economy*, 127(6): 2684-2734.

Diaz, D. B. & Moore, F. C. Quantifying the Economic Risks of Climate Change. *Nat. Clim. Chang. Rev.* (2017). doi:10.1038/nclimate3411

Fleurbaey, M., Ferranna, M., Budolfson, M., Denning, F, Mintz-Woo, K., Socolow, R., Spears, D., and Zuber, S. The Social Cost of Carbon: Valuing Inequality, Risk, and Population for Climate Policy. *The Monist*, Volume 102, Issue 1, January 2019, Pages 84–109

Nordhaus, W. D. Revisiting the social cost of carbon. *Proc. Natl. Acad. Sci.* 114, 1518–1523 (2017).

Pindyck, Robert S. 2019. "The Social Cost of Carbon Revisited." *Journal of Environmental Economics and Management* 94 (March): 140–60. <https://doi.org/10.1016/j.jeem.2019.02.003>.

- Ricke, K., Drouet, L., Caldeira, K. & Tavoni, M. Country-level social cost of carbon. *Nat. Clim. Chang.* 8, 895–900 (2018).
- Van den Bremer, Ton S., and Rick van der Ploeg, 2019. "The risk-adjusted carbon price," CESifo Working Paper Series 7592, CESifo Group Munich.

9. Climate change policy (2 sessions)

- Andersson, Julius J. 2019. "Carbon Taxes and CO2 Emissions: Sweden as a Case Study." *American Economic Journal: Economic Policy*, 11(4), 1-30.
- Burke, Marshall, W. Matthew Davis, and Noah S. Diffenbaugh. 2018. "Large Potential Reduction in Economic Damages under UN Mitigation Targets." *Nature* 557 (7706): 549–53. <https://doi.org/10.1038/s41586-018-0071-9>.
- 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.]
- 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: 44–64. <https://doi.org/10.1016/j.jpubeco.2019.04.002>.
- Harstad, Bård. "Buy coal! A case for supply-side environmental policy." *Journal of Political Economy* 120, no. 1 (2012): 77-115.
- Hassler, John, Per Krusell, Conny Olovsson and Michael Reiter. 2020 "On the effectiveness of climate policies" *Working Paper* <http://130.237.148.146/PAPERS/HKOR.pdf>
- Metcalf, Gilbert E. 2019. "On the Economics of a Carbon Tax for the United States." *Brookings Papers on Economic Activity*, (Spring), 405-458.

Assessment and Grading System

Evaluation will be based on in-class participation and presentations.

The course will be graded on a 0-10 scale:

- 0-4.5 Fail
- 5-6 C
- 6.5-7.5 B
- 8-9 A
- 9.5-10 A+