Innovation in California

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Research Question

- **Are the number of patents in the State of California influenced by population density, unemployment rates, or educational attainment?**
  - Focused on California over a 10 year period (2005-2015)
  - This time frame allowed us to see how the 2008 Housing Crisis impacted innovation
- Also conducted an analysis on all 50 states in 2015

Economic Background & Theory

- **Technological Agglomeration Economies** : A city with a high concentration of technological firms experiences higher levels of productivity. Firms benefits from the close proximity to one another since it results in knowledge spillover and competition between workers.
- **Joseph Schumpeter** argued that crises sparked innovation and entrepreneurship
  - According to this theory, we expected to see increased rates of utility patents in the years with high unemployment rates, specifically during the 2008 Housing Crisis.

About Our Data

Dependent Variable

- Utility Patents per 100,000 people

Independent Variables

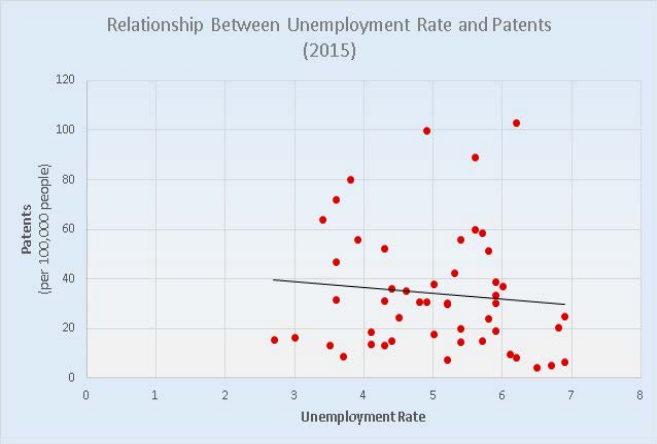
- Unemployment Rate
- Percentage of Population with Higher Education (Bachelor's degree or higher 25 to 64 year olds)
- Population Density per square mile of land area

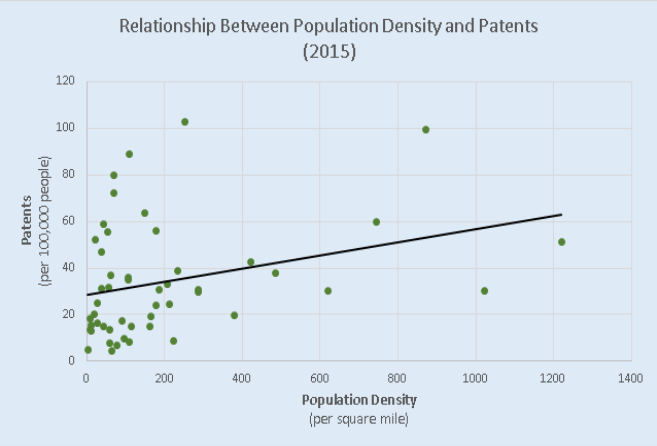
Sources

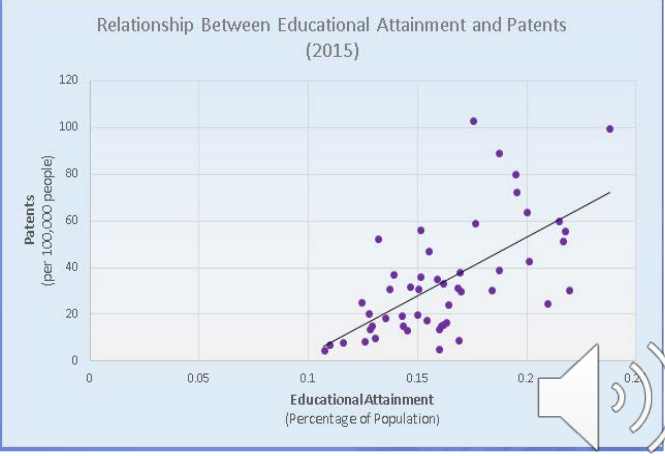
- U.S. Patent and Trademark Office
  - Utility Patents
- Bureau of Labor Statistics
  - Unemployment rate
- NCHEMS Information Center for Higher Education Policy making Analysis
  - Percent of Adults 25 to 64 with a Bachelor's Degree or Higher
- United States Census Bureau
  - Population
  - Land area

2015 U.S. Analysis

Variable	Correlation Coefficient (Utility Patents)
Unemployment Rate	-0.1
Higher Education (% of pop.)	0.64
Population Density	0.31

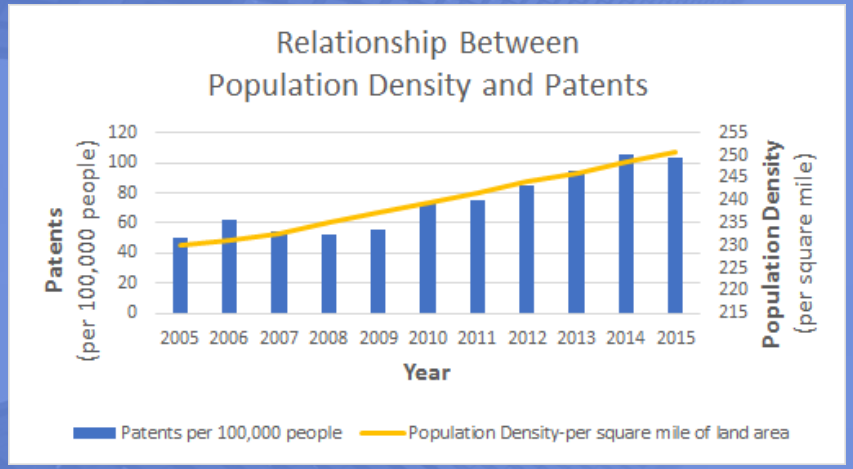


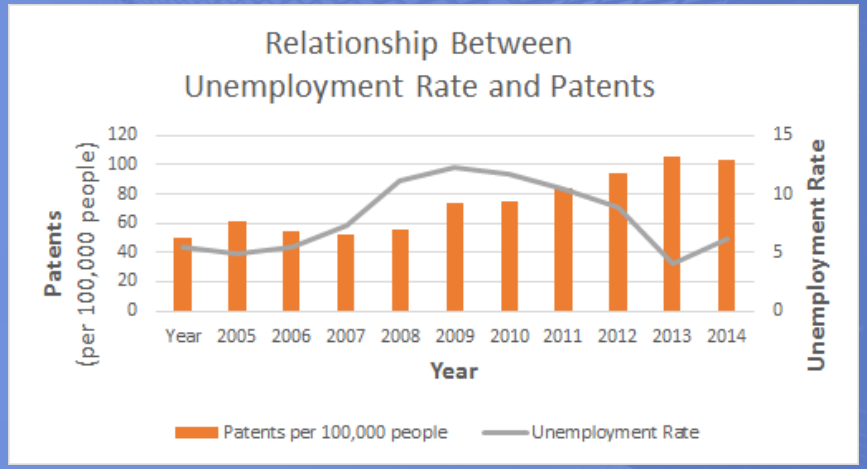




Innovation in The United States: Distribution of Utility Patents 2005 to 2015

Analysis of California (2005 -2015)





Variable	Corr. Coef. (Utility Patents)	Mean	Std. Dev	Min	Max
Unemployment Rate	-0.04	7.96	3.02	4.00	12.20
Higher Education (% of pop.)	0.90	16.67	.006	15.99	17.73
Population Density	0.95	239.71	7.09	229.99	250.56

Results

Strong and Positive Relationship

California

- Utility patents and population density (.95)
- Utility patents and higher education (.90)

USA

- Utility patents and higher education (.65)

Weak and Positive Relationship

USA

- Utility patents and population density (.31)

Weak and Negative Relationship

California

- Utility patents and unemployment rate (-.04)

USA

- Utility patents and unemployment rate (-.10)

Possible Improvements:

- Analyzing more years so that multiple financial crises can be included.
- Utilize Median Household Income as another Independent variable to account for.

- Our results **reaffirm** the concept of Technological Agglomeration Economies since the number of utility patents increases as a state's educational attainment and population density increases.
  - California experiences a stronger and positive relationship than the entire U.S. mainly because it is the fifth largest economy in the world and is therefore at a greater advantage than the other states.
- During the 2008 Housing Crisis, there was a slight dip in the number of utility patents for both California and the entire U.S.
  - This **counters** Schumpeter's theory that during economic hardship there is an increase in innovation.
  - In California's case, 2013 was the year with the **lowest** unemployment rate out of the ten years and had the **highest** rate of utility patents created.