

## Econ 36740/PPHA 44330 – Environmental and Energy Economics II, Winter 2021

**Instructor: Michael Greenstone**

**TA: Michael Galperin**

**Lectures: Mondays, 6:30 pm – 9:20 pm.**

### Meetings:

The course will meet Mondays, from 6:30 pm – 9:20 pm via Zoom.

Michael Galperin (mgalperin@uchicago.edu) is the TA for the course. The weekly TA session will be Wednesday from 4:10-5:00 pm, held via Zoom.

### Grades:

The course grade is determined in the following way:

- Class Participation (20%). An important part of the course will be the class discussion. It is incumbent upon each of you to ask questions and help to stimulate conversation.
- Research Summaries (20%). Students are required to write two 1-2 page response papers per week that should summarize the paper that will be discussed in class, as well as identify any flaws in the paper or questions that you may have. These papers are due at **9 am on Monday** via Canvas.
- Final Exam (60%). There will be a closed book 3-hour exam during finals week which will cover the entire course material and be worth 60% of the grade.

### Energy & Environmental Sector 2020-21 Requirements related to Summer 2021 prelim exam/paper

To qualify in the Environmental Economics Field for the academic year 2020-21, students must submit a prelim paper to the field chair. The chair will assign two readers/graders from the field committee, according to the paper's subject matter, who will determine whether the author passes or fails the field.

The original research paper is due in September 2021. An original research paper will attempt to answer a question related to the public sector using a model, data, and/or econometric techniques that have not yet been applied to the research question. Such a paper would have the potential as serving as one of the author's PhD dissertation chapters (although completion of the research paper is in no way a commitment to write a certain type of dissertation).

### Econ 36740/PPHA 44330 Home Page:

This course will use canvas. Links for all required readings that are not easily available online will be on the course website.

### Office Hours:

Professor Greenstone will hold weekly office hours (weekly time TBD) and he is available by appointment. Send emails to mgreenst@uchicago.edu.

### Public Sector & Energy/Environment Workshops:

The purpose of this course is to prepare you to conduct original economics research at a high level. A key part of this training comes from becoming familiar with the frontier of research. An important complement to the lectures is regular attendance at workshops. You should plan to attend at least one workshop each week. The following workshops have excellent speakers and regularly feature papers relevant to Public. It is likely that most will not meet over the winter quarter, but you should plan on attending when they are active:

Becker Applied Economics Workshop (3:30-4:30 pm on Mondays)

Energy Policy Institute at Chicago Workshop (1:00-2:00 pm on Tuesdays)

Public Policy and Economics Workshops (11:00 am-12:00 pm on Wednesdays)

Workshop in Applied Economics (1:20-2:50 pm on Wednesdays)

Econometrics Workshop (3:45 – 5:00 pm on Thursdays)

Note that all seminars are held virtually via Zoom. There are also several other excellent workshops on campus that cover relevant topics.

## **COURSE READING LIST AND SCHEDULE**

Students are required to read the papers preceded by a \*. You should read the other papers if you are interested in the topic and/or treat them as ways to learn about promising areas of inquiry.

### **Useful Readings: Theory of Public Finance**

A. Auerbach and M. Feldstein, Handbook of Public Economics: Volumes 1 & 2 & 3 & 4 (Amsterdam: North Holland, 1985, 1987, 2002, 2002).

A. Atkinson and J. Stiglitz, Lectures in Public Economics (New York: McGraw Hill, 1980).

J. Gruber, Public Finance and Public Policy, 2<sup>nd</sup> edition (New York: Worth Publishers, 2007) *relevant chapters are 12-17 – We have posted these on the course web site.*

J. Laffont, Fundamentals of Public Economics (Cambridge: MIT Press, 1988).

R.A.Moffit (Ed) Means-Tested Transfer Programs in the United States. National Bureau of Economic Research Conference Report. University of Chicago Press. Chicago and London. 2003.

G. Myles, Public Economics (New York: Cambridge University Press, 1995).

E. Sheshinski, Lectures on Annuities, MIT Press. 2007

B Salanie The Economics of Taxation (Cambridge: MIT Press 2003).

R. Tresch, Public Finance (Second edition), (McGraw-Hill, 2002).

Committee on Ways and Means, Green Book – 2004 edition.

<http://www.gpoaccess.gov/wmprints/green/index.html>

### **Lectures 1-2, January 11, 2021: Willingness to Pay for Non-Market Goods: Hedonics and Applications**

Banzhaf, Spencer. 2020. "Difference-in-Differences Hedonics." *Journal of Political Economy*, forthcoming.

Bartik, Timothy J. 1987. "The Estimation of Demand Parameters in Hedonic Price Models." *Journal of Political Economy*, 95(1): 81-88.

Black, Sandra. 1999. "Do Better Schools Matter? Parental Valuation of Elementary Education." *Quarterly Journal of Economics*. 114(2): 577-99.

\*Chay, Kenneth and Michael Greenstone. 2005. "Does Air Quality Matter? Evidence from the Housing Market," *Journal of Political Economy*, 118(3): 1121-1187.

Currie, Janet, Lucas Davis, Michael Greenstone, and Reed Walker. 2015. "Environmental Health Risks and Housing Values: Evidence from 1,600 Toxic Plant Openings and Closings," *American Economic Review*, 105(2): 678-709.

Ekeland, Ivar, James J. Heckman, and Lars Nesheim. 2004. "Identification and Estimation of Hedonic Models." *Journal of Political Economy*, 102(S1): S60-S109.

Epplé, Dennis. 1987. "Hedonic Prices and Implicit Markets: Estimating Demand and Supply Functions for Differentiated Products." *Journal of Political Economy*, 95(1): 59-80.

\*Freeman III., A Myrick, Joseph A. Herriges, and Catherine L. King. 2014. Chapter 10 "Property Value Models" in The Measurement of Environmental and Resource Values, Resources for the Future: Washington, DC.

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

Greenstone, Michael. 2017. "The Continuing Impact of Sherwin Rosen's 'Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition.'" *Journal of Political Economy*, 125(6): 1891-1902.

Rosen, Sherwin. 1986. "The Theory of Equalizing Difference," *Handbook of Labor Economics*, Vol. 1, (Amsterdam: Elsevier Science), pp. 641-92.

\*Rosen, Sherwin. 1974. "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition." *Journal of Political Economy* 82(1): 34-55.

*Supplemental reading: Regression Discontinuity*

Lee, David S. and Thomas Lemieux. 2010. "Regression Discontinuity Designs in Economics." *Journal of Economic Literature*, 48: 281-355. – very good for conceptual understanding, slightly outdated for methodological points (functional forms, bandwidth selection)

Calonico, Sebastian, Matias D. Cattaneo, and Max H. Farrell. 2020. "Optimal Bandwidth Choice for Robust Bias-Corrected Inference in Regression Discontinuity Designs." *The Econometrics Journal* 23, 192-210.

*Supplemental reading: Difference in Differences with many periods and groups*

Callaway, Brantly, and Pedro H.C. Sant'Anna. 2020. "Difference-in-Differences with Multiple Time Periods." *Journal of Econometrics*, Forthcoming.

Goodman-Bacon, Andrew. 2020. "Difference in Differences with Variation in Treatment Timing." Working Paper. Available at: <http://goodman-bacon.com/pdfs/ddtiming.pdf>

## **MLK Day, January 18, 2021**

There will be no class on January 18 in observance of Martin Luther King Jr. Day. An optional lecture will be held later in the week; the date of the lecture will be decided by the class in the first week of the term. This lecture will not contribute to the class participation grade, and its content will not be referenced in the research summaries or final exam. You can learn more about the university's 31<sup>st</sup> annual Martin Luther King Jr. Celebration at <https://mlk.uchicago.edu/>.

### **Lectures 3-4, January 25, 2021**

#### **Willingness to Pay for Non-Market Goods: Discrete Choice Approaches and Relationship to Hedonics**

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

Train, Kenneth. *Discrete Choice Methods with Simulation*. 2<sup>nd</sup> edition (New York: Cambridge University Press, 2009), especially chapters 2, 3, and 5. Available online at <https://eml.berkeley.edu/books/choice2.html>.

Knittel, Christopher R., and Konstantinos Metaxoglou. 2014. "Estimation of Random-Coefficient Demand Models: Two Empiricists' Perspective." *Review of Economics and Statistics*, 96(1): 34-59.

#### **Willingness to Pay for Non-Market Goods: Hedonic and Discrete Choice Applications to Estimating the Value of a Statistical Life**

\*Ashenfelter, Orley and Michael Greenstone. 2004. "Using Mandated Speed Limits to Measure the Value of a Statistical Life," *Journal of Political Economy*, 112(S1): S226-S267.

\*Black, Dan A. and Kneisner, Thomas J. 2003. "On the Measurement of Job Risk in Hedonic Wage Models." *Journal of Risk and Uncertainty*, 27(3): 205-220.

\*Greenberg, Kyle, Michael Greenstone, Stephen Ryan, and Michael Yankovich. "The Value of a Statistical Life: Evidence from Military Retention Incentives and Occupation-Specific Mortality Hazards." Mimeograph. 2021 (See course web site)

\*Thaler, Richard, and Sherwin Rosen. "The Value of Saving a Life: Evidence from the Labor Market," in *Household Production and Consumption*. Nestor E. Terleckyj, ed., Cambridge, MA: NBER, 1976: 265 – 298.

### **Lectures 5-6, February 1, 2021**

#### **Health as Human Capital: Theory**

\*Becker, G. (2007): "Health as human capital: synthesis and extensions," *Oxford Economic Papers*, 59, 379–410.

\*Freeman III., A Myrick. 2003. Chapter 10 "Valuing Longevity and Health" in The Measurement of Environmental and Resource Values, Resources for the Future: Washington, DC.

Grossman, Michael. "The Human Capital Model," Chapter 7 in Handbook of Health Economics, Vol 1A (editors Culyer and Newhouse).

Harrington, Winston and Paul R. Portney. 1987 "Valuing the Benefits of Health and Safety Regulation," *Journal of Urban Economics*, 22(1): 101-112.

\*Murphy, Kevin and Robert Topel. 2006. "The Value of Health and Longevity." *Journal of Political Economy*, 114(5): 871-904.

### **Health as Human Capital: Dose-Response Applications**

\*Chay, Kenneth and Michael Greenstone. "The Impact of Air Pollution on Infant Mortality: Evidence from Geographic Variation in Pollution Shocks Induced by a Recession." *Quarterly Journal of Economics*, 2003, 118(3): 1121-1167.

Chay, Kenneth and Michael Greenstone. "Air Quality, Infant Mortality, and the Clean Air Act of 1970," NBER Working Paper No. 10053, 2003.

Currie, Janet, and Reed Walker. 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.

Dominici, Francesca, Michael Greenstone, and Cass R. Sunstein. "Particulate Matter Matters." *Science*, 2014, 344 (6181, April 18, 2014): 257-259.

Ebenstein, Avraham, Maoyong Fan, Michael Greenstone, Guojun He, and Maigeng Zhou. 2017. "New 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* 114(39): 10384-10389.

Ebenstein, Avraham and Michael Greenstone. 2020. "Childhood Exposure to Particulate Air Pollution, Human Capital Accumulation, and Income: Evidence from China." Mimeograph. 2021. (See course web site)

Hsiang, Solomon, Paulina Oliva, and Reed Walker. 2019. "The Distribution of Environmental Damages," *Review of Environmental Economics and Policy*, 13(1): 83-103.

\*Isen, Adam, Maya Rossin-Slater, and Reed Walker. 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*.

### **Health as Human Capital: Avoidance Behavior and Willingness to Pay for Health Applications**

Baylis, Patrick, Michael Greenstone, Kenneth Lee, and Harshil Sahai. "Do Wealthier Households Breathe Cleaner Air in Delhi?." Mimeograph. 2021. (See course website)

\*Deschenes, Olivier, Michael Greenstone, and Joseph Shapiro. 2017. "Defensive Investments and the Demand for Air Quality: Evidence from the NOx Budget Program." *American Economic Review* 107(10): 2958-89.

Finkelstein, Hendren, and Luttmer. 2019. "The Value of Medicaid: Interpreting Results from the Oregon Health Insurance Experiment." *Journal of Political Economy*, 127(6): 2836-2874.

Ito, Koichiro, and Shuang Zhang. 2020. "Willingness to Pay for Clean Air: Evidence from Air Purifier Markets in China." *Journal of Political Economy*, 128 (5): 1627-1672.

Jayachandran, Seema and Adriana Lleras-Muney. 2009. "Life Expectancy and Human Capital Investments: Evidence from Declines in Maternal Mortality," *Quarterly Journal of Economics*, 124(1): 349-497.

\*Kremer, Michael, Jessica Leino, Edward Miguel, and Alix Zwane. 2011. "Spring Cleaning: Rural Water Impacts, Valuation, and Institutions." *Quarterly Journal of Economics*, 126(1): 145-205.

Neidell, Matthew. 2009. "Information, Avoidance Behavior, and Health: The Effect of Ozone on Asthma Hospitalizations." *Journal of Human Resources*, 44(2): 450-478.

## **Lectures 7-8, February 8, 2021**

### **Costs of Environmental Regulations**

\*Burgess, Robin, Matthew Hansen, Ben Olken, Peter Potapov, and Stefanie Sieber. 2012. "The Political Economy of Deforestation in the Tropics" *Quarterly Journal of Economics* 127(4), pp. 1707-1754.

Carlson, C., D. Burtraw, M. Cropper, and K. Palmer. 2000. "Sulfur Dioxide Control by Electric Utilities: What Are the Gains from Trade?" *Journal of Political Economy* 108(6):1292–1326.

\*Fowlie, Meredith. 2010. "Emissions Trading, Electricity Restructuring, and Investment in Pollution Abatement." *American Economic Review*, 100(3): 837-869.

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

\*Greenstone, Michael, John List, and Chad Syverson. 2012. "The Effects of Environmental Regulation on the Competitiveness of U.S. Manufacturing," Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2145006](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2145006)

Hanna, Rema. 2010. "US Environmental Regulation and FDI: Evidence from a Panel of US-Based Multinational Firms," *American Economic Journal: Applied Economics*, 2(3): 158-189.

Keiser, David, and Joseph S. Shapiro. 2019. "Consequences of the Clean Water Act and the Demand for Water Quality." *Quarterly Journal of Economics*, 134(1): 349-396.

Lipscomb, M. and A. M. Mobarak. 2017. "Decentralization and Pollution Spillovers: Evidence from the Redrawing of County Borders in Brazil," *Review of Economic Studies*, 84(1): 464-502.

Shapiro, Joseph, and Reed Walker. 2018. "Why is Pollution from U.S. Manufacturing Declining? The Roles of Environmental Regulation, Productivity, and Trade," *American Economic Review*, 108(12): 3814-54.

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

## **Lectures 9-10, February 15, 2021**

### **The Economics of Climate Change: Theory**

\*Becker, Gary S., Kevin M. Murphy, and Robert H. Topel. 2011. "On the Economics of Climate Policy," *The B.E. Journal of Economic Analysis & Policy*, 10(2): 1935-1682.

Nordhaus, W. 2013. The Climate Casino, Yale University Press.

\*Weitzman, M. 2009. "On modeling and interpreting the economics of catastrophic climate change." *Review of Economics and Statistics*, 91(1): 1-19.

### **The Economics of Climate Change: Discount Rates**

K. Arrow, M. Cropper, C. Gollier, B. Groom, G. Heal, R. Newell, W. Nordhaus, R. Pindyck, W. Pizer, P. Portney, T. Sterner, R. S. J. Tol, and M. Weitzman "Determining Benefits and Costs for Future Generations" *Science* 26 July 2013, 341 (6144), 349-350.

\*Giglio, Stefano, Matteo Maggiori, Johannes Stroebe, and Andreas Weber. 2015. "Climate Change and Long-Run Discount Rates: Evidence from Real Estate," *Mimeograph*. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2639748](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2639748)

Newell, Richard G. and William A. Pizer. 2003. "Discounting the Distant Future: How Much do Uncertain Rates Increase Valuations?" *Journal of Environmental Economics and Management*, 46: 52-71.

### **The Economics of Climate Change: Impacts**

\*Burgess, Robin, Olivier Deschenes, David Donaldson, and Michael Greenstone 2017. "Weather and Death in India: Mechanisms and Implications for Climate Change." *Mimeograph*

\*Dell, Melissa, Benjamin F. Jones, and Benjamin A. Olken. 2014. "What Do We Learn from the Weather? The New Climate-Economy Literature," *Journal of Economic Literature*, 52(3): 740-798.

Carleton, Tamma, and Solomon Hsiang. 2016. "Social and economic impacts of climate," *Science*, 353(6304).

Deschenes, Olivier and Michael Greenstone. 2011. "Climate Change, Mortality, and Adaptation: Evidence from Annual Fluctuations in Weather in the US." *American Economic Journal: Applied Economics*, 2011, 3 (4): 152-185.

Greenstone, Michael, Elizabeth Kopits, and Ann Wolverton. "Developing a Social Cost of Carbon for US Regulatory Analysis: A Methodology and Interpretation," *Review of Environmental Economics and Policy*, 2013, 7(1): 23-46.

Heal, G. 2009. "Climate Economics: A Meta-Review and Some Suggestions for Future Research." *Review of Environmental Economics and Policy*, 3(1): 4-21.

Hsiang, Solomon. 2016. "Climate Econometrics." *Annual Review of Resource Economics* 8: 43-75

\*Hsiang, Solomon and Amir Jina. 2013. "The Causal Effect of Environmental Catastrophe on Long Run Economic Growth," *NBER Working Paper 20352*.

Pindyck, Robert S. 2013. "Climate Change Policy: What Do the Models Tell Us?" *Journal of Economic Literature*, 51(3): 860-72.

Weitzman, M. 2007. "The Stern Review of the Economics of Climate Change." *Journal of Economic Literature*, 45(3) :703-724.



### **The Economics of Climate Change: Adaptation and Technical Change**

Acemoglu, Daron, Philippe Aghion, Leonardo Bursztyn, and David Hemous. 2012. "The Environment and Directed Technical Change." *American Economic Review*, 102(1): 131-166.

\*Barreca, Alan, Karen Clay, Olivier Deschenes, Michael Greenstone, and Joe Shapiro. 2016. "Adapting to Climate Change: The Remarkable Decline in the U.S. Temperature-Mortality Relationship over the 20th Century," *Journal of Political Economy*, 124(1): 105-159.

\*Carleton, Tamma, Amir Jina, Michael T. Delgado, Michael Greenstone, Trevor Houser, Solomon M. Hsiang, Andrew Hultgren, Robert E. Kopp, Kelly E. McCusker, Ishan B. Nath, James Rising, Ashwin Rode, Hee Kwon Seo, Arvid Viaene, Jiacan Yuan, and Alice Tianbo Zhang. 2020. "Valuing the Global Mortality Consequences of Climate Change Accounting for Adaptation Costs and Benefits." *NBER Working Paper #27599*.

Costinot, Arnaud, Dave Donaldson, and Cory Smith. 2016. "Evolving Comparative Advantage and the Impact of Climate Change in Agricultural Markets: Evidence from 1.7 Million Fields around the World." *Journal of Political Economy*, 124(1): 205-248.

### **Lectures 11-12, February 22, 2021**

#### **Equilibrium in Local Labor Markets with Applications to Agglomeration and Environmental Amenities**

\*Bartik, Alexander W., Janet Currie, Michael Greenstone, and Christopher R. Knittel. 2019. "The Local Economic and Welfare Consequences of Hydraulic Fracturing." *American Economic Journal: Applied Economics* 11(4): 105-155.

Chay, Kenneth and Michael Greenstone. 2005. "Does Air Quality Matter? Evidence from the Housing Market," *Journal of Political Economy*, 113(2): 376-424.

Currie, Janet, Lucas Davis, Michael Greenstone, and Reed Walker. 2014. "Environmental Health Risks and Housing Values: Evidence from 1600 Toxic Plant Openings and Closings," *American Economic Review*, 105(2): 678-709.

Ellison, Glenn, Edward Glaeser, and William Kerr. 2010. "What Causes Industry Agglomeration? Evidence from Coagglomeration Patterns." *American Economic Review*, 100(3), 1195-1213.

Ellison, Glenn and Edward Glaeser. 1997. "Geographic Concentration in U.S. Manufacturing Industries: A Dartboard Approach." *Journal of Political Economy*, 105(5), 889-927.

\*Greenstone, Michael, Rick Hornbeck and Enrico Moretti. 2010. "Identifying Agglomeration Spillovers: Evidence from Winners and Losers of Large Plant Openings." *Journal of Political Economy*, 118(3): 536-598.

Gyourko, Joseph, and Joseph Tracy. 1991. "The Structure of Local Public Finance and the Quality of Life," *Journal of Political Economy*, 99(4): 774-806.

Kline, Patrick and Enrico Moretti. 2014. "People, Places, and Policy: Government and the Spatial Distribution of Economic Activity." *Annual Review of Economics*, 6: 629-662.

\*Kline, Patrick and Enrico Moretti. 2014. "Economic Development, Agglomeration Economies and the Big Push: 100 Years of Evidence from the Tennessee Valley Authority." *Quarterly Journal of Economics*, 129(1): 275-331.

\*Roback, Jennifer. 1982. "Wages, Rents, and the Quality of Life," *Journal of Political Economy*, 90(6): 1257-1278.

Roback, Jennifer. 1988. "Wages, Rents, and Amenities: Differences Among Workers and Regions," *Economic Inquiry*, 26(1): 23-41.

Tiebout, Charles. 1956. "A Pure Theory of Local Expenditures," *Journal of Political Economy*, 64(5): 416-424.

## **Energy Markets**

Anderson, Soren T., Ryan Kellogg, and Stephen W. Salant. 2018. "Hotelling Under Pressure," *Journal of Political Economy*.

Borenstein, Severin, James Bushnell and Frank Wolak. 2002. "Measuring Market Inefficiencies in California's Restructured Wholesale Electricity Market," *American Economic Review*, 92(5): 1376-1405.

Cicala, Steve. 2015. "When Does Regulation Distort Costs? Lessons From Fuel Procurement in U.S. Electricity Generation." *American Economic Review*, 105(1): 411-44.

Cicala, Steve. 2016. "Imperfect Markets versus Imperfect Regulation in U.S. Electricity Generation," Mimeograph. Available at: [http://home.uchicago.edu/~scicala/papers/elec\\_gov\\_v\\_mkt\\_draft\\_2.pdf](http://home.uchicago.edu/~scicala/papers/elec_gov_v_mkt_draft_2.pdf)

\*Davis, Lucas and Lutz Killian, "The Allocative Cost of Price Ceilings in the U.S. Residential Market for Natural Gas." *Journal of Political Economy*, 119(2): 212-241.

Davis, Lucas, and Erich Muehlegger. 2010. "Do Americans Consume Too Little Natural Gas? An Empirical Test of Marginal Cost Pricing," *RAND Journal of Economics*, 41(4): 791-810.

\*Ito, Koichiro. 2014. "Do Consumers Respond to Marginal or Average Price? Evidence from Nonlinear Electricity Pricing." *American Economic Review*. 104(2): 537-563

Ito, Koichiro and Mar Reguant. 2016. "Sequential Markets, Market Power, and Arbitrage," *American Economic Review*, 106(7): 1921-1957.

Kellogg, Ryan. 2014. "The Effect of Uncertainty on Investment: Evidence from Texas Oil Drilling," *American Economic Review*, 104(6): 1698-1734.

Rapson, David, and Katrina Jessoe. 2013. "Knowledge is (Less) Power: Experimental Evidence from Residential Energy Use." *American Economic Review*, 104(4): 1417-1438.

## Lectures 13-14, March 1, 2021

### Energy Efficiency

\*Allcott, Hunt and Michael Greenstone, 2012. "Is there an Energy Efficiency Gap?" *Journal of Economic Perspectives*, 26(1): 3-28.

\*Allcott, Hunt and Michael Greenstone, 2016. "Measuring the Welfare Effects of Residential Energy Efficiency Programs," Mimeograph.

\*Allcott, Hunt, and Todd Rogers. "The Short-Run and Long-Run Effects of Behavioral Interventions: Experimental Evidence from Energy Conservation." *American Economic Review*, 104(10): 3003-37.

Allcott, Hunt and Nathan Wozny. 2014. "Gasoline Prices, Fuel Economy, and the Energy Paradox." *Review of Economics and Statistics*, 96(5): 779-795.

Anderson, Soren T., and James M. Sallee. 2011. "Using Loopholes to Reveal the Marginal Cost of Regulation: The Case of Fuel-Economy Standards." *American Economic Review*, 101(4): 1375-1409.

\*Busse, Meghan R., Christopher R. Knittel, and Florian Zettelmeyer. 2013. "Are Consumers Myopic? Evidence from New and Used Car Purchases." *American Economic Review*, 103(1): 220-56.

\*Costa, Francisco and Francois Gerard. 2018. Hysteresis and the Welfare Effect of Corrective Policies: Theory and Evidence from an Energy-Saving Program. *NBER Working Paper #24608*.

\*Davis, Lucas W., Alan Fuchs, and Paul Gertler. 2013. "Cash for Coolers: Evaluating a Large-Scale Appliance Replacement Program in Mexico." *American Economic Journal: Economic Policy*, 6(4): 207-38.

Dubin, Jeffrey and Daniel McFadden. 1984. "An Econometric Analysis of Residential Electric Appliance Holdings and Consumption." *Econometrica*, 52(2): 345-362

\*Fowlie, Meredith, Michael Greenstone, and Catherine Wolfram. 2018. "Do Energy Efficiency Investments Deliver? Evidence from the Weatherization Assistance Program." *Quarterly Journal of Economics* 133(3): 1597-1644.

Goldberg, Pinelopi. 1998. "The Effects of the Corporate Average Fuel Efficiency Standards in the US," *Journal of Industrial Economics* 46(1): 1-33.

Hausman, Jerry. 1979. "Individual Discount Rates and the Purchase and Utilization of Energy-Using Durables." *Bell Journal of Economics*, 10(1): 33-54.

Jacobsen, Mark, "Evaluating U.S. Fuel Economy Standards in a Model with Producer and Household Heterogeneity," *American Economic Journal: Economic Policy*, 5(2): 148-87.

Knittel, Christopher R. 2011. "Automobiles on Steroids: Product Attribute Trade-Offs and Technological Progress in the Automobile Sector," *American Economic Review*, 101(7): 3368-3399.

## Lecture 15-16, March 8, 2021

### Energy and Environmental Problems in Developing Countries

Adhvaryu, Achyuta, Namrata Kala, and Anant Nyshadham. 2014. "Management and Shocks to Worker Productivity: Evidence from Air Pollution Exposure in an Indian Garment Factory." Mimeograph.

Available at: [https://economics.stanford.edu/sites/default/files/pm\\_oct14.pdf](https://economics.stanford.edu/sites/default/files/pm_oct14.pdf)

Alix-Garcia, Jennifer, Craig McIntosh, Katharine R. E. Sims, and Jarrod R. Welch. 2013. "The Ecological Footprint of Poverty Alleviation: Evidence from Mexico's Oportunidades Program." *Review of Economics and Statistics* 95 (2): 417–35.

\*Allcott, Hunt, Allan Collard-Wexler, and Stephen D. O'Connell. 2016. "How Do Electricity Shortages Affect Industry? Evidence from India." *American Economic Review*, 106(3): 587-624.

Burgess, Robin, Michael Greenstone, Nicholas Ryan, and Anant Sudarshan. 2020. "The Consequences of Treating Electricity as a Right." *Journal of Economic Perspectives* 34(1): 145-169.

\*Burlig, Fiona, and Louis Preonas. "Out of the Darkness and Into the Light? Development Effects of Rural Electrification," *Energy Institute at Haas Working Paper 268*.

Available at: <https://haas.berkeley.edu/wp-content/uploads/WP268.pdf>

Clay, Karen, Joshua Lewis, and Edson R. Severnini. 2016. "Canary in a Coal Mine: Infant Mortality, Property Values, and Tradeoffs Associated with Mid-20<sup>th</sup> Century Air Pollution," *NBER Working Paper 22155*.

\*Dinkelman, Taryn. 2011. "The effects of rural electrification on employment: New evidence from South Africa," *American Economic Review*, 101(7): 3078-3108.

\*Chen, Yuyu, Avraham Ebenstein, Michael Greenstone, and Hongbin Li. "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*, 2013, 110 (32): 12936–12941.

also available at: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2291154](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2291154)

Ebenstein, Avraham, Maoyong Fan, Michael Greenstone, Guojun He, and Maigeng Zhou. 2017. "The Impact of Sustained Exposure to Particulate Matter on Life Expectancy: New Evidence from China's Huai River Policy," Mimeograph.

Duflo, Esther, Michael Greenstone, and Rema Hanna. 2016. "Up in Smoke: The Influence of Household Behavior on the Long-Run Impact of Improved Cooking Stoves," *American Economic Journal: Economic Policy*, 8(1): 80-114.

\*Duflo, Esther, Michael Greenstone, Rohini Pande, and Nicholas Ryan. 2013. "Truth-telling by Third-Party Auditors and the Response of Polluting Firms: Experimental Evidence from India." *Quarterly Journal of Economics*, 128(4): 1499- 1545.

\*Duflo, Esther, Michael Greenstone, Rohini Pande, and Nicholas Ryan. 2013. "The Value of Discretion in the Enforcement of Regulation: Experiment Evidence and Structural Estimates from Environmental Inspections in India," Mimeograph, 2016.

Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2513150](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2513150)

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## **Lecture 17-18, March 15, 2021**

### **Bonus: Regulation of Financial Markets (Probably Not Enough Time to Cover this Material)**

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