Environmental & Resource Economics

ECG 715
North Carolina State University
Fall 2016

Instructor:	Dr. Harrison Fell Office: 4312 Nelson Telephone: (919) 515-4676 Email: hfell@ncsu.edu Office Hours: 2:00 – 4:00 TTh and by appointment
Class Hours:	TTh, 10:15am-11:30am
Room:	4163 Nelson
Website:	Moodle (you will need your Unity ID and password to access this site)
Objectives:	This course is the first in the environmental Ph.D. sequence. The course is primarily a survey course that will be broken down into two major themes. For the first half of the semester we will survey papers related to environmental policy design. For the second half of the semester we will survey empirical papers in environmental and energy economics with a key focus on modern micro-econometric methods and identification concepts.
Prerequisites:	ECG 700 (or graduate-level microeconomic theory)
Text:	There is no text book required for this course. Readings will come from academic journals and working paper series.
Grades:	Your final grade will be determined as follows:

Midterm	25%
Research Proposal Paper	35%
Referee Reports	15%
Presentations	15%
Participation/Seminars Attendance	10%

TAKE-HOME MIDTERM: 3-5 short answer and mathematical questions. You will have 24 hours.

RESEARCH PROPOSAL PAPER: The research proposal should be around 10-15 pages in length on a topic of your choosing. The paper topic does not necessarily have to relate to a topic covered in class, although it does need to fall within the field of environmental and resource economics – please check with me. You *may not* use a paper you are writing for another class to satisfy this assignment.

The purpose of this research proposal is for you to provide a possible research idea that could turn into a dissertation chapter and/or academic publication and to do a lot of work you will need for that future paper now. The paper should include a description and motivation of the research question, a literature review, and a discussion of modeling, econometric, or data issues. In particular, if you are proposing an empirical research topic to explore, you must identify and discuss the data available. If the data you need does not exist or cannot be easily obtained, your research topic is invalid.

Early in the semester, I will give you some advice on working on a research proposal and my expectations for this paper. Again, if you are planning on writing a dissertation in environmental and resource economics, this is an excellent opportunity to start exploring topics. Due dates concerning the paper are as follows:

- A bibliography of roughly 15 academic papers in the area your area of interest. **Due October 6th.**
- A two-page description of and motivation for the research question you will explore. **Due October 15th**.
- A draft literature review section. **Due November 17th**.
- Final paper. **Due December 3rd** (last day of the semester).
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Presentations: Approximately every other week, 2 students will present papers noted below. The presentations will be similar to those presented in academic conferences – approximately 20 minutes in length, with about 10 minutes of Q&A following. The student's grade will be dependent, in part, on their ability to keep their presentation to the allotted time, so please practice your talks beforehand. Also, all students are required to read the student-presented papers even if they are not personally presenting the paper.

Referee Report: Students are required to turn in 2 "referee report" papers on papers of their choosing. The only restriction is that one must be a theory/simulation based paper and the other an applied econometric paper. Additionally, all reviewed must be unpublished (i.e. still working papers). These papers can be from your list of referenced papers from your research proposal. I will provide sample referee reports so that you may get a sense of what I am looking for in these assignments.

Participation and Seminar Attendance: I expect students to complete the readings and come prepared to engage during in-class discussions. This is particularly true for the student-presentation days. I also expect to students to attend TREE seminars and the CEnREP colloquium. The TREE series meets on Thursdays at Research Triangle Institute (RTI) in the Research Triangle Park from 3:15-4:15. This year's schedule of presenters is as follows:
Sep. 8 – Catie Hausman (Michigan)
Sep. 15 – Matt Kotchen (Yale)
Sep. 29 – Amir Jina (Chicago)
Oct. 27 – Mushfiq Mobarak (Yale)
Nov. 10 – Koichiro Ito (Chicago)

Students are expected to attend these seminars, with the exception of one excused absence. CEnREP also conducts a more student-focused lunch meeting each Friday. Again students are expected to attend, though pre-excused absences for this colloquium is allowed.

Academic Integrity: Cheating will be prosecuted to the maximum extent possible within the University's Code of Student Conduct:
http://policies.ncsu.edu/policy/pol-11-35-01

Incomplete Grades & Withdrawals: University policy will be strictly followed, and incomplete grades will only be granted under exceptional circumstances.

Course Outline: Below is a tentative outline of topics and papers we may cover. The "*" papers indicate that it can be used for a student presentation.

Part I: Environmental Policy Design

1. Prices vs. Quantities and Hybrid Policies (static)

- Weitzman, M. 1974. Prices vs. Quantities. *Review of Economic Studies* 41 :477-91
- Stavins, R. 1996, "Correlated Uncertainty and the Choice of Pollution Control Instruments," *Journal of Environmental Economics and Management* **30**: 218-232.
- Roberts, M. and Spence, M. 1976. Effluent charges and licenses under uncertainty. *Journal of Public Economics*, 5: 193-208.
- *Yates, A. 2012. On a fundamental advantage of permits over taxes for the control of pollution. *Environmental and Resource Economics*, 51: 583-598.
- *Stocking, Andrew. 2012. Unintended Consequences of Price Controls: An Application to Allowance Markets. *Journal of Environmental Economics and Management*, 63(1): 120-136.

2. Dynamic Considerations of Instrument Choice

- Rubin, Jonathan. 1996. A Model of Intertemporal Emission Trading, Banking and Borrowing. *Journal of Environmental Economics and Management*, 31(3): 269-286.

- Yates, A.J. and M.B. Cronshaw. 2001. Pollution Permit Markets with Intertemporal Trading and Asymmetric Information. *Journal of Environmental Economics and Management*, 42(1):104-118.
- Newell, R. G. and W. A. Pizer. 2003. Regulating stock externalities under uncertainty. *Journal of Environmental Economics and Management*, 45(2): 416-432.
- Hoel, M. and L. Karp. 2002. Taxes versus quotas for a stock pollutant. *Resource and Energy Economics*, 24: 367–384.
- Fell, H., D. Burtraw, R.D. Morgenstern, and K.L. Palmer. 2012. Soft and Hard Price Collars in a Cap-and-Trade System: A Comparative Analysis. *Journal of Environmental Economics and Management*, 64(2):183-198.
- *Makoto, H. and S. Salant. 2014. Cap-and-Trade Programs Under Delayed Compliance: Consequences of Interim Injection of Permits. *Journal of Public Economics*, 119:24-34.
- *Lemoine, D. and I. Rudik. 2015. Steering the Climate System: Using Inertia to Lower the Cost of Policy. University of Arizona Working Paper 14-03.

3. Performance Standards and Output Based Allocations

- Fischer, C. 2009. Renewable Portfolio Standards: When do they lower energy prices? *The Energy Journal*. 30(4): 81-99.
- Fell, H. and J. Linn. 2013. Renewable electricity policies, heterogeneity, and cost effectiveness. *Journal of Environmental Economics and Management*, 66(3): 688-707.
- Fischer, C. 2011. Market power and output-based refunding of environmental policy revenues. *Resource and Energy Economics*, 33(1): 212-230.
- Fischer, C. and A. K. Fox. 2007. Output-based allocation of emissions permits for mitigating tax and trade interactions. *Land Economics*, 83(4): 575-599.
- Holland, S. P., J. E. Hughes, and C. R. Knittel. 2009. Greenhouse gas reductions under Low Carbon Fuel Standards? *American Economic Journal: Economic Policy*, 1(1):106-146.
- Fell, H., D. Kaffine, and D. Steinberg. 2016. Energy efficiency and emissions intensity standards. Colorado School of Mines, Division of Economics and Business Working Paper
- *Holland, S.P. 2012. Emissions taxes versus intensity standards: second-best environmental policies with incomplete regulation. *Journal of Environmental Economics and Management*, 63(3): 375-387.
- *Fullerton, D. and G. Heutel. 2010. The general equilibrium incidence of environmental mandates. *American Economic Journal: Economic Policy*, 2(3): 64-89.
- *Bushnell, J.B., S.P. Holland, J.E. Hughes, C.R. Knittel. Forthcoming. Strategic Policy Choice in State-level Regulation: The EPA's Clean Power Plan.

4. Investment and Policy Choice

- Requate, T. and Unold, W. 2003. Environmental policy incentives to adopt advanced abatement technology: will the true ranking please stand up? *European Economic Review*, 47: 125-146.
- Phaneuf, D.J. and T. Requate. 2002. Incentives for investment in advanced pollution abatement technology in emission permit markets with banking. *Environmental and Resource Economics*, 22: 369-390.
- Fischer, C., I. W. H. Parry, and W.A. Pizer. 2003. Instrument choice for environmental protection when technological innovation is endogenous. *Journal of Environmental Economics and Management*, 45(3): 523-545.
- *Zhao, J. 2003. Irreversible abatement investment under cost uncertainties: tradable emission permits and emissions charges. *Journal of Public Economics*, 87: 2765-2789.
- *Montero, J.P. 2002. Permits, Standards, and Technology Innovation. *Journal of Environmental Economics and Management*, 44: 23-44.

5. Spatial Issues

- Muller, N. and R. Mendelsohn. 2009. Efficient pollution regulation: getting the prices right. *American Economic Review*, 99: 1714-1739.
- Krysiak, F., and P. Schweitzer. 2010. The optimal size of a permit market. *Journal of Environmental Economics and Management*, 60: 133-143

- *Holland, S. and A. Yates. 2015. Optimal trading ratios for pollution permit markets. *Journal of Public Economics*. 125: 16-27.
- *Ogawa, H. and D.E. Wildasin. 2009. Think locally, act locally: spillovers, spillbacks, and efficiency decentralized policy making. *American Economic Review*, 99(4): 1206-17.
- *Fell, H. and D. Kaffine. 2014. Can decentralized planning really achieve first-best in the presence of environmental spillovers? *Journal of Environmental Economics and Management*, 68(1): 46-53.

Part II: Empirical Work in Environmental and Energy Economics

1. Electricity Markets, Pricing, and Deregulation

- Fabrizio, K.R., N.L. Rose, and C.D. Wolfram. 2007. Do Markets Reduce Costs? Assessing the Impact of Regulatory Restructuring on US Electric Generation Efficiency. *American Economic Review*, 97(4): 1250-77
- Jessoe, K. and D. Rapson. 2014. Knowledge Is (Less) Power: Experimental Evidence from Residential Energy Use. *American Economic Review*, 104(4):1417-38.
- Davis, L.W. and C. Wolfram. 2012. Deregulation, Consolidation, and Efficiency: Evidence from US Nuclear Power. *AEJ: Applied Economics*, 4(4): 1994-225.
- *Holland, S.P. and E. Mansur. 2008. Is Real-Time Pricing Green? The Environmental Impacts of Electricity Demand Variance." *Review of Economics and Statistics*, 90(3): 550-561.
- *Allcott, Hunt (2011). "Rethinking Real-Time Electricity Pricing." *Resource and Energy Economics*, 33(4): 820-42.
- *Ito, K. 2014. Do Consumers Respond to Marginal or Average Price? Evidence from Nonlinear Electricity Pricing. *American Economic Review*, 104(2): 537-63.

2. Electricity Producers/Markets and Environmental Regulation

- Fowlie (2010), "Emissions Trading, Electricity Restructuring, and Investment in Pollution Abatement." *American Economic Review*, June 2010, 837-869.
- Bushnell, Chong and Mansur, "Profiting from Regulation: Evidence from the European Carbon Market" *American Economic Journal: Economic Policy* 5(4) November 2013, Pages 78-106.
- Fowlie, Holland and Mansur, "What Do Emissions Markets Deliver and to Whom? Evidence from Southern California's NOx Trading Program." *American Economic Review*, 102(2): 965-93.
- *Fabra, N. and M. Raguant. 2014. Pass-through of emissions costs in electricity markets. *American Economic Review*, 104(9): 2872-2899.
- * Cullen, J.A. 2015. Dynamic Responses to Environmental Regulation in the Electricity Industry. Working Paper.
- * Bushnell, J.B. and C.D. Wolfram. 2012. Enforcement of vintage differentiated regulations: the case of new source review. *Journal of Environmental Economics and Management*, 64:137-152.

3. Energy Use and Efficiency

- Fowlie, Greenstone and Wolfram, 2015. "Do Energy Efficiency Investments Deliver? Evidence from the Weatherization Assistance Program"
- Gertler, P.J., O. Shelef, C.D. Wolfram, and A.Fuchs. "The Demand for Energy-Using Assets among the World's Rising Middle Classes" *American Economic Review*, 106(6): 1366-1401
- Davis, Lucas W., Alan Fuchs, and Paul Gertler. 2014. "Cash for Coolers: Evaluating a Large-Scale Appliance Replacement Program in Mexico." *American Economic Journal: Economic Policy*, 6(4): 207- 38.
- Allcott, H. and T. Rodgers. 2014. "The Short-Run and Long-Run Effects of Behavioral Interventions: Experimental Evidence from Energy Conservation." *American Economic Review*, 104(10): 3003-3037.
- *Ito, K. 2015. "Asymmetric Incentives in Subsidies: Evidence from a Large-Scale Electricity Rebate Program." *American Economic Journal: Economic Policy*, 7(3): 209:37.

- *Allcott, Hunt and Dmitry Taubinsky. 2015. “Evaluating Behaviorally Motivated Policy: Experimental Evidence from the Lightbulb Market.” *American Economic Review*, 105(8): 2501-38.

4. Renewables and Electricity

- Cullen, Joseph. 2013. "Measuring the Environmental Benefits of Wind-Generated Electricity." *American Economic Journal: Economic Policy*, 5(4): 107-33.
- Fell, H. and D. Kaffine. 2016. “The Fall of Coal: Joint Impacts of Fuel Prices and Renewables.” CSM Division of Economics Working Paper.
- *Novan, Kevin. 2015. "Valuing the Wind: Renewable Energy Policies and Air Pollution Avoided." *American Economic Journal: Economic Policy*, 7(3): 291-326.
- *Hollingsworth, A.J. and I. Rudik. 2016. External Impact of Local Energy Policy: The Case of Renewable Portfolio Standards. Working Paper.

5. Climate Change Responses

- Albouy, D. J. Graf, R. Kellogg, H. Wolff. 2012. “Aversion to Extreme Temperatures, Climate Change, and Quality of Life.” http://wwwersonal.umich.edu/~kelloggr/NBERw18925.pdf
- Deschênes, O. and M. Greenstone. 2011. Climate Change, Mortality, and Adaptation: Evidence from Annual Fluctuations in Weather in the U.S. *AEJ: Applied Economics*, 3(4):152-85.
- *Burke, M. and K. Emerick. Forthcoming. “Adaptation to Climate Change: Evidence from US Agriculture” *AEJ: Economic Policy*.
- *Schlenker, W., W.M. Hanemann, and A.C. Fisher. 2006. The Impacts of Global Warming on US Agriculture: An Econometric Analysis of Optimal Growing Conditions. *Review of Economics and Statistics*, 88(1): 113-25.
- *Deschenes and Greenstone. 2007. The Economic Impacts of Climate Change: Evidence from Agricultural Output and Random Fluctuations in Weather. *American Economic Review*, 97(1): 354-385
- *Fisher, Hanemann, Roberts and Schlenker. 2012. The Economic Impacts of Climate Change: Evidence from Agricultural Output and Random Fluctuations in Weather: Comment. *American Economic Review*, 102(7): 3749-3760.

6. Misc.

- Alix-Garcia, J.M., Katharine R.E. Sims and P. Yañez-Pagans. 2015. Only One Tree from Each Seed? Environmental Effectiveness and Poverty Alleviation in Mexico's Payments for Ecosystem Services Program. *American Economic Journal: Economic Policy*, 7(4): 1-40.
- Muehlenbachs, L., E. Spiller, and C. Timmins. 2015. The Housing Market Impacts of Shale Gas Development. *American Economic Review*, 105(12): 3633-59.
- Calel, R. and A. Dechezlepretre. 2016. Environmental Policy and Directed Technological Change: Evidence from the European carbon market. *Review of Economics and Statistics*, 98(1):173-191.
- Schlenker, W. and R. Walker. 2016. Airports, Air Pollution, and Contemporaneous Health. *Review of Economic Studies*, 83:768-809.