Nasrin Khanam
Econometrics

Homework 8

Fell, Harrison, Daniel T. Kaffine, and Kevin Novan. 2021. "Emissions, Transmission, and the Environmental Value of Renewable Energy." *American Economic Journal: Economic Policy* 13 (2): 241–72.
DOI: 10.1257/pol. 20190258

This paper looks at wind generation's effects on fossil fuel emissions once transmission congestion and grid constraints are taken into account. Unlike Cullen's paper, this looks at wind generation on a national level instead of restricting it just to Texas. Similar to Fell's 2018 paper, data from several different electricity markets are used. The question being answered is: How much pollution does wind avoid once real-world grid constraints are taken into account? Fell runs regressions that estimate how an extra MWh of renewables changes emissions at different points on the grid. Since different regions are taken into account, the emission benefits results vary depending on where the wind farm is located. In congested areas, wind offsets fossil fuel generation only a little, which speaks to how the environmental value of renewable energy depends not only on technological advances but on whether the grid can deliver clean energy efficiently and effectively.

Imelda, Mathias Fripp, and Michael J. Roberts. 2024. "Real-Time Pricing and the Cost of Clean Power." *American Economic Journal: Economic Policy 16 (4):100-141*
DOI: 10.1257/pol. 20220506

Imelda's paper examines how shifting from flat electricity prices to real-time pricing (RTP) can dramatically change the economics of renewable energy systems. Using publicly available data for Oahu, including hourly electricity demand, wind and solar profiles, and technology cost assumptions, the paper runs a long-run system optimization model rather than econometric regressions. The key question is how pricing design affects the cost of integrating large shares of wind and solar. The results show RTP provides only small benefits in fossil-heavy systems, but becomes 6-12 times more valuable when renewables dominate because it shifts electricity consumption into hours with abundant clean energy. This makes the overall system cheaper and easier to operate as renewables rise.