

ARE 264 – Part 2 - Syllabus
Empirical Energy and Environmental Economics

Department of Agricultural and Resource Economics
UC Berkeley, Spring 2022

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Reed's office hours: Wednesday 3-4pm (signup [here](#)) or by appointment.

Course description: This course is designed to help prepare graduate students to conduct empirical research in energy and environmental economics (EEE). The course builds on material covered in ARE 212 and 213. It is designed to be a companion course to ARE 261. The course has two broad objectives. The first is to develop an in depth understanding of empirical methods and research designs that are commonly used in the field of energy and environmental economics. The second is to familiarize students with important empirical findings and lines of inquiry at the frontier of empirical EEE.

Prerequisites: Students must be familiar with the econometric methods covered in ARE 212 and 213. Previous coursework in environmental economics will be helpful, but not required.

Academic integrity: I expect it of everyone. These expectations are elaborated upon here: <http://sa.berkeley.edu/conduct/integrity>.

Assignments and grading:

Part 1 (Sallee) and Part 2 (Walker) of the course will account for 33.3% of the total semester grade each. The remaining 33.3% will involve a replication exercise that will bridge both Part 1 and Part 2.

Within Part 2, grading is as follows:

Problem sets (90%): I will assign two problem sets that emphasize applications of methods we are discussing. These can be completed in small groups, but each student must write up his or her own responses.

Class Participation (10%)

Statistical software: Problem sets will be based on Stata and Matlab but students may use any software they choose. However, problem set solutions and classroom discussion will be based on Stata and Matlab.

Textbook: There is no textbook for this section. Instead, we will mostly discuss papers. When discussing empirical methods, we will draw most heavily from the following resources:

Angrist, Joshua and Jorn-Steffen Pischke (2009). *Mostly Harmless Econometrics*. Princeton University Press.

Gerber, A. S., & Green, D. P. (2012). *Field experiments: Design, analysis, and interpretation*. WW Norton.

Wooldridge, J., (2001), *Econometric Analysis of Cross Section and Panel Data*. MIT Press.

Rough course outline: Module 1 (Walker)

I. Setting the Stage: The Environment and Environmental Policy in the United States

Currie, J., & Walker, R. (2019). What do economists have to say about the Clean Air Act 50 years after the establishment of the Environmental Protection Agency?. *Journal of Economic Perspectives*, 33(4), 3-26.

Fowlie, M., Rubin, E., & Walker, R. (2019, May). Bringing satellite-based air quality estimates down to earth. In *AEA Papers and Proceedings* (Vol. 109, pp. 283-88).

Currie, J., Voorheis, J., & Walker, R. (Forthcoming). What caused racial disparities in particulate exposure to fall? New evidence from the Clean Air Act and satellite-based measures of air quality. *American Economic Review*.

Fowlie, M., Walker, R., & Wooley, D. (2020). Climate policy, environmental justice, and local air pollution. *Brookings Economic Studies*.

II. Non-market valuation: Measurement and Direct Damage Impacts – Pollution

Viscusi, W. K. (1993). The value of risks to life and health. *Journal of economic literature*, 31(4), 1912-1946.

Chay, K. Y., & Greenstone, M. (2003). The Impact of Air Pollution on Infant Mortality: Evidence from Geographic Variation in Pollution Shocks Induced by a Recession. *The Quarterly Journal of Economics*, 1121-1167.

Chen, Y., Ebenstein, A., Greenstone, M., & Li, H. (2013). Evidence on the impact of sustained exposure to air pollution on life expectancy from China's Huai River policy. *Proceedings of the National Academy of Sciences*, 110(32), 12936-12941.

Deryugina, T., Heutel, G., Miller, N. H., Molitor, D., & Reif, J. (2016). *The Mortality and Medical Costs of Air Pollution: Evidence from Changes in Wind Direction* (No. w22796). National Bureau of Economic Research.

Schlenker, W., & Walker, W. R. (2016). Airports, Air Pollution, and Contemporaneous Health. *The Review of Economic Studies*, 83(2), 768-809.

Currie, J., & Neidell, M. (2005). Air Pollution and Infant Health: What Can We Learn from California's Recent Experience?. *The Quarterly Journal of Economics*, 120(3), 1003-1030.

Anderson, M. L. (2015). As the Wind Blows: The Effects of Long-Term Exposure to Air Pollution on Mortality. *NBER Working Paper*, (w21578).

Isen, A., Rossin-Slater, M., & Walker, W. R. (2017). Every breath you take—Every dollar you'll make: The long-term consequences of the Clean Air Act of 1970. *Journal of Political Economy*, 125(3), 848-902.

III. Non-market valuation: Health and Direct Damage Impacts – Climate Change

Burke, M., Hsiang, S. M., & Miguel, E. (2015). Global non-linear effect of temperature on economic production. *Nature*.

Hsiang, S. M. (2016). Climate Econometrics. *NBER Working Paper*, (w22181).

Carleton, T. A., & Hsiang, S. M. (2016). Social and economic impacts of climate. *Science*, 353(6304).

Deschenes, O., & Greenstone, M. (2007). The economic impacts of climate change: evidence from agricultural output and random fluctuations in weather. *The American Economic Review*, 97(1), 354-385.

Fisher, A. C., Hanemann, W. M., Roberts, M. J., & Schlenker, W. (2012). The economic impacts of climate change: evidence from agricultural output and random fluctuations in weather: comment. *The American Economic Review*, 102(7), 3749-3760.

Deschênes, O., & 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.

Schlenker, W., & Roberts, M. J. (2009). Nonlinear temperature effects indicate severe damages to US crop yields under climate change. *Proceedings of the National Academy of sciences*, 106(37), 15594-15598.

Dell, M., Jones, B. F., & Olken, B. A. (2014). What do we learn from the weather? The new climate-economy literature. *Journal of Economic Literature*, 52(3), 740-798.

Burke, M., & Emerick, K. Adaptation to Climate Change: Evidence from US Agriculture. *American Economic Journal: Economic Policy*.

IV. Non-market valuation: Indirect Impacts and Damage Aggregation

Grossman, M. (2000). The human capital model. *Handbook of health economics*, 1, 347-408.

Grossman, M. (1972). On the concept of health capital and the demand for health. *Journal of Political Economy*, 80(2), 223-255.

Deschenes, O., Greenstone, M., & Shapiro, J. S. (2012). *Defensive investments and the demand for air quality: Evidence from the nox budget program and ozone reductions* (No. w18267). National Bureau of Economic Research.

Ito, K., & Zhang, S. Willingness to Pay for Clean Air: Evidence from Air Purifier Markets in China.

Barreca, A., Clay, K., Deschenes, O., Greenstone, M., & Shapiro, J. S. (2013). *Adapting to climate change: The remarkable decline in the US temperature-mortality relationship over the 20th century* (No. w18692). National Bureau of Economic Research.

Hsiang, S. M., Burke, M., & Miguel, E. (2013). "Quantifying the influence of climate on human conflict." *Science*, 341(6151), 1235367 (including Supplementary Appendix!)

NAS report (National Academy of Sciences)

Houser, T., Hsiang, S., Kopp, R., & Larsen, K. (2015). *Economic risks of climate change: an American prospectus*. Columbia University Press.

Greenstone, M., Kopits, E., & Wolverton, A. (2013). Developing a social cost of carbon for US regulatory analysis: A methodology and interpretation. *Review of Environmental Economics and Policy*, 7(1), 23-46.

Carleton, T. A., Jina, A., Delgado, M. T., Greenstone, M., Houser, T., Hsiang, S. M., ... & Zhang, A. T. (2020). *Valuing the global mortality consequences of climate change accounting for adaptation costs and benefits* (No. w27599). National Bureau of Economic Research.

V. Non-market valuation: Stated versus Revealed Preference and Hedonics

Rosen, S. (1974). Hedonic prices and implicit markets: product differentiation in pure competition. *Journal of political economy*, 82(1), 34-55.

Chay, K. Y., & Greenstone, M. (2005). Does Air Quality Matter? Evidence from the Housing Market. *Journal of Political Economy*, 113(2), 376-424.

Keiser, David A., and Joseph S. Shapiro. (2017). Consequences of the Clean Water Act and the demand for water quality. No. w23070. National Bureau of Economic Research,

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

Ashenfelter, O., & Greenstone, M. (2004). Using Mandated Speed Limits to Measure the Value of a Statistical Life. *Journal of Political Economy*, 112(S1), S226-S267.

Currie, J., Davis, L., Greenstone, M., & Walker, R. (2015). Environmental health risks and housing values: evidence from 1,600 toxic plant openings and closings. *The American economic review*, 105(2), 678-709.

Schlenker, W., Hanemann, W. M., & Fisher, A. C. (2005). Will US agriculture really benefit from global warming? Accounting for irrigation in the hedonic approach. *The American Economic Review*, 95(1), 395-406.

Hornbeck, R. (2012). The enduring impact of the American Dust Bowl: Short-and long-run adjustments to environmental catastrophe. *The American Economic Review*, 102(4), 1477-1507.

Black, S. E. (1999). Do better schools matter? Parental valuation of elementary education. *Quarterly journal of economics*, 577-599.

Banzhaf, H. S. (2015). *Panel Data Hedonics: Rosen's First Stage and Difference-in-Differences as "Sufficient Statistics"* (No. w21485). National Bureau of Economic Research.

Christensen, P., & Timmins, C. (2021). *The Damages and Distortions from Discrimination in the Rental Housing Market* (No. w29049). National Bureau of Economic Research.

Fisher, A. C., Hanemann, W. M., Roberts, M. J., & Schlenker, W. (2012). The economic impacts of climate change: evidence from agricultural output and random fluctuations in weather: comment. *The American Economic Review*, 102(7), 3749-3760.

Severen, C., Costello, C., & Deschenes, O. (2016). A Forward Looking Ricardian Approach: Do Land Markets Capitalize Climate Change Forecasts? (No. w22413). National Bureau of Economic Research.

Arrow, Kenneth, et al. "Report of the NOAA panel on contingent valuation." *Federal register* 58.10 (1993): 4601-4614.

Hausman, J. (2012). Contingent valuation: from dubious to hopeless. *The Journal of Economic Perspectives*, 26(4), 43-56.

V.A. Hedonics and the Relationship to Sorting Models (time permitting)

Bayer, P., Ferreira, F., & McMillan, R. (2007). A Unified Framework for Measuring Preferences for Schools and Neighborhoods. *Journal of Political Economy*, 115(4), 588-638.

Kuminoff, Nicolai V, V. Kerry Smith and Christopher Timmins (2013). "The New Economics of Equilibrium Sorting and Policy Evaluation Using Housing Markets." *Journal of Economic Literature*, 51(4): 1007-62

Gao, X., Song, R., & Timmins, C. (2021). *The Role of Information in the Rosen-Roback Framework* (No. w28943). National Bureau of Economic Research.

VI. Program Evaluation: Costs of Environmental Policy, Prospective/Retrospective Analysis

Gollop, F. M., & Roberts, M. J. (1983). Environmental regulations and productivity growth: the case of fossil-fueled electric power generation. *The Journal of Political Economy*, 654-674.

Jaffe, A. B., Peterson, S. R., Portney, P. R., & Stavins, R. N. (1995). Environmental regulation and the competitiveness of US manufacturing: what does the evidence tell us?. *Journal of Economic literature*, 33(1), 132-163.

Carlson, C., Burtraw, D., Cropper, M., & Palmer, K. L. (2000). Sulfur dioxide control by electric utilities: What are the gains from trade?. *Journal of political Economy*, 108(6), 1292-1326.

Joskow, P. L., & Rose, N. L. (1989). The effects of economic regulation. *Handbook of industrial organization*, 2, 1449-1506.

Fullerton, D. (2011). Six distributional effects of environmental policy. *Risk analysis*, 31(6), 923-929.

Parry, I. W., Sigman, H., Walls, M., & Williams III, R. C. (2005). *The incidence of pollution control policies* (No. w11438). National Bureau of Economic Research

Meng, Kyle C. (2017). Using a Free Permit Rule to Forecast the Marginal Abatement Cost of Proposed Climate Policy. Forthcoming, *American Economic Review*.

Greenstone, M. (2002). The Impacts of Environmental Regulations on Industrial Activity: Evidence from the 1970 and 1977 Clean Air Act Amendments and the Census of Manufactures. *Journal of Political Economy*, 110(6), 1175-1219.

Walker, W. R. (2013). The Transitional Costs of Sectoral Reallocation: Evidence From the Clean Air Act and the Workforce. *The Quarterly Journal of Economics*, 128(4), 1787-1835.

Shapiro, J. S., & Walker, R. (2020). *Is Air Pollution Regulation Too Stringent?* (No. w28199). National Bureau of Economic Research.

Greenstone, M., List, J. A., & Syverson, C. (2012). *The effects of environmental regulation on the competitiveness of US manufacturing* (No. w18392). National Bureau of Economic Research.

Ryan, S. P. (2012). The costs of environmental regulation in a concentrated industry. *Econometrica*, 80(3), 1019-1061.

Cicala (2017), "Imperfect Markets versus Imperfect Regulation in U.S. Electricity Generation" NBER Working Paper No. 23053

VII. Production Functions (time permitting)

Akerberg, D. A., Caves, K., & Frazer, G. (2015). Identification properties of recent production function estimators. *Econometrica*, 83(6), 2411-2451.

De Loecker, J., & Goldberg, P. K. (2013). Firm Performance in a Global Market. *The Annual Review of Economics*.

Collard-Wexler, A., & De Loecker, J. (2014). Reallocation and technology: evidence from the US steel industry. *The American Economic Review*, 105(1), 131-171.

Ganapati, S., Shapiro, J. S., & Walker, R. (2020). Energy cost pass-through in US manufacturing: Estimates and implications for carbon taxes. *American Economic Journal: Applied Economics*, 12(2), 303-42.

De Loecker, J., & Van Biesebroeck, J. (2016). *Effect of International Competition on Firm Productivity and Market Power* (No. w21994). National Bureau of Economic Research.

Allcott, H., Collard-Wexler, A., & O'Connell, S. D. (2016). How Do Electricity Shortages Affect Industry? Evidence from India. *The American Economic Review*, 106(3), 587-624.

Covert, T. (2014). Experiential and social learning in firms: the case of hydraulic fracturing in the Bakken Shale. Available at SSRN 2481321.

Kellogg, R. (2011). Learning by drilling: Interfirm learning and relationship persistence in the Texas oilpatch. *The Quarterly Journal of Economics*, 126(4), 1961-2004.

Syverson, C. (2011). What determines productivity?. *Journal of Economic literature*, 49(2), 326-365.

Lyubich, Shapiro, and Walker (2018) Regulating Mismeasured Pollution: Implications of Firm Heterogeneity for Environmental Policy, Working Paper.

VIII. Policy Design and Evaluation in Second Best Settings (time permitting)

Fowle, M., Reguant, M., & Ryan, S. P. (2016). Market-based emissions regulation and industry dynamics. *Journal of Political Economy*, 124(1), 249-302.

Fabra, N., & Reguant, M. (2014). Pass-through of emissions costs in electricity markets. *The American Economic Review*, 104(9), 2872-2899.

**Goulder, L. H. (2013). Climate change policy's interactions with the tax system. *Energy Economics*, 40, S3-S11.

Goulder, L. H., & Williams III, R. C. (2003). The substantial bias from ignoring general equilibrium effects in estimating excess burden, and a practical solution. *Journal of political Economy*, 111(4), 898-927.

Tarduno, Matt (2022) For Whom the Bridge Tolls: Congestion, Air Pollution, and Second-Best Road Pricing. Working Paper.