Effect of County Population Size on Median Income & Unemployment

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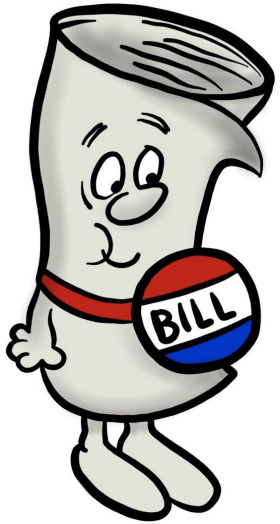
What is the effect of county populations?

- Will the population size of a county affect the following metrics?
  - Median Household Income
  - Unemployment Rate
- Stakeholders: governments, businesses, homeowners
- Provides information about policies, where to do business or sell products, and where to purchase a home



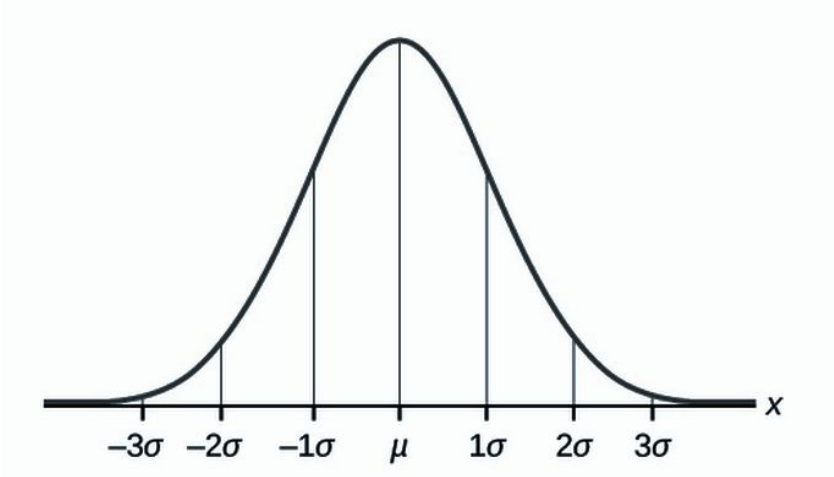
Data Sources

- US Census Bureau:
  - API: http://api.census.gov/data/2018/pep/population
    - County Populations
  - County Rural Classification Data

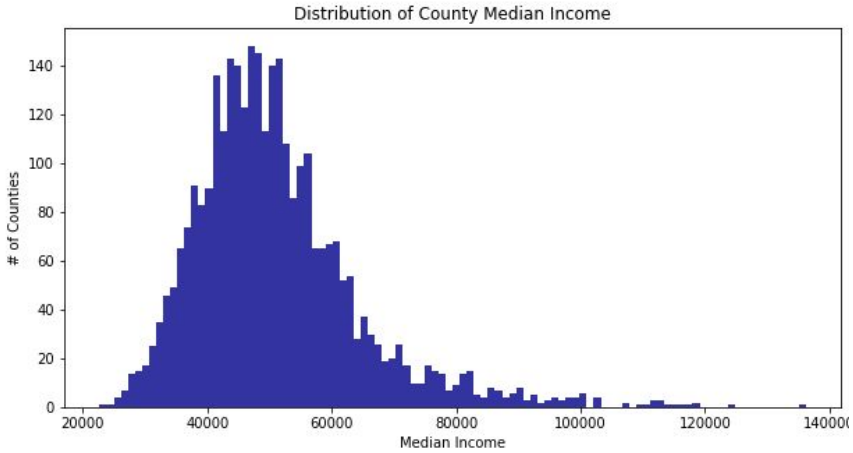
- USDA County Level Dataset:
  - https://www.ers.usda.gov/data-products/county-level-data-sets/download-data/
  - County Unemployment Rate
  - County Median Income

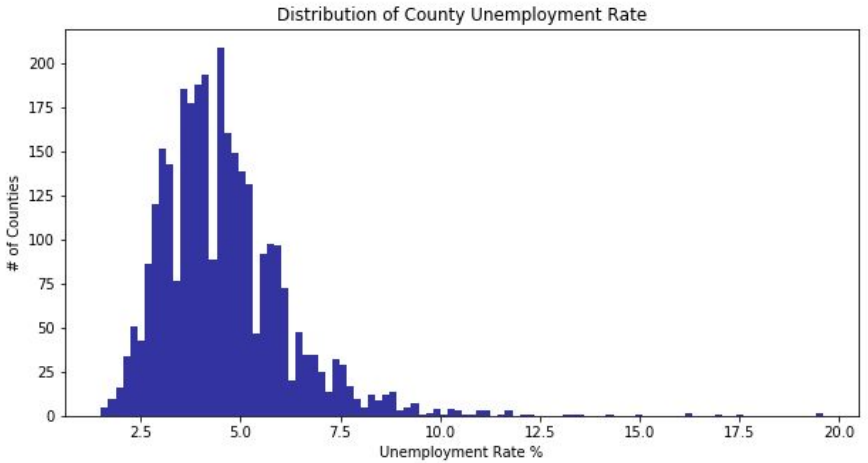
Statistical Measures and Tests

- **μ**: Population mean - Average
- **σ:** Population standard deviation - How much does the data vary? What is the spread?
- **$\bar{x}$:** Sample mean - Average
- **z:** Z-score - Number of standard deviations away from the mean
- **p:** P-value - Probability of sample mean being from a different population
- **α:** Alpha - Threshold for p-value to be significant



Population Dataset - All US Counties

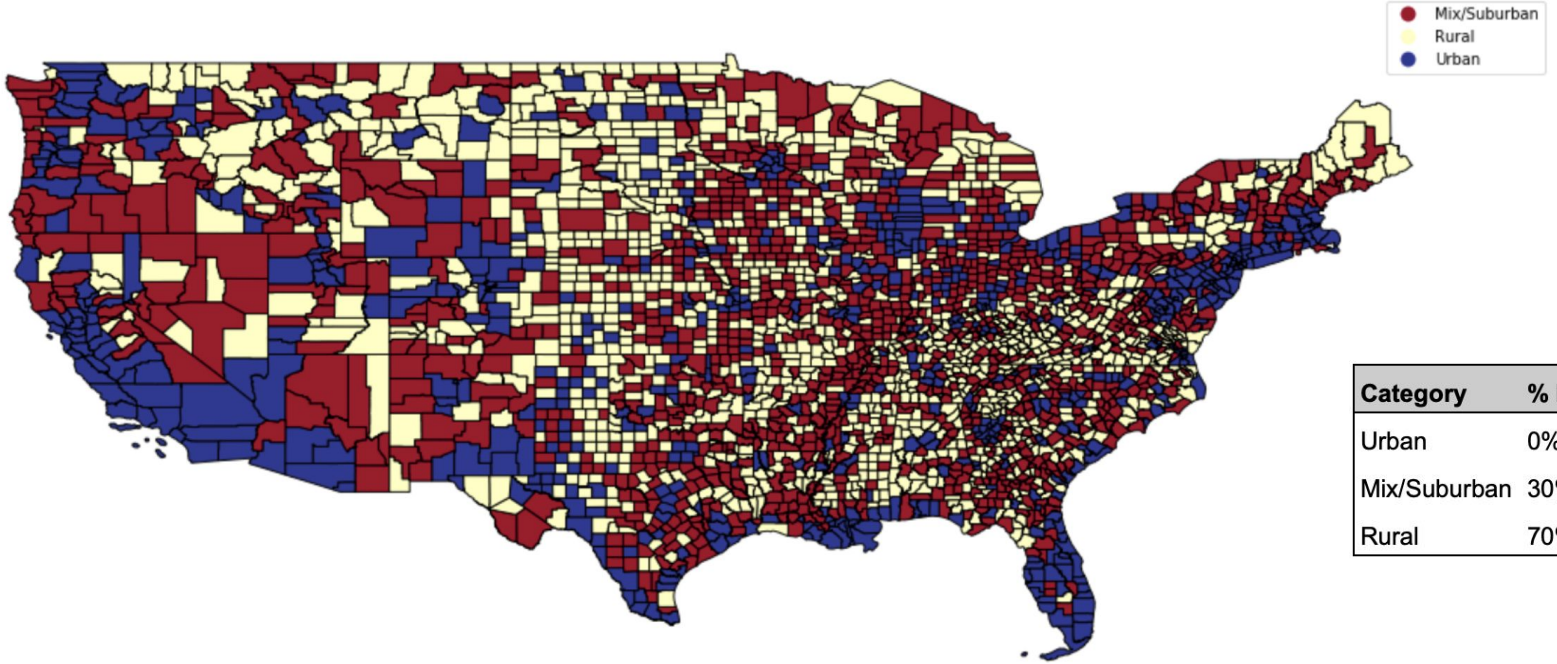




- # of counties: 3,141
- Median Income Summary Stats:
  - μ: $51,090.53
  - σ: $13,497.97

- # of counties: 3,141
- Unemployment Summary Stats:
  - μ: 4.60%
  - σ: 1.67%

County Population Categories



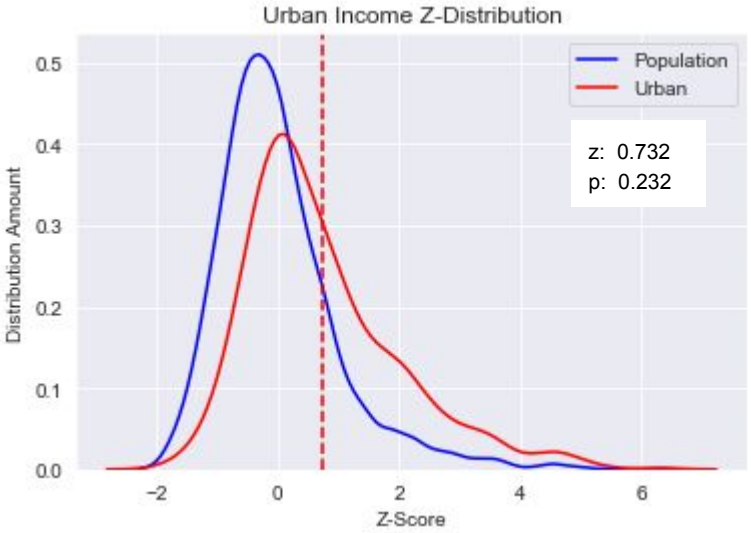
Category	% Rural
Urban	0% - 30%
Mix/Suburban	30% - 70%
Rural	70% - 100%

Urban

H_0 : County median income is not affected by urban populations
H_1 : County median income is affected by urban populations

μ: $51,090
σ: $13,497
x̄: $60,977

Fail to Reject H_0



H_0 : County unemployment rate is not affected by urban populations (pop_mean == urban_mean)
H_1 : County unemployment rate is affected by urban populations (pop_mean ≠ urban_mean)

μ: 4.59%
σ: 1.66%
x̄: 4.35%

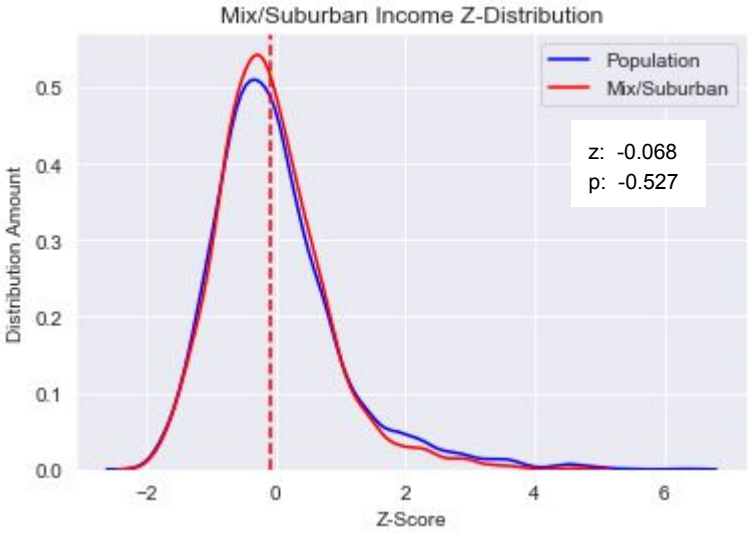
Fail to Reject H_0

Mixed / Suburban

H_0 : County median income is not affected by mixed / suburban populations
H_1 : County median income is affected by mixed / suburban populations

μ: $50,090
σ: $13,497
x̄: $50,167

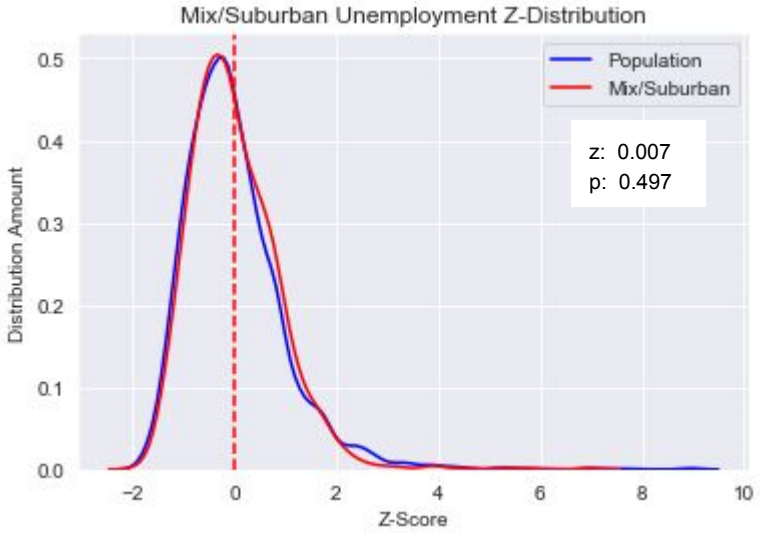
Fail to Reject H_0



H_0 : County unemployment rate is not affected by mixed / suburban populations (pop_mean == mixed /suburban_mean)
H_1 : County unemployment rate is affected by mixed suburban populations (pop_mean ≠ mixed /suburban_mean)

μ: 4.59%
σ: 1.66%
x̄: 4.60%

Fail to Reject H_0

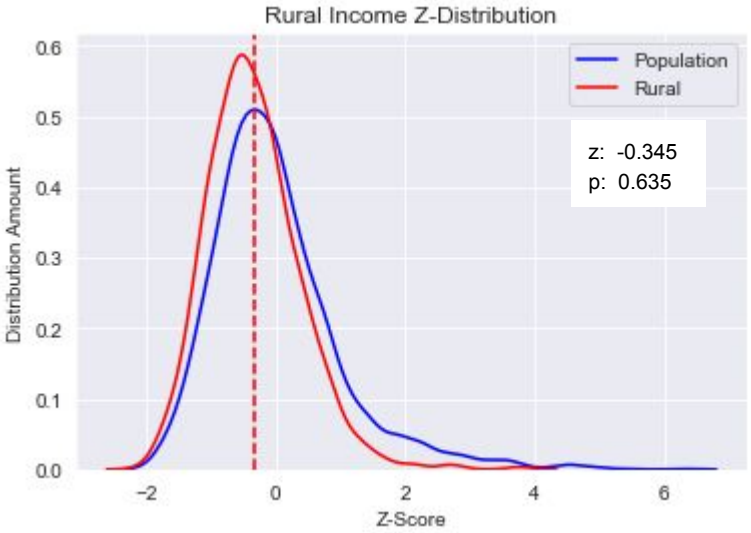


Rural

H_0 : County median income is not affected by rural populations
H_1 : County median income is affected by rural populations

μ:	$51,090
σ:	$13,497
x̄:	$46,423

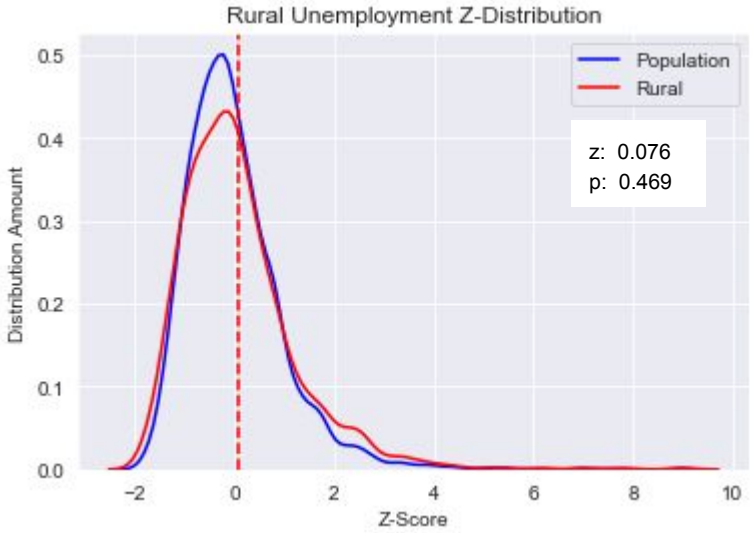
Fail to Reject H_0



H_0 : County unemployment rate is not affected by rural populations (pop_mean == rural_mean)
H_1 : County unemployment rate is affected by rural populations (pop_mean ≠ rural_mean)

μ:	4.59%
σ:	1.66%
x̄:	4.72%

Fail to Reject H_0



Conclusion

- The population size of a county does not create a significantly different change in median income or unemployment metrics
- Urban counties have a higher median income by $9k, lower unemployment rate by .35% from our sample
- Rural counties have a lower median income by $4k, higher unemployment rate by .20% from our sample
- Although our results are not statistically significant, our findings may inform business and policy decisions