

ISM6419 : DATA VISUALIZATION FOR STORYTELLING
FINAL PROJECT
SOCIO-ECONOMIC DETERMINANTS OF CRIME

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INTRODUCTION:

Crime is a multifaceted societal challenge influenced by economic, social, and demographic variables. Among these factors, economic stability — particularly household income levels — has been widely debated as a determinant of crime. While conventional perspectives associate poverty with higher crime rates, the relationship between income and crime is not always straightforward. High-income states also experience crime, but the nature of that crime may differ, often encompassing white-collar offenses and organized crime rather than violent or property-related incidents.

This study seeks to analyze how household income levels, income inequality, and broader economic indicators correlate with crime rates across U.S. states. Using state-level data from 2010 to 2023, the research aims to uncover whether predictable patterns emerge based on income distributions, economic mobility, and state-level policies. The study also examines whether there exists a specific income threshold beyond which crime rates significantly decline or change in nature and evaluates the extent to which economic growth and social welfare measures may contribute to crime reduction.

To guide this investigation, the following research questions are addressed.

RESEARCH QUESTIONS:

1. Is there a specific income threshold beyond which crime rates significantly decline?
2. How does income inequality impact different types of crimes (violent vs. property crimes)?
3. How do economic indicators such as “Unemployment Rate” and “Percentage Population Below Poverty Line” affect the crime rates?

METHODOLOGY:

To explore the relationships between economic indicators and crime, this project utilized three primary datasets: Economic Characteristics, Crime Statistics, and Income Inequality Data. Each dataset was extracted using official APIs and preprocessed using Python to ensure consistency and analytical readiness before being imported into Tableau for visualization and exploration.

1. Economic Characteristics

The economic dataset was sourced from the U.S. Census Bureau's American Community Survey (ACS) via the Census Data API, specifically from the DP03: Selected Economic Characteristics table. A Python script was used to automate the extraction of yearly data for all the U.S. states from 2010 to 2023. After processing, the dataset was saved as an Excel file for Tableau ingestion.

The final structured dataset contained the following columns:

- **Year**
- **State**
- **Median Family Income**
- **Per Capita Income**
- **Unemployment Rate**
- **Percentage Families Below Poverty Line**
- **Percentage Population Below Poverty Line**

Source Link: <https://data.census.gov/table?q=dp03>

2. Crime Statistics

The crime data was retrieved from the FBI Crime Data Explorer API using a Python script. The data initially included monthly crime counts for multiple offense categories across all states. To make the data analytically useful, it was aggregated to a yearly level, grouped by **State**, **Year**, and **Offense**. The dataset captures data for a total of 10 offenses including violent crimes and property crimes. The final table was saved in Excel format and later uploaded to Tableau for further analysis.

The final structured dataframe included:

- **Year**
- **State**
- **Offense**
- **Crime Count**
- **State Population**

Source Link: <https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/explorer/crime/query>

3. Income Inequality Data

The income inequality data was sourced from the U.S. Census Bureau's American Community Survey (ACS) via the Census Data API, specifically from the B19083: Gini Index of Income Inequality table. A Python script was used to extract yearly Gini index values for each state. This metric served as the basis for evaluating the relationship between inequality and different types of crimes. The final data was exported to Excel for use in Tableau.

The resulting dataframe was concise and included:

- **Year**
- **State**
- **Gini Index**

Source Link: <https://data.census.gov/table?q=B19083>

Data Integration in Tableau:

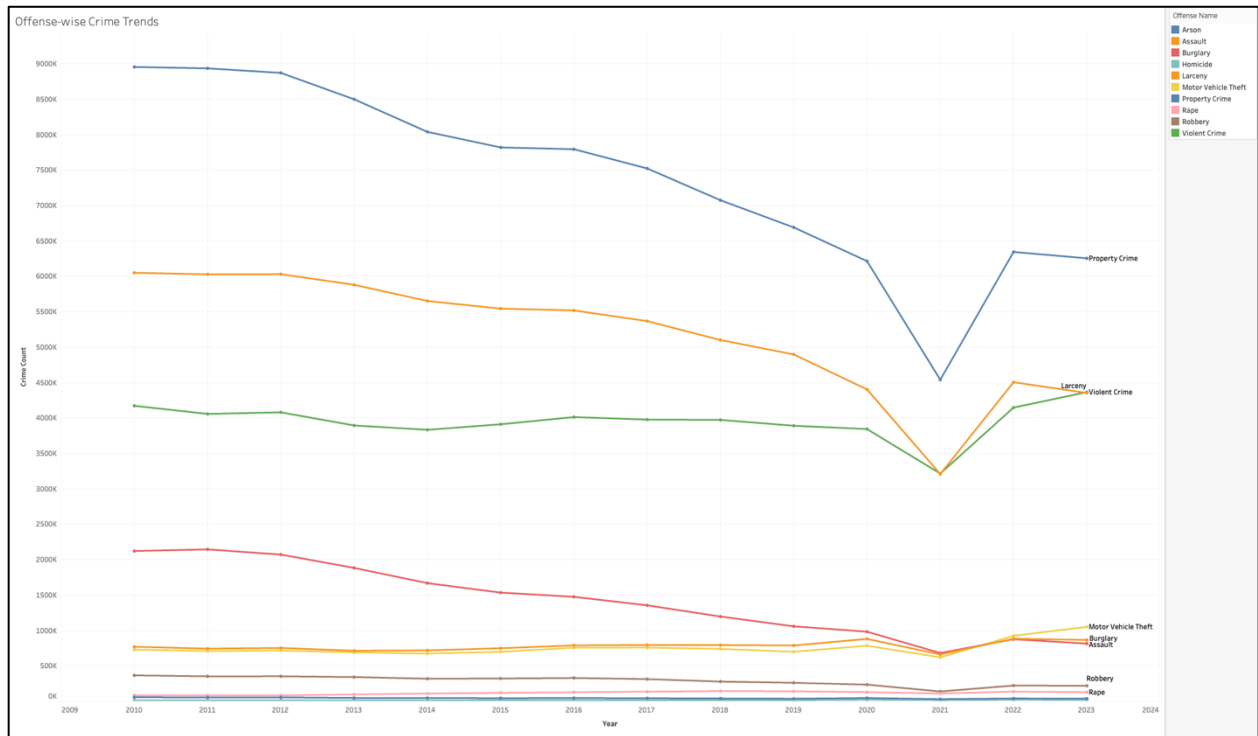
After preprocessing, all three datasets were imported into Tableau. The following relationships (joins) were created to facilitate cross-analysis:

- **Economic Data – Crime Data**, joined on: **Year and State**
- **Economic Data – Income Inequality Data**, joined on: **Year and State**

These relationships allowed for unified analysis across all socio-economic and crime related indicators over the 14-year period (2010–2023). The integrated structure enabled flexible slicing of data by offense type, geography, and time, supporting explanatory visualizations throughout the project.

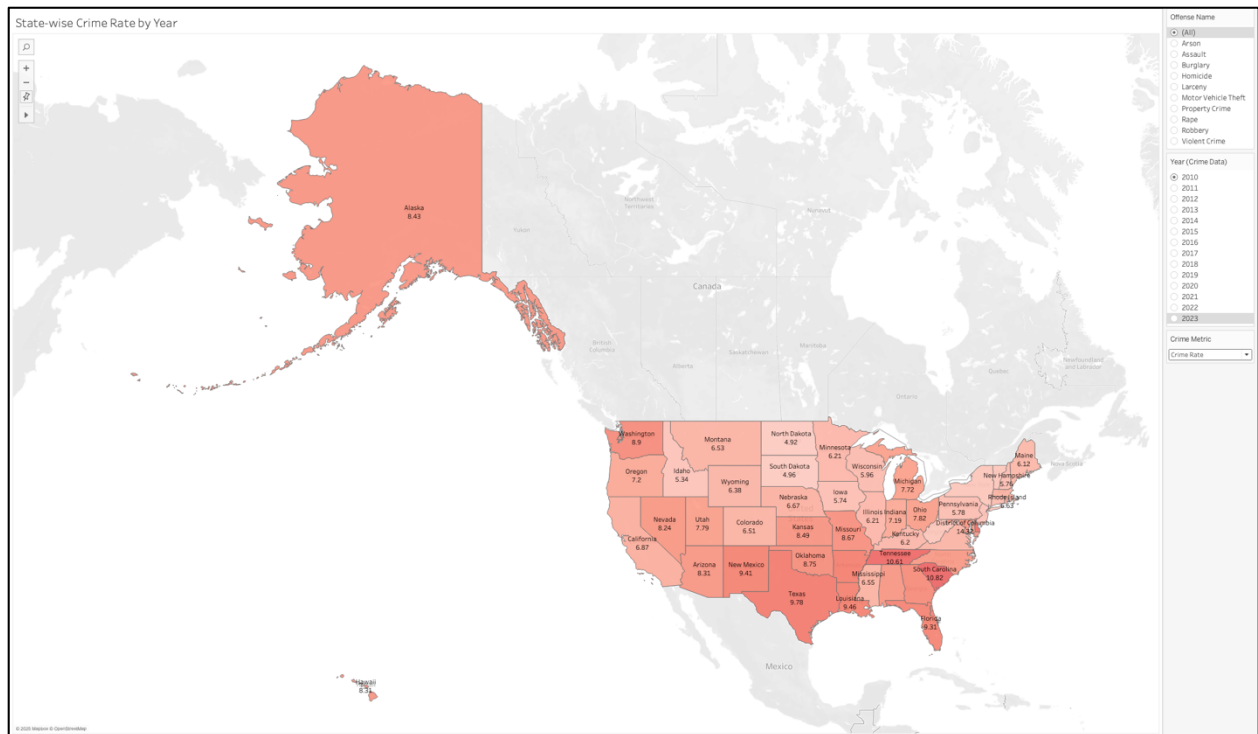
ANALYSIS:

1. Offense-wise Crime Trends in the U.S. (2010–2023)



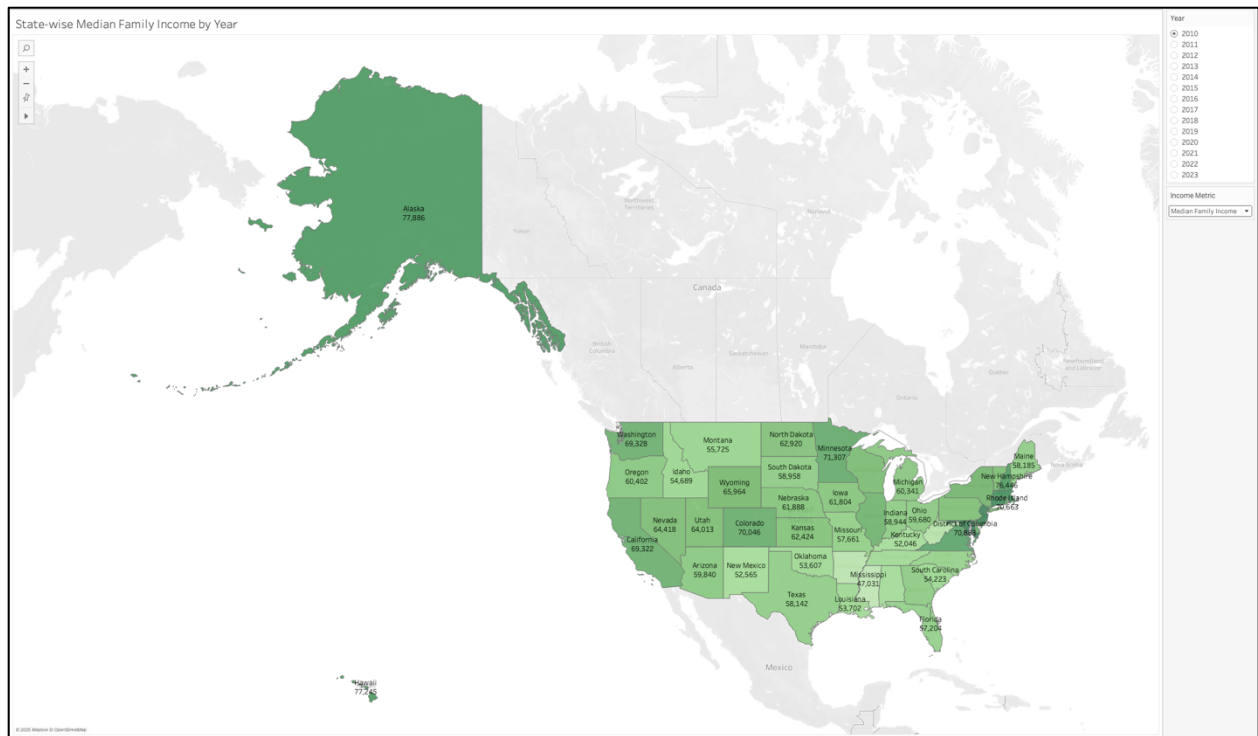
The chart depicts offense-wise crime trends in the U.S. from 2010 to 2023, revealing a steady decline in most crimes until 2020. Property crime and larceny were the most frequent offenses, while violent crime remained mid-level. A sharp dip occurred in 2021, likely due to the COVID-19 pandemic, followed by a modest rebound in 2022–2023. Homicide and rape counts remained relatively stable throughout. The long-term downward trend may reflect economic recovery, while the pandemic’s disruption influenced short-term crime dynamics. Overall, the chart highlights a gradual reduction in crime, with offense patterns remaining largely consistent over time.

2. State-wise Crime Rate by Year



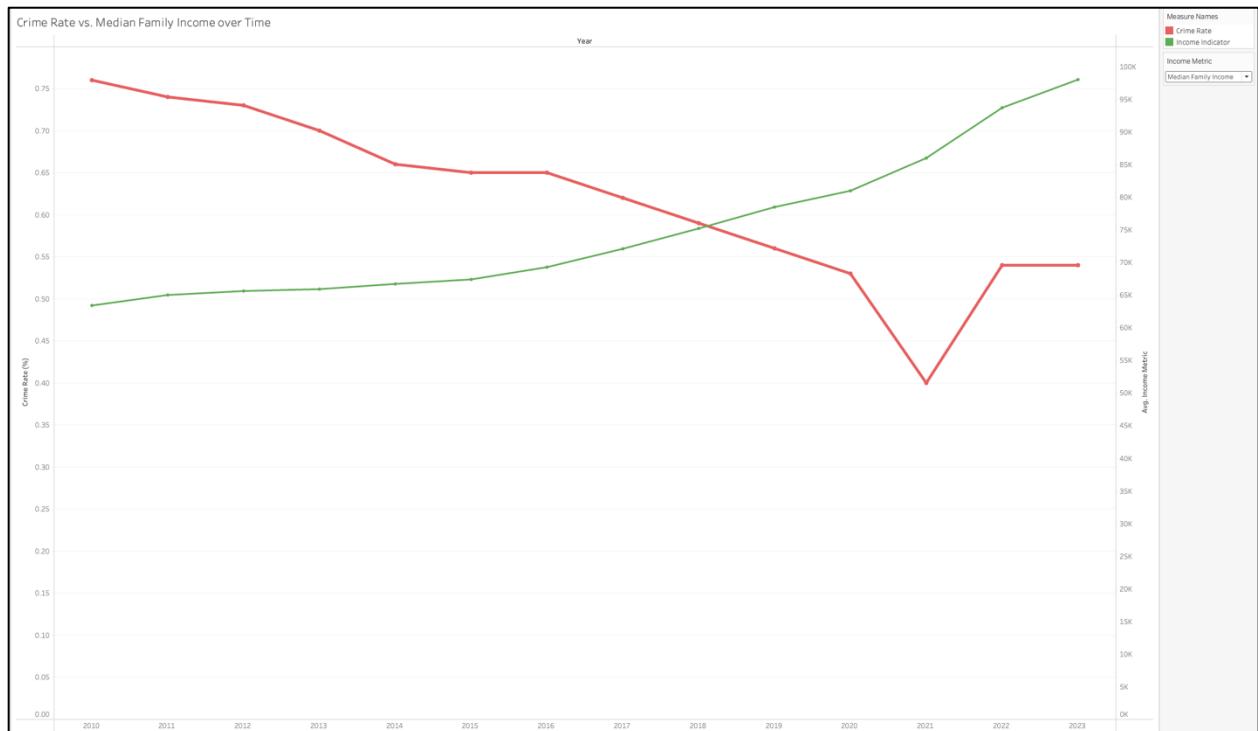
This map visualizes crime rates across U.S. states for a selected year. States are shaded according to their total crime rate per 100 people, with darker shades indicating higher crime rates. In this view, southern states such as Tennessee, Louisiana, and South Carolina display the highest crime rates, while states like North Dakota and South Dakota exhibit the lowest. The visualization highlights clear regional patterns — with the South and Southwest consistently showing elevated crime levels — suggesting underlying economic or policy factors that merit further investigation. The map also enables year-wise exploration for trend analysis. The sheet also allows to switch between Crime Counts and Crime Rates with the help of parameters in Tableau.

3. State-wise Median Family Income by Year



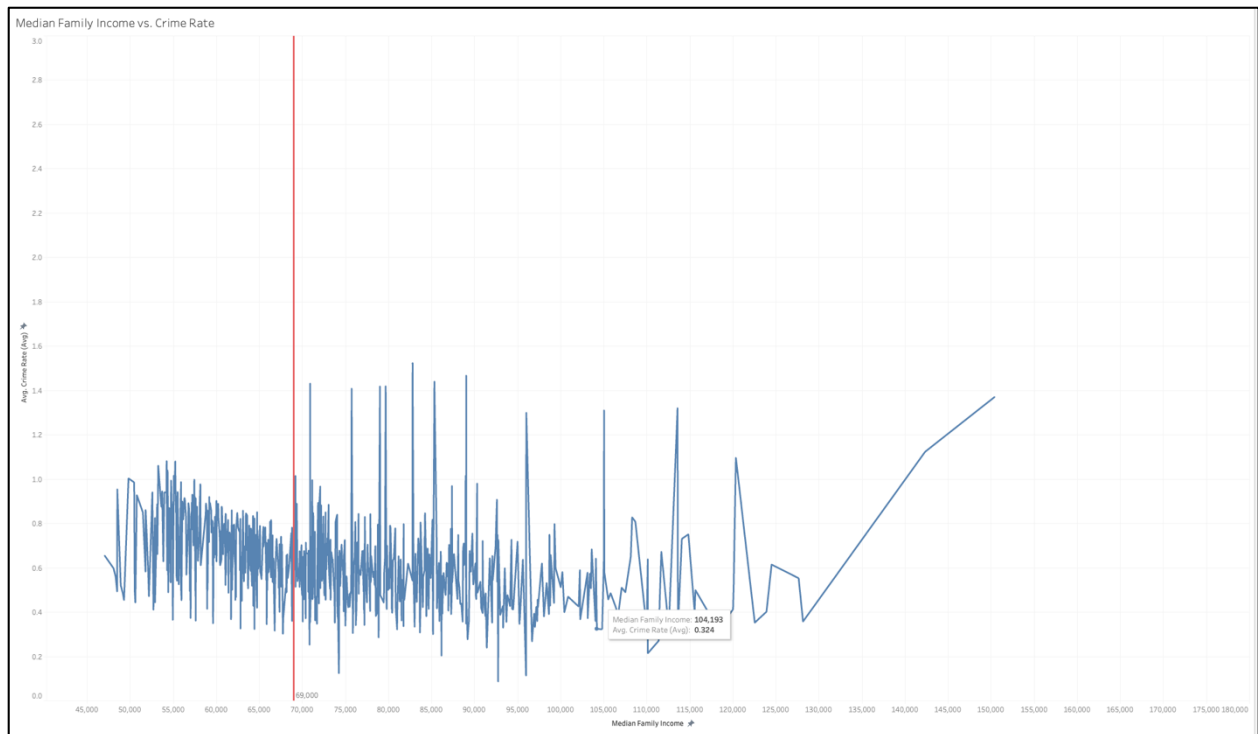
This map visualizes median family income across U.S. states for a selected year. Darker shades of green indicate higher income levels. Alaska, Hawaii, and Rhode Island stand out among the highest earners, while Mississippi and Arkansas reflect some of the lowest. The distribution highlights notable regional disparities: Western and Northeastern states generally exhibit higher income levels, while Southern states tend to have lower medians. This map allows users to explore temporal income trends by year and identify patterns in regional economic prosperity, providing a clear snapshot of income variation across the nation.

4. Crime Rate vs. Median Family Income Over Time



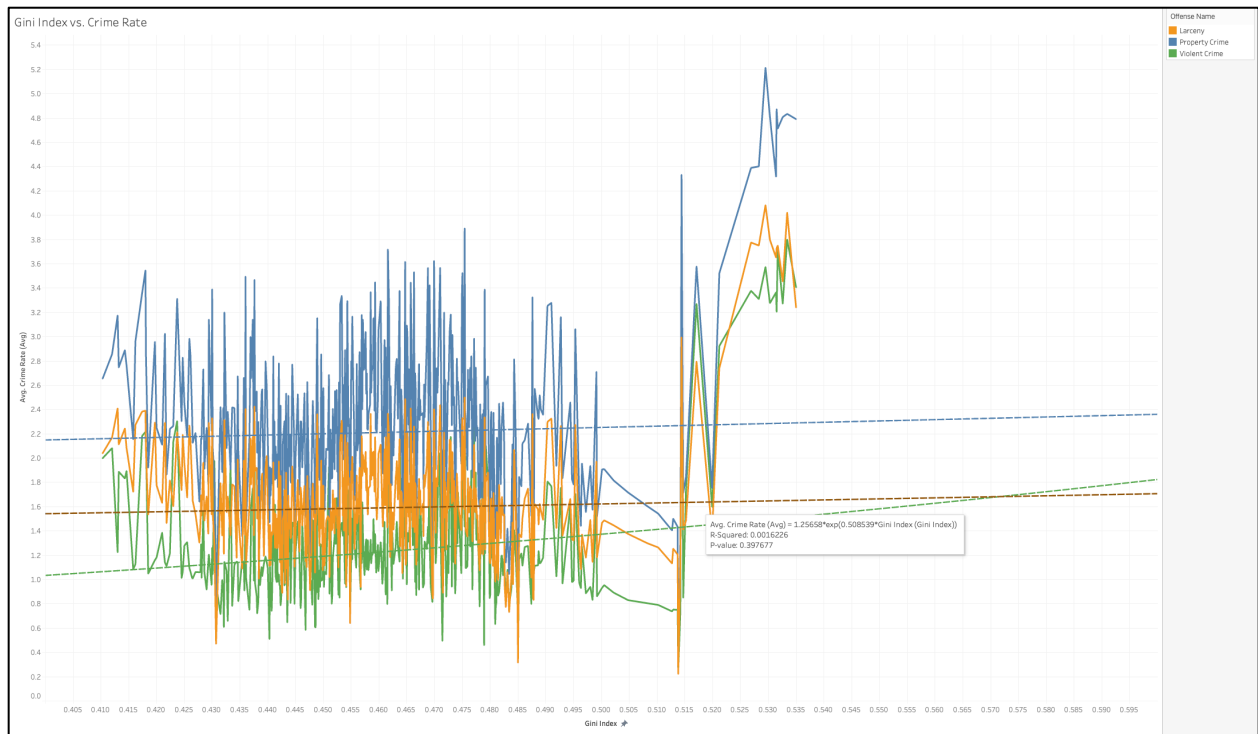
This dual-axis line chart compares the average crime rate (red line, left axis) and median family income (green line, right axis) across all U.S. states from 2010 to 2023. The visualization reveals an inverse relationship. As median family income steadily rises over time, the crime rate shows a consistent decline. The most dramatic dip in crime occurs in 2021, likely influenced by the COVID-19 pandemic, before stabilizing in the following years. Meanwhile, income trends upward with minor year-to-year variation. This chart illustrates a strong macro-level association between increasing economic well-being and declining crime at the national scale.

5. Median Family Income vs. Crime Rate (Income Threshold Analysis)



This scatter plot examines the relationship between median family income and average crime rate, with a reference line at \$69,000 marking a potential threshold. To the left of the line, the curve appears to decline gradually, indicating that increases in income correlate with modest reductions in crime rate. However, beyond the \$69,000 mark, the curve seems to be flattening, suggesting that states with higher incomes experience more stable and consistently lower crime rates. This trend supports Research Question 1, highlighting a possible economic tipping point where crime dynamics.

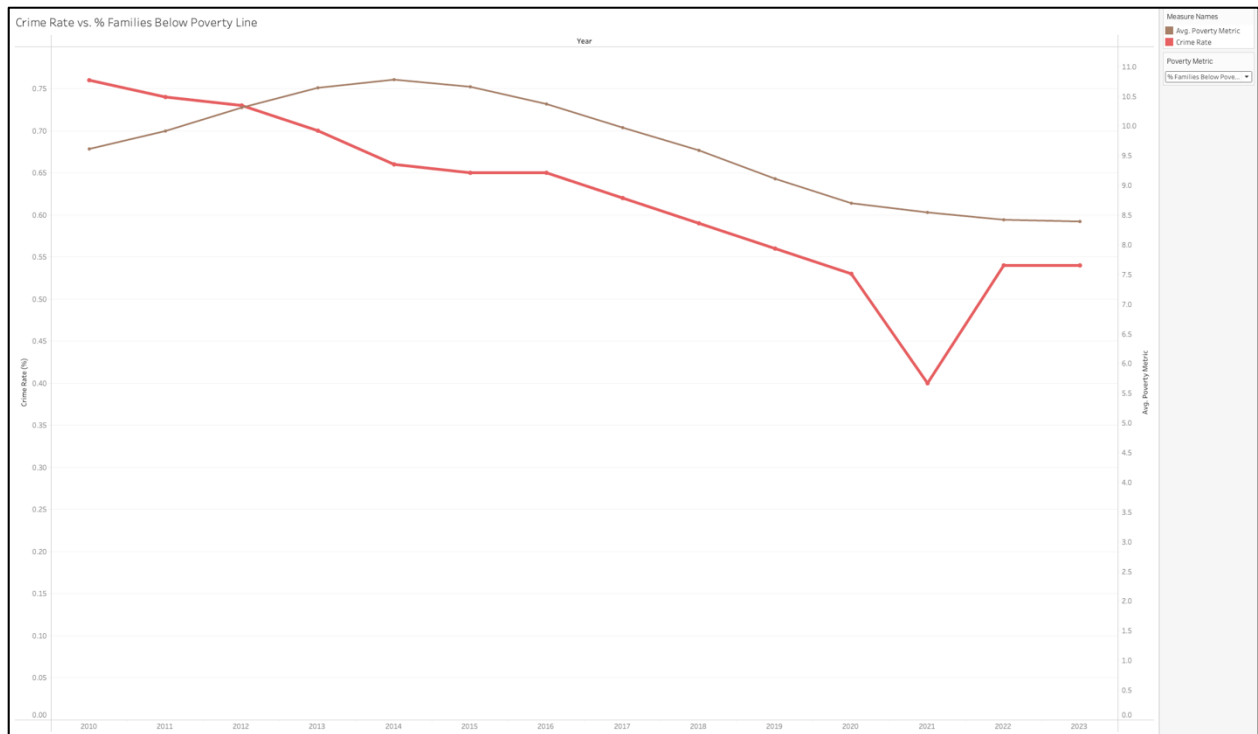
6. Gini Index vs. Crime Rate



This chart visualizes the relationship between the Gini Index (income inequality) and average crime rate, segmented by offense type: Violent Crime, Property Crime, and Larceny. All trend lines follow an exponential model, capturing the compounding effect of inequality on crime.

While Property Crime and Larceny exhibit higher overall crime rates, the exponential trend line for Violent Crime is noticeably steeper. This indicates that although violent crime occurs less frequently, it is more sensitive to increases in income inequality. As inequality rises, the rate of violent crime accelerates at a faster pace than property-related crimes. This insight supports Research Question 2, revealing that growing inequality may be a stronger driver of violent crime escalation than it is for more opportunistic offenses.

7. Crime Rate vs. Poverty Metrics

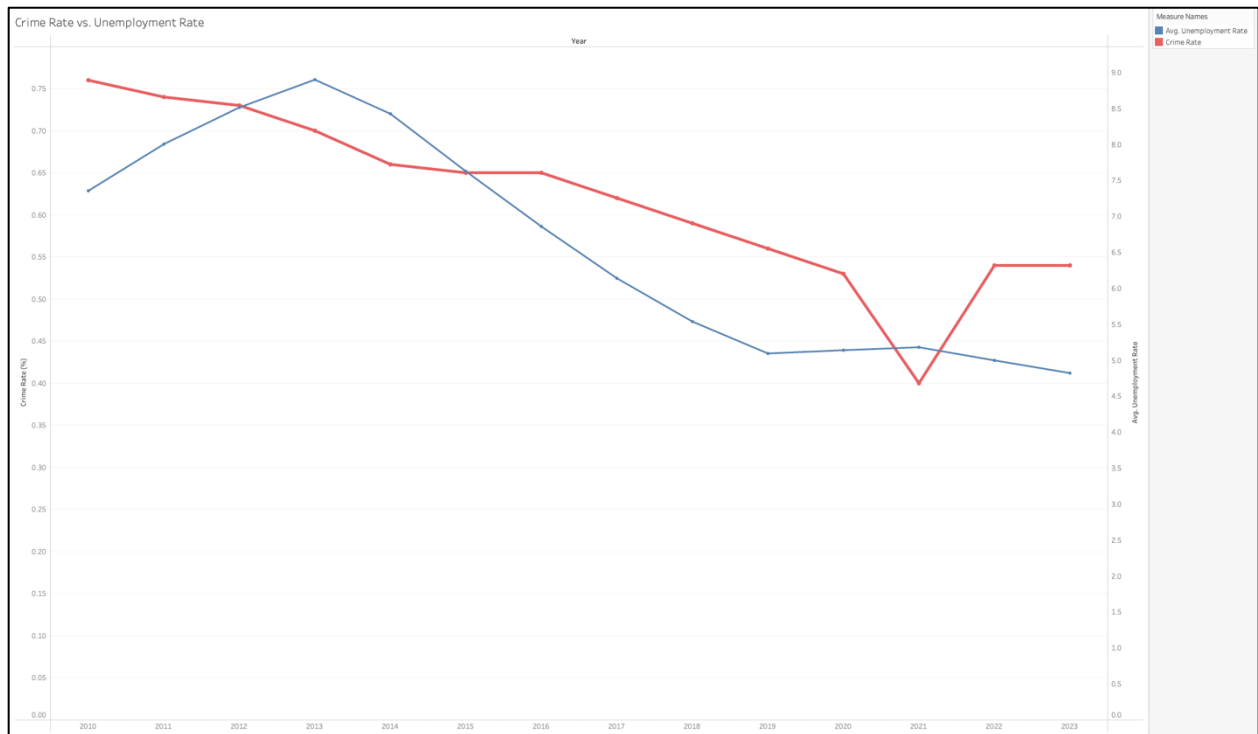


This dual-axis line chart compares the average crime rate (red line) with a poverty indicator (brown line), using a parameter to toggle between Percentage Families Below Poverty Line and Percentage Population Below Poverty Line.

From 2014 onward, both lines demonstrate a clear positive relationship: as the percentage of people or families below the poverty line decreases, the crime rate also declines steadily. This simultaneous drop suggests that economic hardship and crime are closely linked, particularly in the post-2014 period.

This analysis supports Research Question 3, indicating that economic indicators such as poverty levels have a direct effect on crime rates. As poverty is reduced, potentially through social programs or economic growth, communities tend to experience notable declines in crime.

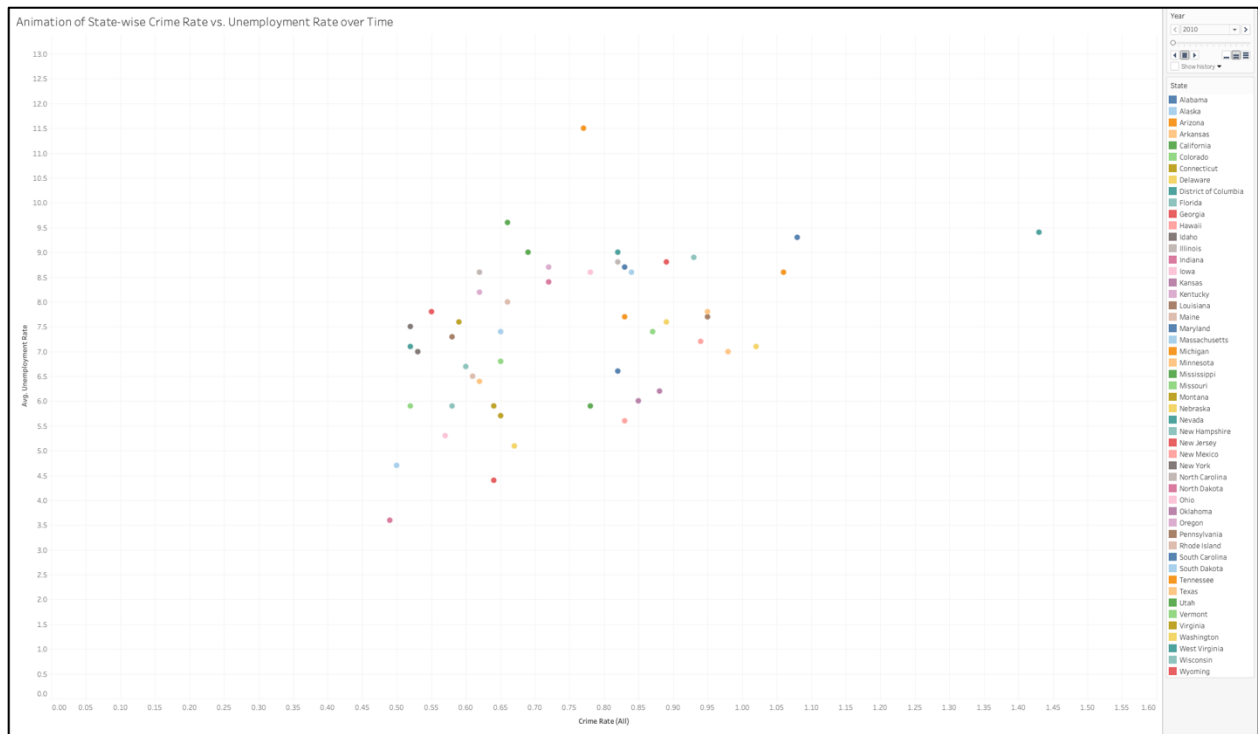
8. Crime Rate vs. Unemployment Rate



This dual-axis line chart compares the average crime rate (red line) with the average unemployment rate (blue line) across U.S. states. Focusing on the period after 2013, both indicators show a clear and consistent decline. Unemployment begins a sharp drop from its peak around 2013, followed by a steady decrease in crime rate starting around 2015. By 2021, both the metrics are low, likely reflecting pandemic-related conditions, before stabilizing in subsequent years.

The parallel downward trends after 2013 strongly support Research Question 3, suggesting that as economic opportunities improve through lower unemployment, states experience a corresponding reduction in crime, highlighting the importance of labor market strength in public safety outcomes.

9. State-wise Crime Rate vs. Unemployment Rate Over Time



This animated scatter plot visualizes the relationship between crime rate (x-axis) and unemployment rate (y-axis) for each U.S. state from 2010 to 2023. Each dot represents a state in a given year, color-coded by state, with time controlled via a slider.

The animation reveals that states have moved downward and leftward over time, indicating a joint decline in both unemployment and crime rates. However, some states consistently exhibit higher unemployment and crime, while others cluster in the lower-left quadrant with stronger economic and public safety outcomes.

This dynamic visualization supports Research Question 3, emphasizing how improvements in employment conditions often align with reductions in crime, and how this relationship varies across the country. It provides a compelling, state-by-state view of how economic recovery may help drive safer communities over time.

CONCLUSION:

This study examined the relationship between economic indicators and crime rates across U.S. states from 2010 to 2023, using state-level data on income, inequality, poverty, unemployment, and crime.

The findings clearly show that crime rates decline significantly as median family income increases, with a flattening trend observed beyond the \$69,000 income threshold. This indicates a critical point beyond which additional income gains are associated with stable and consistently low crime rates.

The analysis also establishes that income inequality, measured by the Gini index, has a measurable impact on different types of crime. While property crime and larceny are more prevalent overall, violent crime exhibits a steeper exponential response to rising inequality, suggesting it is more sensitive to widening income gaps.

Finally, states with declining poverty rates and lower unemployment levels consistently demonstrate lower crime rates. This pattern is particularly strong post-2014, aligning with nationwide economic recovery. The animated and year-wise trends further confirm that economic growth and welfare improvements are strongly linked to reductions in both violent and property-related crimes.

Future research could isolate the effects of specific policy interventions such as job programs, minimum wage laws, or housing support to measure their direct impact on crime reduction. Additionally, disaggregating crime types by urban and rural areas may uncover more granular dynamics masked by state-level aggregates.