How Do Electricity Shortages Affect Industry? Evidence from India

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Question

- How do electricity shortages affect input choices, revenue, and productivity in the Indian manufacturing sector?

Contributions

1. **Quantify the total effects of electricity shortages across the entire country's manufacturing sector.**
2. **Quantify a potential partial solution; interruptible contracts.**
3. **Show how shortages may affect plant size distribution.**

Data

- Weather, power sector, and manufacturing data in India for 1992 to 2010.
  - Rainfall data from Univ. of Delaware, temps from National Climate Centre
  - India Central Electricity Authority provides % energy deficit, electricity sold, hydro generation, capacity, hydro reservoir inflows. Cleaned digitized data now available at www.indiaenergydata.info
  - India Annual Survey of Industries provides plant-level microdata for factories over 100 workers. Includes revenue, capital stock, number of employees, cost of labor, materials, fuel, grid electricity, self-generated electricity.
- 615,721 plant-by-year observations

Identification/Model

- **Model:** Cobb-Douglas production function to predict how variation in shortages affects existing plants.
  - Shortages act like electricity input tax for plants with generators, infinite income tax for those without
- **Identification:** Instrumental variables using shifts in electricity supply from hydroelectric power to estimate shortage effects on plants. Also simulation using structural production function.

Results

- 1% increase in shortage increases share of self-generated electricity 0.442%
- Plants don't become less electricity-intensive in short-run
- Shortage decreases materials cost and revenue almost 1:1
- Structural model simulation and IV results nearly identical
- Smaller firms hit harder, less self-generate