Zachary Tulley

Economic Data Analysis

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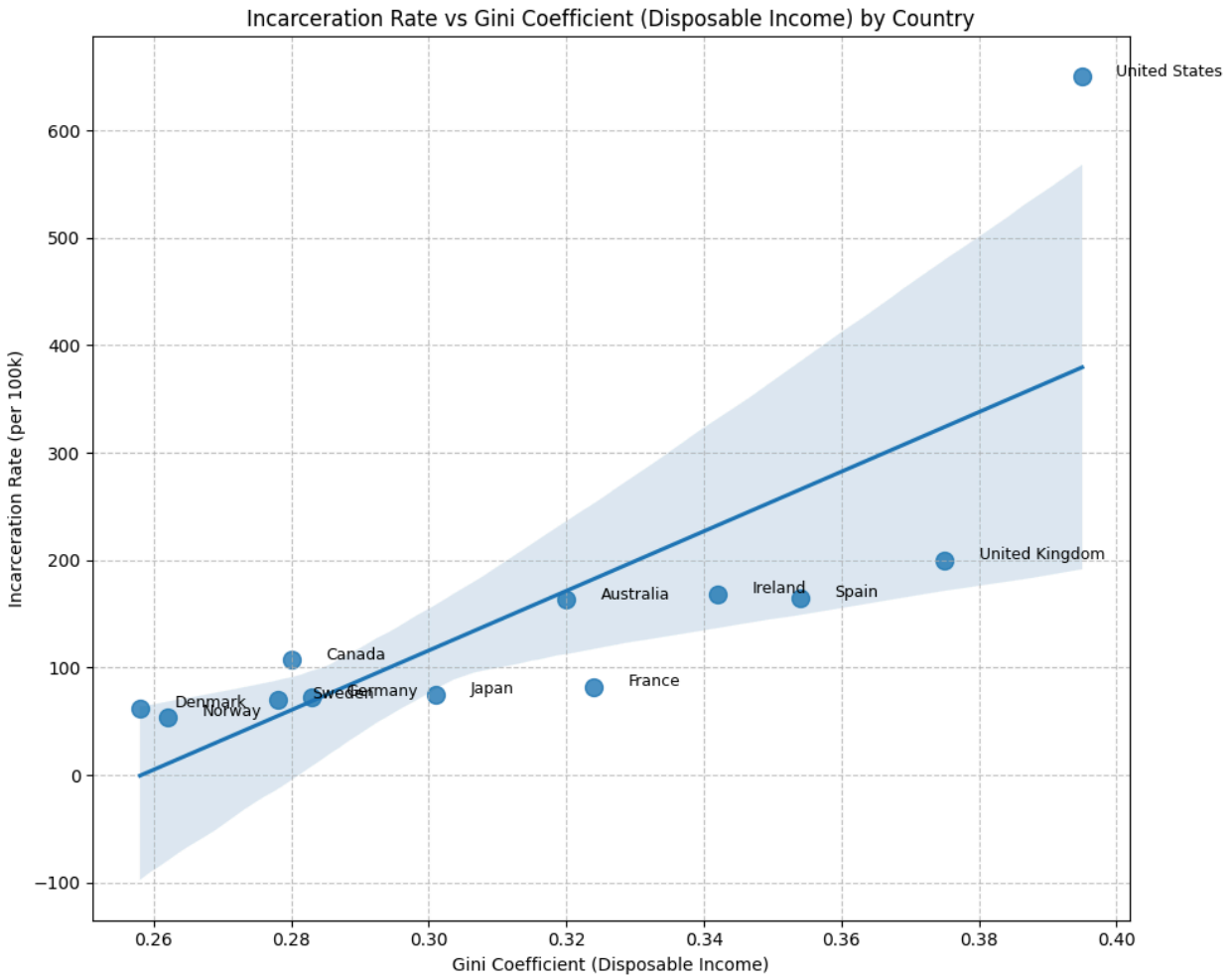
Final Project

For this project, I wanted to incorporate economic measures I learned in another class, Economics of Inequality, while following the regulations for this project. Income inequality is an important socio-economic issue that has been associated with a variety of negative outcomes. My study investigates the relationship between the Gini coefficient, a widely used measure of income inequality based on disposable income, and incarceration rates across "wealthy" nations. Does economic inequality associate to incarceration rates in “wealthy” nations?

The dataset includes 12 countries and reports two variables for each, incarceration rate per 100,000 individuals and Gini coefficient for disposable income. To get this data, I went to the OECD and World Prison Brief websites, only taking data from countries that fit the “developed” description and both had data from the same year. It is safe to say this is reliable data. I conducted a simple linear regression to examine the association between income inequality and incarceration rate. All analyses were conducted using Python in Google Colab, with visualizations generated using the same.

The scatterplot below illustrates the relationship between the Gini coefficient and incarceration rate for the 12 countries in the dataset. The x-axis shows the Gini coefficient, with the y-axis being the incarceration rate, each country is labeled,




The plot visually suggests the positive association that countries with higher Gini coefficients tend to have higher incarceration rates.

The results of the regression are summarized in Table 1.

| Variable | Coefficient | Std. Error | t-Statistic | P-value | 95% CI Lower | 95% CI Upper |
|---|---|---|---|---|---|---|
| Intercept | -716.314 | 236.191 | -3.033 | 0.013 | -1242.581 | -190.047 |
| Gini Coefficient | 2774.33 | 744.46 | 3.727 | 0.004 | 1115.57 | 4433.089 |

I used a GLM to analyze the relationship between the Gini coefficient and incarceration rate per 100,000 population across countries. The dependent variable I used is the incarceration rate, while the independent variable is the Gini coefficient. The intercept captures the baseline expected incarceration rate when the Gini coefficient is zero, and the slope quantifies the expected change in incarceration rate per unit change in income inequality. Standard errors, t-statistics, and confidence intervals are computed to deduce the precision of these estimates.

The regression results show a positive and significant association between the Gini coefficient and incarceration rate ($\beta=2774.33$, $p=0.004$) suggesting that a 0.01 increase in the Gini coefficient corresponds to an increase of approximately 27.7 individuals per 100,000 in the incarceration rate. The model intercept ($\beta 0=-716.314$) is statistically significant at the 0.05 level though its interpretation is largely theoretical as a Gini coefficient of zero is outside the observed range. America is our one clear outlier, having the most inequality with over triple the incarceration rate of the next high nation, the United Kingdom. Developed nations show the tendency that income inequality may drive incarceration rates higher. Income inequality likely drives criminalization and incarceration rates, given the positive correlation we found, mirroring established research on social tension.

This analysis, being correlational, doesn't prove causation despite our significant finding. Variations in incarceration likely stem from disparate criminal justice policies, cultural views on punishment, and socioeconomic structures as well. Income inequality correlates with incarceration across our country's sample. Moving forward, it would be important to find more recent data for all the countries I wasn't able to include, boosting the validity of the study, as these findings show how economic inequality might affect society and why policies addressing income disparity are important to lower incarceration rates.

# Sources

Organisation for Economic Co-operation and Development. *Income Inequality (Indicator)*. OECD, 2023, https://www.oecd.org/en/data/indicators/income-inequality.html.

"Highest to Lowest – Prison Population Rate." *World Prison Brief*, Institute for Crime & Justice Policy Research, 2021, https://www.prisonstudies.org/highest-to-lowest/prison_population_rate.