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IDEA 2024
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Energy Economics Fall 2024

This course is focused on the analysis of energy markets using tools from Industrial Organization and Applied Micro. We will structure the lectures around 1) reviewing papers on particular themes, and 2) replicating papers with interactive notebooks. The course will require solving a paper presentation, an in-class project proposal presentation, and a term paper.

Topics will include electricity markets (market power, entry, climate policy), energy efficiency, demand response, and the distributional implications of the energy transition. The tools will cover various techniques, including basic regressions, instrumental variables, structural modeling of electricity markets, and machine learning applications to energy economics.

Lectures: 10 two-hour lectures (November 2024) + TA sessions.

Grading: Grading will be based on problem sets (40%) and term paper (60%).

Topics and Reading list (tentative, to be completed)

We will not discuss all the papers on the reading list, but I expect you to read all of the papers we discuss in detail in class**.** This reading list is meant to be a reference for the future, and it includes some subtopics we will likely not have time to cover. Students are encouraged to contact the instructor if there are particular topics that are particular suited to their interests.

I. Intro - Energy transition and renewables (regressions, IV)

Abrell, J., Kosch, M., & Rausch, S. (2019). Carbon abatement with renewables: Evaluating wind and solar subsidies in Germany and Spain. Journal of Public Economics, 169, 172–202. https://doi.org/10.1016/j.jpubeco.2018.11.007

Bushnell, J., & Novan, K. (2021). Setting with the Sun: The Impacts of Renewable Energy on Conventional Generation. Journal of the Association of Environmental and Resource Economists, 8(4), 759–796. https://doi.org/10.1086/713249

Cullen, J. (2013). Measuring the environmental benefits of wind-generated electricity. American Economic Journal: Economic Policy, 5(4), 107–133. https://doi.org/10.1257/pol.5.4.107

Gowrisankaran, G., Reynolds, S. S., & Samano, M. (2016). Intermittency and the value of renewable energy. Journal of Political Economy, 124(4), 1187–1234. https://doi.org/10.1086/686733

Joskow, P. L. (2019). Challenges for wholesale electricity markets with intermittent renewable generation at scale: the US experience. Oxford Review of Economic Policy, 35(2), 291–331. https://doi.org/10.1093/OXREP/GRZ001

Kellogg, R., & Reguant, M. (2021). Energy and Environmental Markets, Industrial Organization, and Regulation, in preparation for Handbook of Industrial Organization, https://www.nber.org/papers/w29235

Liski, M., & Vehviläinen, I. (2020). Gone with the Wind? An Empirical Analysis of the Equilibrium Impact of Renewable Energy. Journal of the Association of Environmental and Resource Economists, 7(5), 873–900. https://doi.org/10.1086/709648

Novan, K. (2015). Valuing the Wind: Renewable Energy Policies and Air Pollution Avoided. American Economic Journal: Economic Policy, 7(3), 291–326. https://doi.org/10.1257/pol.20130268

Petersen, C., Reguant, M. & Segura, L. (2022) Measuring the Impact of Wind Power. *Working paper*. https://mreguant.github.io/papers/Measuring_the_Impact_of_Wind_Power.pdf

Weber, P., & Woerman, M. (2022) Intermittency or Uncertainty? Impacts of Renewable Energy in Electricity Markets, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4212066.

II. Supply I - Electricity markets functioning (modeling + market power, clustering)

Bushnell, J. (2011). Building blocks: Investment in renewable and nonrenewable technologies. In Harnessing Renewable Energy in Electric Power Systems: Theory, Practice, Policy: Vol. WP-202R (pp. 159–180). https://doi.org/10.4324/9781936331864

Bushnell, J., Mansur, E., & Saravia, C. (2008). Vertical Arrangments, Market Structure, and Competition: An Analysis of Restructured US Electricity Markets. American Economic Review, 98(1), 237–266. https://doi.org/10.1257/aer.98.1.237

Green, R., Staffel, I., & Vasilakos, N. (2014). Divide and Conquer? k-Means Clustering of Demand Data Allows Rapid and Accurate Simulations of the British Electricity System, IEEE Transactions on Engineering Management, Volume: 61, Issue: 2, https://ieeexplore.ieee.org/document/6729088/

Ito, K., & Reguant, M. (2016). Sequential markets, market power, and arbitrage. American Economic Review, 106(7), 1921–1957. https://doi.org/10.1257/aer.20141529

Kim, H. (2021). Heterogeneous Impacts of Cost Shocks, Strategic Bidding and Pass-Through: Evidence from the New England Electricity Market. American Economic Journal: Microeconomics, 1–42. https://doi.org/10.1257/MIC.20190367

Reguant, M. (2019). The Efficiency and Sectoral Distributional Impacts of Large-Scale Renewable Energy Policies. Journal of the Association of Environmental and Resource Economists, 6(S1), S129–S168. https://doi.org/10.1086/701190

III. Supply II - Climate policies: taxes, subsidies, emissions leakage, and CBAMs (model + regressions)

Bushnell, J., Chen, Y., & Zaragoza-Watkins, M. (2014). Downstream regulation of CO2 emissions in California's electricity sector. Energy Policy, 64, 313–323. https://doi.org/10.1016/j.enpol.2013.08.065

Bushnell, J. B., Holland, S. P., Hughes, J. E., & Knittel, C. R. (2017). Strategic policy choice in state-level regulation: The EPA's clean power plan. American Economic Journal: Economic Policy, 9(2), 57–90. https://doi.org/10.1257/pol.20150237

Davis, L., & Hausman, C. (2016). Market impacts of a nuclear power plant closure. American Economic Journal: Applied Economics, 8(2), 92–122. https://doi.org/10.1257/app.20140473

Fabra, N., & Reguant, M. (2014). Pass-through of emissions costs in electricity markets. American Economic Review, 104(9). https://doi.org/10.1257/aer.104.9.2872

Fowlie, M., & Reguant, M. (2018). Challenges in the Measurement of Leakage Risk. AEA Papers and Proceedings, 108, 124–129. https://doi.org/10.1257/pandp.20181087

Fowlie, M., & Reguant, M. (2022). Mitigating Emissions Leakage in Incomplete Carbon Markets, Journal of the Association of Environmental and Resource Economics, 2022, 9: 2, 307-343.

Fowlie, M., Petersen, C., & Reguant, M. (2021). Border Carbon Adjustments When Carbon Intensity Varies Across Producers: Evidence from California, AER Papers & Proceedings, 2021, 111: 401-405.

Ganapati, S., Shapiro, J. S., & Walker, R. Energy Cost Pass-Through in US Manufacturing: Estimates and Implications for Carbon Taxes, American Economic Journal: Applied Economics 12(2), 2020, pp. 303–342

IV. Demand I - Demand response and energy efficiency (RCTs, natural experiments, ML regs, modeling)

Blonz, J. A. (2021). Making the Best of the Second-Best: Welfare Consequences of Time-Varying Electricity Prices. Working paper.

Burlig, F., Knittel, C., Rapson, D., Reguant, M., & Wolfram, C. (2020). Machine Learning from Schools about Energy Efficiency. Journal of the Association of Environmental and Resource Economists, 7(6), 1181–1217. https://doi.org/10.1086/710606

Christensen, P., Francisco, P., Myers, E., & Souza, M. (2021). Decomposing the Wedge between Projected and Realized Returns in Energy Efficiency Programs. The Review of Economics and Statistics, 1–46. https://doi.org/10.1162/resta01087

Fowlie, M., Wolfram, C., Baylis, P., Spurlock, C. A., Todd, A., and Cappers, P. (2021). Default Effects and Follow-on Behavior: Evidence from an Electricity Pricing Program. Review of Economic Studies. Direct link

Fowlie, M., Greenstone, M., Wolfram, C. (2018). Do Energy Efficiency Investments Deliver? Evidence from the Weatherization Assistance Program, The Quarterly Journal of Economics, Volume 133, Issue 3. https://doi.org/10.1093/qje/qjy005

Jessoe, K., & Rapson, D. (2014). Knowledge is (Less) power: Experimental evidence from residential energy use. American Economic Review. https://doi.org/10.1257/aer.104.4.1417

Jessoe, K., & Rapson, D. (2015). Commercial and Industrial Demand Response Under Mandatory Time-of-Use Electricity Pricing. Journal of Industrial Economics, 63(3), 397–421. https://doi.org/10.1111/joie.12082

Fabra, N., Rapson, D., Reguant, M., & Wang, J. (2021). Estimating the Elasticity to Real-Time Pricing: Evidence from the Spanish Electricity Market. AEA Papers and Proceedings, 111, 425–429. https://doi.org/10.1257/pandp.20211007

V. Demand II - Distributional impacts of the transition (survey, regressions, simulations)

Borenstein, S. (2012). The Redistributional Impact of Nonlinear Electricity Pricing. American Economic Journal: Economic Policy, 4(3), 56–90. https://doi.org/10.1257/pol.4.3.56

Borenstein, S., & Davis, L. W. (2016). The Distributional Effects of US Clean Energy Tax Credits. Https://Doi.Org/10.1086/685597, 30(1), 191–234. https://doi.org/10.1086/685597

Borenstein, S. (2017). Private Net Benefits of Residential Solar PV: The Role of Electricity Tariffs, Tax Incentives, and Rebates. Https://Doi.Org/10.1086/691978, 4(S1), S85–S122. https://doi.org/10.1086/691978

Burger, S. P., Knittel, C. R., Pérez-Arriaga, I. J., Schneider, I., & Vom Scheidt, F. (2020). The efficiency and distributional effects of alternative residential electricity rate designs. Energy Journal, 41(1), 199–239. https://doi.org/10.5547/01956574.41.1.SBUR

Feger, F., Pavanini, N., & Radulescu, D. (2020). Welfare and Redistribution in Residential Electricity Markets with Solar Power. Working Paper.

Leslie, G. and Pourkhanali, A. & Roger, G. (2021). Can Real-Time Pricing Be Progressive? Identifying Cross-Subsidies under Fixed-Rate Electricity Tariffs. working paper

Wang, Reguant, Fabra, and Cahana (2021). The Distributional Impacts of Real-Time Pricing. Work in progress.

Wolak, F. (2016). Designing Nonlinear Price Schedules for Urban Water Utilities to Balance Revenue and Conservation Goals. National Bureau of Economic Research. https://doi.org/10.3386/w22503