

AAE 762: Frontiers in Environ. & Resource Economics II

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Overview of Course and Learning Goals

This is a graduate-level course in Environmental Economics. We will assume an understanding of graduate-level microeconomics and econometrics, and students should have already successfully taken Foundations of Environmental Economics with Prof. Phaneuf.

The field of environmental economics is broad and growing, and the number (and breadth) of topics we will cover is large. My goal is to help students obtain a basic understanding of the literature and an introduction to the analytical models and empirical methods being used. An additional goal is to help identify potential research topics, so we will focus our attention (as possible) on papers that are of interest to the class. As such, we will rely heavily on readings, though I will still lecture from time to time. We will approach each topic with two goals in mind: to obtain a perspective of the literature, and to become familiar with the "state-of-the-art" theory and econometric tools used in the field.

An important goal of this course is to prepare students for a career as an environmental economist. Two indispensable skills are thinking critically about research, and communicating effectively regarding environmental economics research. The structure of the course is designed around developing these skills.

Course Structure and Assessment

Your grade will be determined by the following components and weights. Course grades will be determined based on the following scale: A=93-100%, AB=88-92%, B=83-87%, BC=78-82%, C=70-77%, D=60-69%, F=below 59%.

The course grade will be calculated as follows:

Discussion Leader: 30%

Participation: 10%

Referee Reports: 20%

Research Paper (or proposal): 30%

Research Presentation: 10%

1. Readings & Participation

Each student will be in charge of being a "discussion leader" for a subset of the papers (The schedule will be worked out in coordination with me in advance.). As the discussion leader, you will be in charge of leading the group through the discussion of the assigned reading. You will be assessed based on your understanding of the material, the clarity of your presentation, your willingness and ability to discuss the

readings clearly, and your demonstration that you can think critically about the research presented.

I expect that every student will come prepared for a thorough, in-depth discussion of the assigned readings. For *every* class you should come prepared to answer the following questions regarding the (required) readings: 1) What was interesting? 2) What was confusing? and 3) What could the author(s) have done differently/better? 4) What extensions of these papers would be interesting?

Before class (i.e. by 8:30 a.m. the day of class), email your answers to these four questions to me. This class will be largely discussion-based, so your participation and discussion is critical for success! These questions will help guide our discussion and serve as a commitment mechanism for you.

The participation portion of your grade will be determined by your participation in class discussions and the quality of your answers to the four questions above. It should be clear that you have read the assigned readings, have thought critically about the papers, and are prepared for class.

2. *Referee Reports*

Each student must submit 2 referee reports during the semester. A referee report should assess the research (question, contribution, methodology) and be helpful for the author(s). Students will be evaluated on the quality of their comments and the clarity of the report. This is good practice for what you may be doing in your career as an economist.

The papers and due dates will be announced in class.

3. *Research Paper & Presentation*

At the end of the semester students must submit and present a research paper (15 pgs, 1.5 spacing). The paper should identify a problem, clearly state the research question, and attempt to answer that question using theory and/or empirical methods. It should be clear to the reader how the proposed research fits into the broader literature and why it is an important contribution in environmental economics. This is meant to "jump-start" a research paper for your dissertation. Developing a *good* paper idea takes work and time, so start this early.

To help you along, we will have check-ins along the way through the semester. Check-ins will include

- 1) A description of your general idea. (2-3 minutes each, plus brainstorming time)
- 2) A 1 page writeup of your idea, which we will peer review in class.
- 3) An "egg timer" session, where each student has 5 minutes to present their idea.

Students will present their research to the class at the end of the semester. Presentations will be roughly 30 minutes long, including time for discussion. The presentation will allow for feedback on the research, which could then be incorporated into the final draft of the paper. The final draft of the paper will be due at the time determined by the Registrar's Office (i.e. the time scheduled for the final exam).

The paper's grade will be based on the overall quality of the research paper, including clarity of writing, the contribution to the field, and the appropriate use of analytical tools (e.g. an appropriate theoretical model and/or econometric approach).

Sample of Readings

Empirical Methods

Angrist and Jorn-Steffen Pischke (2010), "The Credibility Revolution in Empirical Economics: How Better Research Design is Taking the Con out of Econometrics." *Journal of Economic Perspectives*, Spring 2010.

Keane, Michael (2010), "Structural vs. Atheoretical Approaches To Econometrics." *Journal of Econometrics*, Vol 156.

Timmins, Christopher and Schlenker, Wolfram (2009), "Reduced-Form Versus Structural Modeling in Environmental and Resource Economics". *Annual Review of Resource Economics*, Vol. 1, No. 1, pp. 351-380.

Public Goods, Externalities, Market Failure

Coase, Ronald. "The Problem of Social Cost". *The Journal of Law and Economics* (October 1969).

* Fowlie, Meredith and Jeffrey Perloff. 2013. "Distributing Pollution Rights in Cap-and-Trade Programs: Are Outcomes Independent of Allocation?" *The Review of Economics and Statistics*.

Matt Kotchen, "Green Markets and Private Provision of Public Goods," *JPE*, 114:816-34 (2006).

* Houde, Sebastien. 2012. How Consumers Respond to Product Certification: A Welfare Analysis of the Energy Star Program. Presented at Summer Institute 2012, NBER EEE.

Market-Based Mechanisms

Stavins, Robert N. 1998. "What Can We Learn from the Grand Policy Experiment? Lessons from SO₂ Allowance Trading." *Journal of Economic Perspectives* 12(3): 69-88.

* Stavins, Robert and Richard Schmalensee. 2012. "The SO₂ Allowance Trading System: The Ironic History of a Grand Policy Experiment." NBER Working Paper 18306.

Holland, Stephen and Michael R. Moore. 2012. Market Design in Cap-and-trade Programs: Permit Validity and Compliance Timing. NBER Working Paper 18098.

Bushnell, Mansur & Chong. 2011. "Profiting from Regulation: An Event Study of the EU Carbon Market." Working Paper.

* Meng, Kyle. 2012. "The Cost of Potential Cap-and-Trade Policy: An Event Study using Prediction Markets and Lobbying Records." Presented at NBER Summer Institute.

Regulation Under Uncertainty

Marc J. Roberts and Michael Spence, "Effluent Charges and Licenses Under Uncertainty," *JPuE*, 5, 193-208 (1976).

* Evan Kwerel, "To Tell the Truth: Imperfect Information and Optimal Pollution Control," *REStud*, 44,595-601 (1977).

* C.D. Kolstad, T. Ulen and G. Johnson, "Ex Ante Regulation vs. Ex Post Liability for Harm: Substitutes or Complements?," *AER* (Sept. 1990)

International/Transboundary Problems

- * Fullerton, Karney and Baylis. "Negative Leakage."
- * Murray, Brian C., Bruce A. McCarl, and Heng-Chi Lee. "Estimating leakage from forest carbon sequestration programs." *Land Economics* 80.1 (2004): 109-124.
- Barrett, Scott, "Self-enforcing international environmental agreements", *Oxford Economic Papers* 46 (1994): 878-894.
- * Fowlie, Meredith. 2009. "Incomplete Environmental Regulation, Imperfect Competition, and Emissions Leakage." *AEJ Policy* 1(2): 72-112.
- * Boehringer, Carbone and Rutherford. 2011. "Embodied Carbon Tariffs." *NBER Working Paper* 17376.
- * Hanna, Rema. 2010. "US Environmental Regulation and FDI: Evidence from a Panel of US-Based Multinational Firms," *American Economic Journal: Applied Economics*, American Economic Association, vol. 2(3), pages 158-89, July.
- * Walker, Reed. 2013. "The Transitional Costs of Sectoral Reallocation: Evidence From the Clean Air Act and the Workforce." *Quarterly Journal of Economics*, (2013) 128 (4): 1787-1835.

State-Level Regulations

- * Williams, Roberton C. III. "Growing State-Federal Conflicts in Environmental Policy: The Role of Market-Based Regulation" *NBER Working Paper* 16184.
- * Banzhaf, Spencer and B. Andrew Chupp. 2012. "Heterogeneous Harm vs. Spatial Spillovers: Environmental Federalism and US Air Pollution." *NBER Working Paper* 15666.
- Bushnell, James B., Carla Peterman, and Catherine Wolfram. 2008. "California's Greenhouse Gas Policies: Local Solutions to a Global Problem?" *Review of Environmental Economics and Policy*, 2(2).

Equity and Regulations

- * Fullerton, Don. 2011. "Six Distributional Effects of Environmental Policy." *NBER Working Paper* 16703.
- West, Sarah and Roberton C. Williams III, 2004. "Estimates from a Consumer Demand System: Implications for the Incidence of Environmental Taxes." *Journal of Environmental Economics and Management*, 47(3):535-558.
- * Fullerton, Don and Garth Heutel "The General Equilibrium Incidence of Environmental Taxes", *Journal of Public Economics* (2007)
- * Parry, Ian W.H. and Roberton C. Williams III. 2010. "What are the costs of meeting distributional objectives for climate policy?" *NBER Working Paper* 16486.
- Holland, Stephen P. 2010. "Spillovers from Climate Policy." *NBER Working Paper* 16158.
- * Fowlie, Meredith, Stephen Holland, and Erin Mansur. 2011. "What Do Emissions Markets Deliver and for Whom? Evidence from Southern California's NOx Trading Program." *AER*
- Banzhaf, H. Spencer. 2010. "Regulatory Impact Analyses of Environmental Justice Effects," *NCEE Working Paper*.
- * Borenstein, Severin. 2012. The Redistributive Impact of Nonlinear Electricity Pricing. *AEJ Policy*.

Grainger, Corbett. 2012. The Distributional Effects of Environmental Regulations: Do Renters Fully Pay for Clean Air? *Journal of Public Economics*.

Coxhead, Ian and Corbett Grainger. 2014. The Incidence and Welfare Effects of Fossil Fuel Subsidies in an Open Economy. Working Paper.

Hedonics

* Roback, Jennifer. 1982. "Wages, Rents, and the Quality of Life," *JPE*, 90:1257-78.

Chay, Kenneth, and Michael Greenstone. 2005. "Does Air Quality Matter? Evidence from the Housing Market" *Journal of Political Economy*, April 2005: 376-24.

Bayer, Patrick, Nat Keohane and Christopher Timmins. 2009. Migration and Hedonic Valuation: The Case of Air Quality. *JEEM*.

Fowlie and Muller. 2013. "Market-based Emissions Regulation When Damages Vary Across Sources: What Are the Gains from Differentiation?" NBER Working Paper 18801.

Environment, Health and Mortality

Karen Clay, Joshua A. Lewis, Edson R. Severnini. "Canary in a Coal Mine: Infant Mortality, Property Values, and Tradeoffs Associated with Mid-20th Century Air Pollution" Presented at NBER Summer Institute 2016.

* Currie, Janet and Matthew Neidell. "Air Pollution And Infant Health: What Can We Learn From California's Recent Experience?," *Quarterly Journal of Economics*, 2005, v120(3, Aug), 1003-1030

Currie, Janet, and Reed Walker. 2011. "Traffic Congestion and Infant Health: Evidence from E-ZPass," *American Economic Journals-Applied*, January 2011, #3: 65-90..

Cameron, Trudy Ann. 2010. "Euthenizing the Value of a Statistical Life." *REEP* 4(2): 161-78.

* Muller, Nicholas and Robert Mendelsohn. 2007. "Measuring the Damages of Air Pollution in the United States." *JEEM* 54(1): 1-14.

* Schlenker, Wolfram and Reed Walker. 2012. Airports, Air Pollution and Contemporaneous Health. NBER Working Paper 17684.

* Arceo-Gomez, Eva O., Rema Hanna and Paulina Oliva. 2012. "Does the effect of pollution on infant mortality differ between developing and developed countries? Evidence from Mexico City." NBER Working Paper 18349.

Chay, Kenneth and Michael Greenstone. 2004. "Air Quality, Infant Mortality, and the Clean Air Act of 1970." *MIT Dept of Economics Working Paper 04-08*.

Climate Change

Stern Review: The Economics of Climate Change, Executive Summary.

Nordhaus, William. 2007. "Critical Assumptions in the Stern Review on Climate Change." *Science*.

Weitzman, Martin. 2007. "A Review of the Stern Review on the Economics of Climate Change." *Journal of Economic Literature* XLV: 703-24.

Costello, Solow, Polasky and Neubert. 2010. "Bounded uncertainty and climate change economics." *Proceedings of the National Academy of Sciences*. 107(18): 8108-8110.

* Pindyck, Robert S., and Neng Wang. 2013. "The Economic and Policy Consequences of Catastrophes." *American Economic Journal: Economic Policy*, 5(4): 306-39.

Matthew Kotchen. "Which Social Cost of Carbon? A Theoretical Perspective" Presented at NBER Summer Institute 2016.

Alan Barreca, Olivier Deschenes, and Melanie E. Guldi. "Maybe Next Month? Temperature Shocks, Climate Change, and Dynamic Adjustments in Birth Rates" Presented at NBER Summer Institute, 2016.

* Deschenes and Greenstone. The Economic Impacts of Climate Change: Evidence from Agricultural Output and Random Fluctuations in Weather, *American Economic Review*, 97(1): 354-385, March 2007.

* Roberts and Schlenker. 2009. "Nonlinear Temperature Effects indicate Severe Damages to U.S. Crop Yields under Climate Change," *Proceedings of the National Academy of Sciences*.

Deschenes, Olivier and Enrico Moretti. Extreme Weather Events, Mortality and Migration, *Review of Economics and Statistics*, 91(4): 659-681, November 2009.

* Feng, Shuaizhang, Michael Oppenheimer, and Wolfram Schlenker. "Weather Anomalies, Crop Yields, and Migration in the US Corn Belt." 2014 Working Paper.

Nonpoint Pollution & Water

Keiser, David and Joseph Shapiro. "Consequences of the Clean Water Act and the Demand for Water Quality." Presented at NBER Summer Institute 2016.

Ferraro, Paul J. "Targeting Conservation Investments in Heterogeneous Landscapes: A Distance Function Approach and Application to Watershed Management" *American Journal of Agricultural Economics*, vol. 86, no. 4, November 2004, pp. 905-18

Ferraro, Paul J; Simpson, R David. "The Cost-Effectiveness of Conservation Payments", *Land Economics*, vol. 78, no. 3, August 2002, pp. 339-53.

Wu, Junjie; Babcock, Bruce A. "Spatial Heterogeneity and the Choice of Instruments to Control Nonpoint Pollution". *Environmental and Resource Economics*, vol. 18, no. 2, February 2001, pp. 173-92.

Energy and Energy Efficiency

Borenstein, Severin (2013). "A Microeconomic Framework for Evaluating Energy Efficiency Rebound And Some Implications", *Energy Institute at Haas Working Paper 242*, May 2013.

* Jacobsen, G. D. and M. J. Kotchen (2013). "Are Building Codes Effective at Saving Energy? Evidence from Residential Billing Data in Florida," *Review of Economics and Statistics* 95 (1): 34-49.

Fowlie, Greenstone, and Wolfram. "Do Energy Efficiency Investments Deliver? Evidence from the Weatherization Assistance Program" Presented at NBER EEE, 2014.

Automobiles and Congestion Externalities

Mathias Reynaert and James M. Sallee. "Self Regulation, Corrective Policy and Goodhart's Law: The Case of Carbon Emissions from Automobiles" Presented at NBER Summer Institute 2016.

* Li, Shanjun. 2014. "Better Lucky Than Rich? Welfare Analysis of Automobile License Allocations in Beijing and Shanghai" Presented at NBER.

Jacobsen, Mark. "Fuel Economy and Safety: The Influences of Vehicle Class and Driver Behavior." Working Paper.

Maximilian Auffhammer and Ryan Kellogg, "Cleaning the Air? The effects of gasoline content regulation on air quality", AER 2010.

Anderson, Kellogg and Sallee. 2011. What Do Consumers Believe About Future Gasoline Prices?

Busse, Meghan, Chris Knittel and Florian Zettelmeyer. "Pain at the Pump: The Differential Effect of Gasoline Prices on New and Used Automobile Markets," Working Paper.

Oliva, Paulina. 2014. "Environmental Regulations and Corruption: Automobile Emissions in Mexico City". Working paper.

Davis, Lucas. 2008. "The Effect of Driving Restrictions on Air Quality in Mexico City." *Journal of Political Economy*.

Miscellany

* Greenstone, Michael, and Justin Gallagher. 2008. "Does Hazardous Waste Matter? Evidence from the Housing Market and the Superfund Program." *The Quarterly Journal of Economics* 123(3): 951-1003.

* S. Gamper-Rabindran and C. Timmins. "Hazardous Waste Cleanup, Neighborhood Gentrification, and Environmental Justice: Evidence from Restricted Access Census Block Data," *American Economic Review Papers and Proceedings*, May 2011.

Auffhammer, Bento & Lowe. 2009. Measuring the effects of the Clean Air Act Amendments on ambient PM₁₀ concentrations: The critical importance of a spatially disaggregated analysis. *Journal of Environmental Economics and Management*.

Kellogg, Ryan and Hendrik Wolff, "Daylight Time and Energy: Evidence from an Australian Experiment," *Journal of Environmental Economics and Management* 56 (2008), 207-220.

* Koichiro Ito. 2012. "How Do Consumers Respond to Nonlinear Pricing? Evidence from Household Electricity Demand." Working Paper.

* Olmstead, Sheila M. and Sigman, Hilary, *Damming the Commons: An Empirical Analysis of International Cooperation and Conflict in Dam Location* (July 1, 2014). World Bank Policy Research Working Paper No. 6992.

Property Rights, Political Economy and the Environment

Libecap, Gary D. 2014. "Addressing Global Environmental Externalities: Transaction Costs Considerations." *Journal of Economic Literature*, 52(2): 424-79.

Hansen, Zeynep and Gary Libecap. 2004. "Small Farms, Externalities, and the Dust Bowl of the 1930s." *Journal of Political Economy*.

* Hornbeck, Richard. "The Enduring Impact of the American Dust Bowl: Short and Long-run Adjustments to Environmental Catastrophe," *American Economic Review*.

Costello and Grainger. 2016. "Property Rights, Regulatory Capture, and Natural Resource Exploitation." Presented at NBER.