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# Climate Change Economics (12h)

## Syllabus

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### Description

Climate change is one of the biggest environmental challenge of the XXIst century. If left unchecked, the continued accumulation of greenhouse gases emissions is projected to warm the planet by 2 to 5 degrees, with large associated impacts on our economies and societies. Climate change can be viewed as a fundamentally economic problem: Emissions of greenhouse gases are overproduced by virtually any kind of economic activity, to the entire planet's detriment. However, climate change has a unique set of attributes that make standard economic analysis very difficult to apply. The costs and benefits of its mitigation are highly mismatched geographically as well as temporally. It is a global problem requiring unprecedented international cooperation and, finally, it is pervaded by uncertainty in every step of the process, especially when translating the global stock of emissions in local damages.

This class is about clarifying each of these challenges of climate change and seeing what economics research contributed on that front. We will learn what is known about economic damages of climate change; we will study theoretical models that clarify the cost-benefit policy problem; and we will examine existing and potential climate policies that may solve the international coordination issue.

In the process, we will practice at developing and carrying out economics research, as well as writing and speaking about it.

### Material

Course material is based on published academic papers. See the outline below for more information.

### Assessment

60% replication and extension paper + 40% presentation.

### Replication and extension

By the second class you should have chosen a paper to replicate and extend. I suggest you start among papers in the reading list. However, you can of course propose an alternative paper (checking first for data availability for empirical paper). Replication means that you re-produce the main tables of results. Extension means you add to the paper in some way for example by combining the original data with new data,

exploiting variation within the existing data that was not utilized, adding robustness checks or constructing new hypothesis tests. If the code is available for the empirical papers, your mark will be heavily weighted towards the extension (similarly of course for the theoretical papers).

### **Paper presentations**

You will be required to present your paper and its extension in the last 2 classes. Presentations should last 20-30 minutes (depending on the number of participants) and usual seminar rules apply.

### **– OUTLINE AND READINGS –**

#### **Lectures 1 and 2: Impacts of climate change and Integrated Assessment Models**

Readings (indicative):

- Nordhaus, W.D. J. Boyer (2000), *Warming the World*, MIT Press.
- Stern, N. (2007) *The Economics of Climate Change*. Cambridge University
- Dell, M., Jones, B. F., and Olken, B. A. (2014). What do we learn from the weather? the new climate-economy literature. *Journal of Economic Literature*, 52(3):740-798
- Deschênes, O., and M. Greenstone. (2007). The Economic Impacts of Climate Change: Evidence from Agricultural Output and Random Fluctuations in Weather. *American Economic Review*, 97(1): 354- 385
- O. Dube, J. Vargas. (2013) Commodity price shocks and civil conflict: Evidence from Colombia. *Rev. Econ. Stud.*
- Barreca, A., Clay, K., Deschenes, O., Greenstone, M., and Shapiro, J. S. (2016). Adapting to climate change: The remarkable decline in the us temperature-mortality relationship over the twentieth century. *Journal of Political Economy*, 124(1):105-159
- Deschênes, O. and Greenstone, M. (2011). Climate change, mortality, and adaptation: evidence from annual fluctuations in weather in the us. *American Economic Journal: Applied Economics*, 3(4):152-185
- Hsiang, S. M. and Jina, A. S. (2014). The causal effect of environmental catastrophe on long-run economic growth: Evidence from 6,700 cyclones. *National Bureau of Economic Research Working Paper*
- Carleton, T.A. and S.M. Hsiang. (2016), *Social and economic impacts of climate*. Science.
- Salvador Barrios, Luisito Bertinelli, and Eric Strobl (2010). Trends in Rainfall and Economic Growth in Africa: A Neglected Cause of the African Growth Tragedy. *Review of Economics and Statistics* 92:2, 350- 366, Vol. 92, No. 2, Pages 350-366

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## Lectures 3 and 4: Climate Change Policies and International Environmental Agreements

Readings (indicative):

- Montero, J.P. (2008). A Simple Auction Mechanism for the Optimal Allocation of the Commons. *American Economic Review* vol. 98, no. 1, pp. 496-518.
- Meng, K. C. (2017). Using a free permit rule to forecast the marginal abatement cost of proposed climate policy. *American Economic Review*
- Fowlie, M. (2010). Emissions trading, electricity restructuring, and investment in pollution abatement. *American Economic Review*, 100(3):837{869
- Fowlie, M., Holland, S. P., and Mansur, E. T. (2012). What do emissions markets deliver and to whom? evidence from southern california's nox trading program. *American Economic Review*, 102(2):965{993
- Fabra, N. and Reguant, M. (2014). Pass-through of emissions costs in electricity markets. *American Economic Review*, 104(9):2872{2899
- Auffhammer, M. and Kellogg, R. (2011). Clearing the air? the effects of gasoline content regulation on air quality. *American Economic Review*, 101(6):2687{2722
- Fowlie, Meredith, Mar Reguant, and Stephen Ryan. (2016). "Market-Based Emissions Regulation and Industry Dynamics". *Journal of Political Economy*, 124, no. 1 (February): 249-302.
- Fowlie, Meredith, Stephen P. Holland, and Erin Mansur. (2012). "What Do Emissions Markets Deliver and to Whom? Evidence from Southern California's NOx Trading Program". 2012. *American Economic Review*. 102(2): 965-93.
- Barrett, S. (1994) Self-enforcing international environmental agreements, *Oxford Economic Papers* 46: 878-894.
- Martimort, D., and Sand-Zantman W. (2016) "A Mechanism Design Approach to Climate-Change Agreements. *Journal of European Economic Association*, 14: 669-718.
- C. Almer and R.Winkler. (2017) Analysing the effectiveness of international environmental policies: The case of the Kyoto Protocol. *Journal of Environmental Economics and Management*, 82: 125– 151.
- Nada Mannoun (2019) The Kyoto protocol: Empirical evidence of a hidden success. *Journal of Environmental Economics and Management*, (95), pp 227-256

## Lectures 5 and 6: Students Presentation