ECON 8000/9000 Empirical Energy Econ

Topic 01: Introduction to Empirical Energy Economics

Christy Zhou

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This Class: Empirical Energy Econ

We shall do two things in this class

- Cover topics related to **energy economics** and **energy policies**
- Learn and apply **empirical methods** that are typically used in modern applied work

Goal 1: Energy Econ and Energy Policies

Key Industries and Markets

- Power sector:
  - Examples: fossil-fuel power plants, renewable power plants
  - Upstream: coal-mining sector, natural gas extraction sector
  - Downstream: Manufacturing plants, consumers
- Energy- or fuel-use durable goods markets
  - Vehicle markets, ICEV market, EV market
  - Appliance markets: Washers, dryers, etc.
  - Heating and cooling: Heat pumps, ACs, etc.
  - Solar PVs
  - Demand for energy-related attributes: energy-efficiency and fuel-efficiency
  - Demand for using these goods: driving, etc.
- Electricity
  - Consumer electricity demand
  - Producer pricing, etc
- Other
  - Pipeline, etc.?

Goal 1: Energy Econ and Energy Policies

Key Industries and Markets: What Are Key Actions to Study

- Power sector:
  - Fuel switch for fossil-fuel plants (coal vs natural gas)
  - Energy transition: fossil-fuel plants retirement and renewable expansion
  - Incentives that drives the siting & capacity expansion
  - Impacts of entry/exits of local power plants on local labor market
  - Power generation wedges across different fuel sources
- Energy- or fuel-use durable goods markets
  - Demand and WTP for fuel economy (or fuel efficiency), EVs
  - Pass-through of EV subsidies
  - Solar PV adoption
  - Intensive margin of using vehicles (vehicle miles traveled, VMT)
- Electricity
  - Consumer price sensitivity

Goal 1: Energy Econ and Energy Policies

Key Industries and Markets: Key Regulations and Policies

- Power sector:
  - Renewable portfolio standard (RPS)
  - Production and investment tax credit (PTC and ITC)
  - Regulation on power plants's emission level
- Energy- or fuel-use durable goods markets
  - Fuel economy standard (CAFE)
  - Information disclosure: Energy labels
  - Incentives: EV subsidy, Solar PV subsidy
  - Congestion pricing
- Electricity
  - Critical time pricing and other real-time pricing
  - Peer-effect interventions
- Other
  - Building Code

Goal 2: Empirical Methods

- Panel data regressions and DID
  - Twoway FE estimator, First-difference estimator, Longer-difference
  - DID and Event Study
  - Local Projection DID
- IV
  - Basic IV use
  - Regression Discontinuity Design (RD) as IV
  - Shift-share (or Shift-share-ish) IV
- Probabilistic models and other functional forms
  - Probit, Logit, Poisson
- Demand estimation
  - Multinomial Logit, Nested Logit
  - Not sure if we have time to do a simple introduction of random-coefficient
- Other (Maybe...)
  - Bunching, synthetic control