Comparative Analysis Of Capital Investments In Electric Utility Industry
Debosh Banerjee¹, Pratik Agrawal¹, Wendy Klusendorf³

Background
- Systematic underinvestment in infrastructure by the electric utility industry in many regions.
- Deprivation of these regions of investments in other economic areas due to fragile utility infrastructure.
- Critical to the economy and everyday modern life.
- Large capital investments with high uncertainty in returns
  - Decades of lag between investments and returns
  - Regulatory uncertainty
  - Rapid advancements in technology

Investment Gap

Objectives
- Identify regions with similar profiles with respect to electricity consumption and economic, demographic, and technological aspects.
- Model the relationship between capital investment amounts and electricity load on the grid over time for each profile of regions.
- Identify regions that under and over invest in infrastructure in comparison to the regions within the same profile.

Beneficiaries
- For electric utility companies to justify rate increases to generate capital funds.
- For policy makers to evaluate legitimacy of the need for capital investments.
- For utility investors to better understand the return on their investments and the associated risk.
- For general investors of other sectors to identify regions with reliable electricity infrastructure.

Profiling Regions With Similar Demand
- A Discriminant analysis revealed that income, unemployment, percentage of retired personnel and income from Food Stamps were the main drivers.

Data
- Collected for a period of 16 years from 1997.
- 23 Features such as Capital Investments, Peak Demand (for 1 hour) and Total Sales.
- 516 Demographic and Economic features.
- Sourced from:
  - Capex & Revenue –mergent database
  - Sales & Peak: www.eia.gov/electricity/data.cfm
- States used for analysis

Brief Look At Demographic And Consumption Data

Analysis
- The consumer profile of each state drives different need for electricity.
- Peak demand is a good proxy for customer mix (residential, industrial, commercial) and size of customer base.

Metric
- Total Sales per Peak Demand
- Our metric for measurement = Capital Expenditure / Peak demand

Capex/Peak Demand across States in Cluster I

Changes YoY

Capex/Peak Demand across States in Cluster II

Conclusion
- Until 2003 the difference between clusters was 1%.
- Clusters started diverging from 2003 to reach a difference of 8% in 2012.
- Within cluster results, mimic the between cluster results.
- Altogether, it seems electric utility investment has become a rich-get-richer type of market starting around 2003.