Economic Insights: Mapping the U.S. Story

DATA VISUALIZATION PROJECT- ISM 6419 – 001

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1. Introduction

This report provides a comprehensive analysis of key economic indicators in the USA and corresponding states, including ***unemployment rates***, ***educational attainment***, ***Cost of Living Index***, ***debt trends***, and their interrelations. Through detailed visualizations, the aim is to uncover patterns, correlations, and trends that inform policymakers, economists, and educators about areas of opportunity and concern for sustainable economic growth and well-being. Comparative study helps to choose state according to the lifestyle and earnings. Also, government can take opportunity to focus on unemployment study to reduce unemployment make jobs available which most affecting factors for job seekers.

Problem Statement

This study addresses the following questions:

1. What are the unemployment rates across states, and how do they relate to educational attainment?
2. How does educational attainment influence earnings and unemployment rates?
3. What is the state-level variations in economic indicators such as debt and education?
4. How have debt trends evolved in recent decades?

2. Methodology

Tool: Tableau, Tableau Prep Builder, Excel.

Data Sources:

I. **U.S. Census Bureau**: Collected data on educational attainment levels, regional demographics, and median household incomes by state.
II. **Bureau of Labor Statistics (BLS)**: Gathered unemployment rates, employment trends, and earnings distribution by education level across states.
III. **Federal Reserve Board:** Retrieved data on Debt Service Ratio (DSR), Financial Obligations Ratio (FOR), and long-term debt trends in the U.S.
IV. **World Population Review:** Retrieved data household debt trends in the U.S over the years.
V. **Federal Bureau of Government:** Collected data on state-level Cost of Living index and economic growth indicators to correlate with education and employment outcomes.

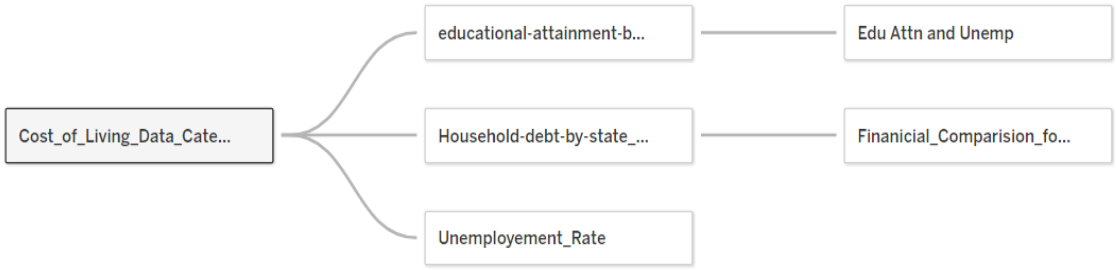
The analysis utilized curated datasets, which underwent rigorous cleaning and processing to ensure accuracy.

Key steps included:

- Harmonizing state names and formatting data for consistency.
- Verifying geographical and temporal data to enhance the reliability of insights.

- Generating a variety of visualizations to highlight trends and relationships among the indicators.
- Collecting data in different formats and synchronizing in same format.
- Removing Clutters and NULL values or columns for better analysis and prevention of wrong interpretations.

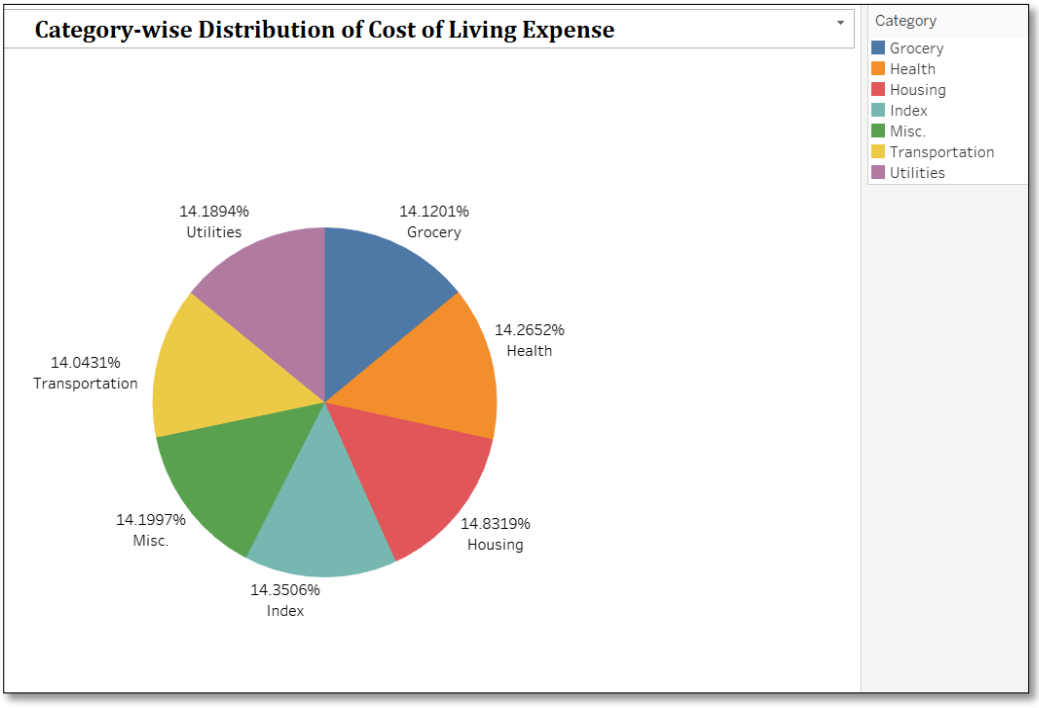
Data Links:



Visualizations include bar graphs, scatter plots, line charts, animations, comparison plots and maps created using Tableau.

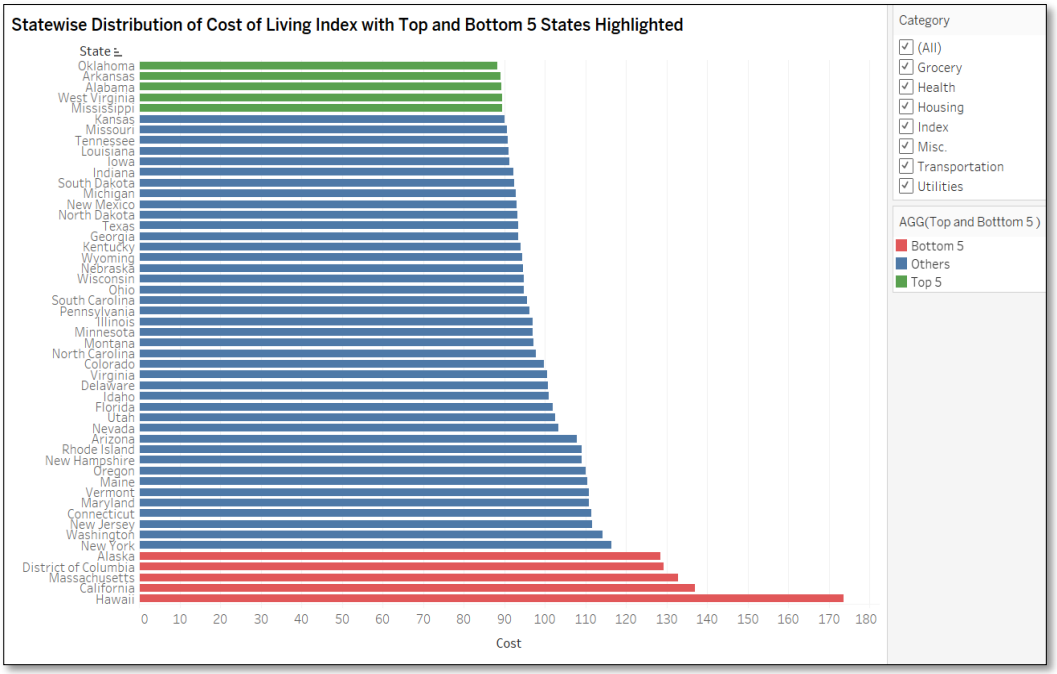
3. Visual Analysis and Insights

3.1 Analysis of Category-wise Cost of Living Distribution



Research Question: *What is the category-wise distribution of cost-of-living expenses across key areas such as housing, health, and utilities?*
The pie chart illustrates the percentage distribution of key cost-of-living categories such *as Housing, Health, Grocery, Utilities, Transportation, and Miscellaneous* expenses in the USA. This visualization effectively addresses the research question by showing the relative contribution of each category to the total cost of living. Housing constitutes the largest share (14.83%), followed closely by Miscellaneous (14.20%) and Utilities (14.19%), reflecting their significant impact on household budgets. The pie chart is an appropriate choice as it clearly conveys proportional data without unnecessary details, allowing for quick and intuitive comparisons. This insight aids in identifying priority areas, such as housing and utilities, for policy interventions to manage living costs effectively.

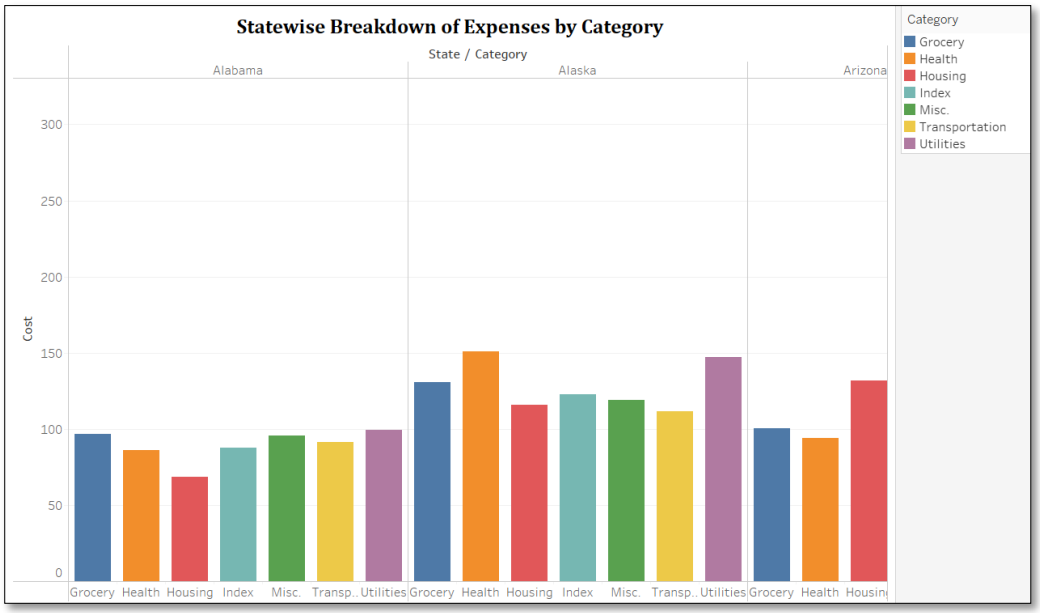
3.2 State wise Distribution of Cost-of-Living Index with Top and Bottom States Highlighted

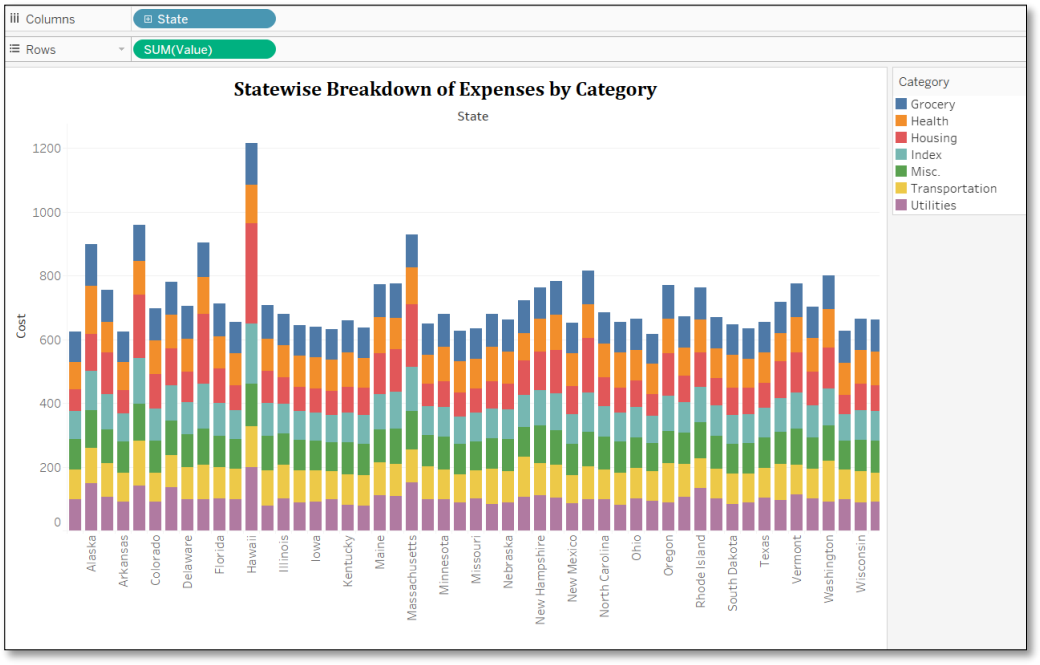


Research Question: *How does the cost-of-living index vary across states, and which states rank among the top and bottom 5 in terms of affordability?*

This bar chart visualizes the cost-of-living index across U.S. states, with the top five states having the lowest costs highlighted in green and the bottom five states with the highest costs highlighted in red. The visualization addresses the research question by ranking states based on their cost of living, providing clear insights into regional disparities. **Oklahoma, Arkansas, and Alabama exhibit the lowest cost of living, making them more affordable, while Hawaii, California, and Massachusetts have the highest costs, indicating significant financial burdens**. The choice of a horizontal bar chart is appropriate as it effectively compares states while maintaining clarity. This visualization is valuable for identifying economically advantageous or challenging regions, aiding in policy formulation and financial planning.

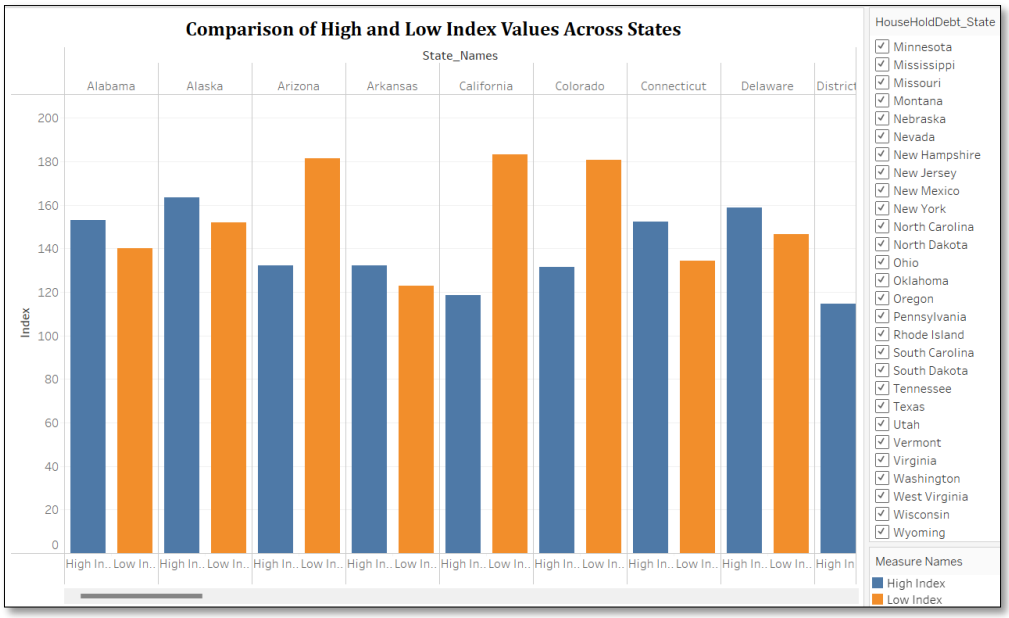
3.3 State wise Breakdown of Expenses by Category





This visualization addresses the research question: *How do cost-of-living expense categories vary across states?*
The grouped bar chart displays the distribution of expenses across categories such as Grocery, Health, Housing, Utilities, and others for individual states, including Alabama, Alaska, and Arizona. In this visualization Drill down feature enabled for granular comparison first with States then for each Category of Cost of living Index. It provides a detailed comparison of how different cost components contribute to the overall cost of living in each state. The visualization highlights notable differences, such as variations in housing and utility costs, while showing consistent patterns in categories like groceries. This chart is effective for identifying regional spending trends and understanding how economic factors impact state-level expenses, aiding targeted policymaking and resource allocation.

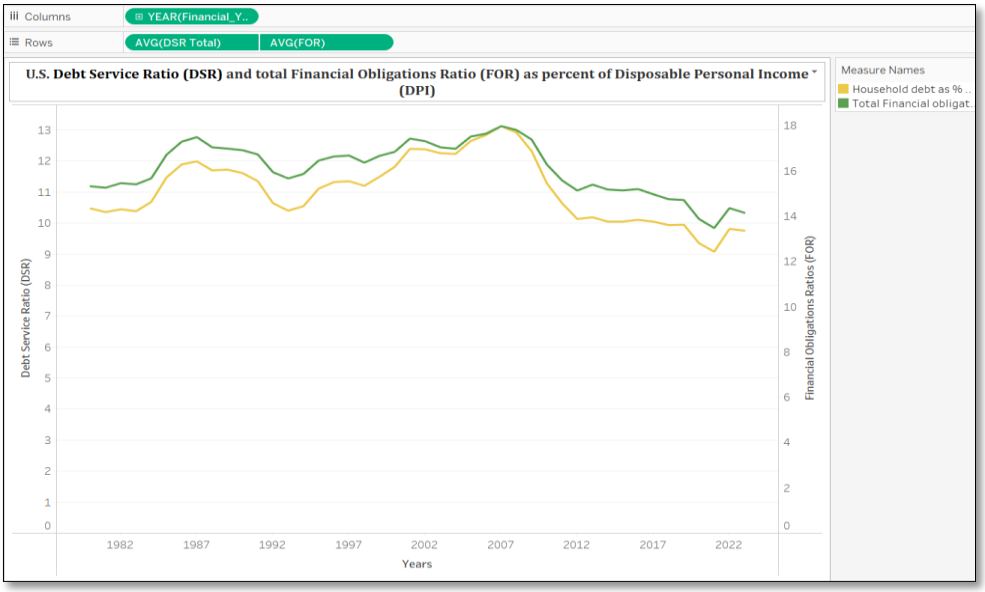
3.4 Comparison of High and Low Index Values Across States



This visualization addresses the research question: *How do high and low economic index values vary across states?*

The grouped bar chart compares high and low index values for each state, providing insights into economic disparities. *For example, states like Hawaii and MAryland exhibit significantly higher high-index values compared to their low-index counterparts, indicating regions with greater economic burdens. Conversely, states like District of Columbia and North Carolina show less disparity between the two indices, reflecting a more balanced economic distribution.* The chart is effective for highlighting variations in economic factors across states and is useful for identifying regions that may require targeted interventions to reduce economic inequality.

3.5 U.S. Debt Service Ratio (DSR) and Financial Obligations Ratio (FOR) Trends



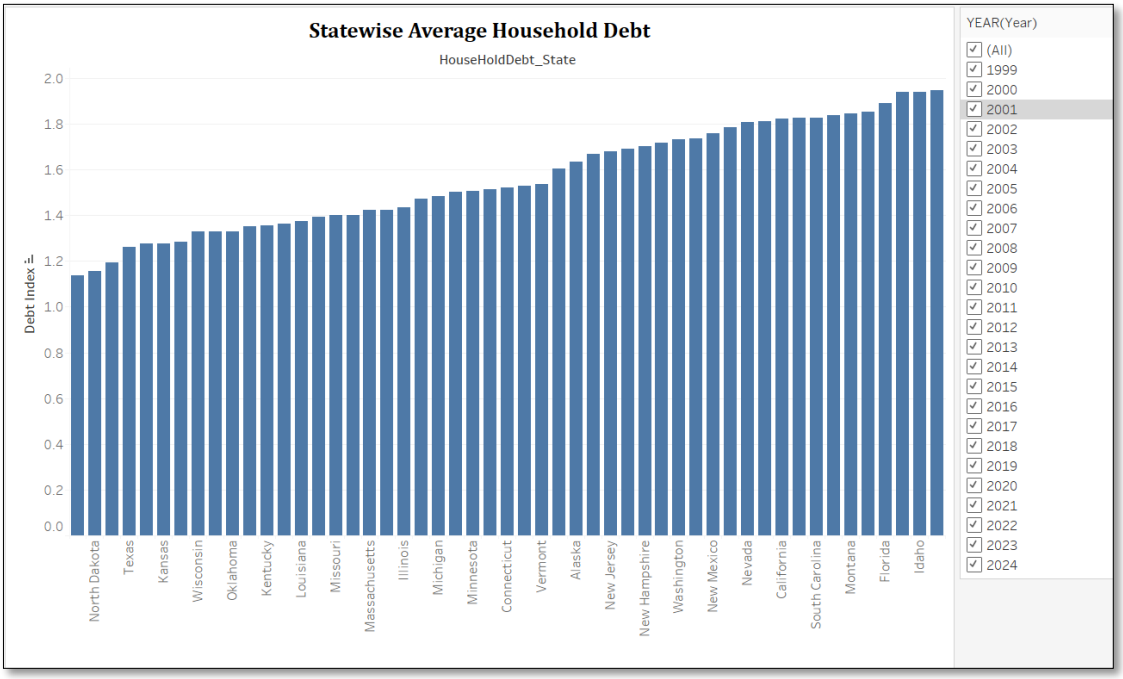
This visualization addresses the research question: *How have U.S. debt indicators evolved over time, and what is their economic significance?*

The line chart depicts the Debt Service Ratio (DSR) and Financial Obligations Ratio (FOR) as percentages of Disposable Personal Income (DPI) from 1980 to 2022. Both metrics reflect household debt burdens relative to income, highlighting key economic shifts.

The chart shows that household debt ratios were relatively stable leading up to the 2007–2009 recession but declined significantly afterward, aided by debt restructuring and federal support programs. Notably, these ratios also dropped during the 2020 pandemic recession due to federal relief measures. However, the upward trend post-2021 indicates growing financial strain, exacerbated by rising interest rates and slower income growth compared to inflation.

The visualization effectively conveys these insights, showing how credit card payments and fixed-rate loans dominate household debt. It also raises concerns about the rising debt-to-income ratio, which could signal a potential recession if unemployment exceeds 4.5%. This chart is crucial for monitoring economic risks and guiding fiscal policy decisions.

3.6 State wise Average Household Debt



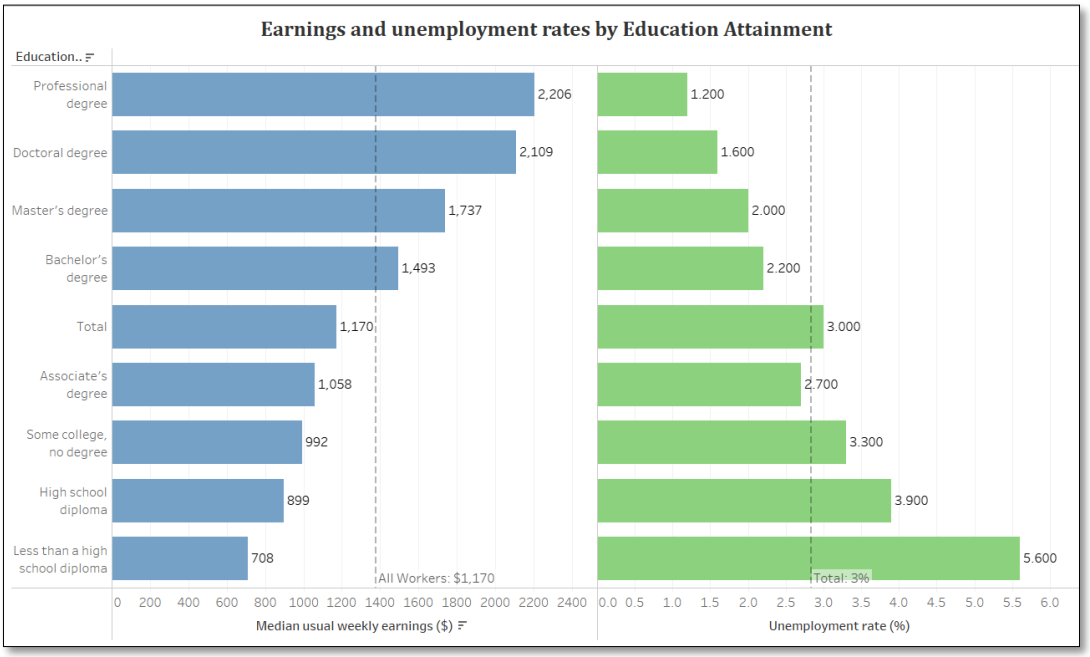
This visualization addresses the research question: *How does household debt vary across U.S. states?*

The bar chart displays the state wise average household debt index for 2001, offering a snapshot of financial obligations across the nation. States like Idaho, Florida, and Montana show the highest debt indices, indicating higher borrowing levels or significant financial obligations. Conversely, North Dakota, Texas, and Wisconsin report the lowest

debt indices, potentially reflecting conservative borrowing practices or a stronger financial position relative to income.

The bar chart effectively communicates regional disparities, enabling easy comparison of debt levels across states. This visualization is critical for identifying high-debt areas and prioritizing financial education or policy interventions to improve financial resilience in those regions.

3.7 Earnings and Unemployment Rates by Education Attainment

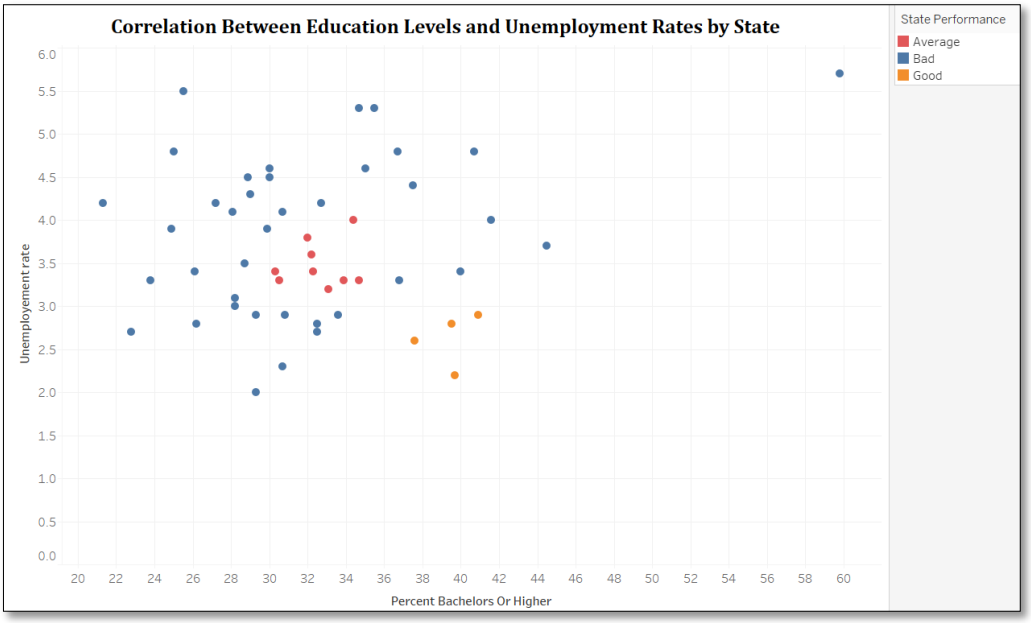


This visualization addresses the research question: *How does educational attainment impact earnings and unemployment rates?*

The dual-axis bar chart demonstrates that higher education levels correlate with significantly higher earnings and lower unemployment rates. For example, individuals with professional degrees earn a median weekly income of $2,206 and face an unemployment rate of just 1.2%, while those without a high school diploma earn only $708 and face an unemployment rate of 5.6%.

The chart effectively highlights the economic value of higher education, emphasizing how advanced degrees contribute to financial security and job stability. It is particularly useful for policymakers and educators to advocate for improved access to education, as it clearly shows the disparity in economic outcomes based on educational attainment. This visualization serves as a compelling argument for investing in education as a driver of economic growth and stability.

3.8 Correlation Between Education Levels and Unemployment Rates by State



This scatter plot addresses the research question: *How does the percentage of individuals with a bachelor's degree or higher correlate with state unemployment rates?* The visualization shows an inverse relationship between education levels and unemployment rates. States with higher percentages of bachelor's degree holders, such as those on the right side of the plot, tend to have lower unemployment rates (represented by orange "Good" performance points). Conversely, states with lower education levels show higher unemployment rates, as depicted by blue and red points.

The colour coding effectively categorizes state performance into "Good," "Average," and "Bad," providing clear insights into the impact of education on employment outcomes. This visualization is a powerful tool for illustrating how investments in higher education can reduce unemployment rates, guiding policymakers in addressing educational and economic disparities.

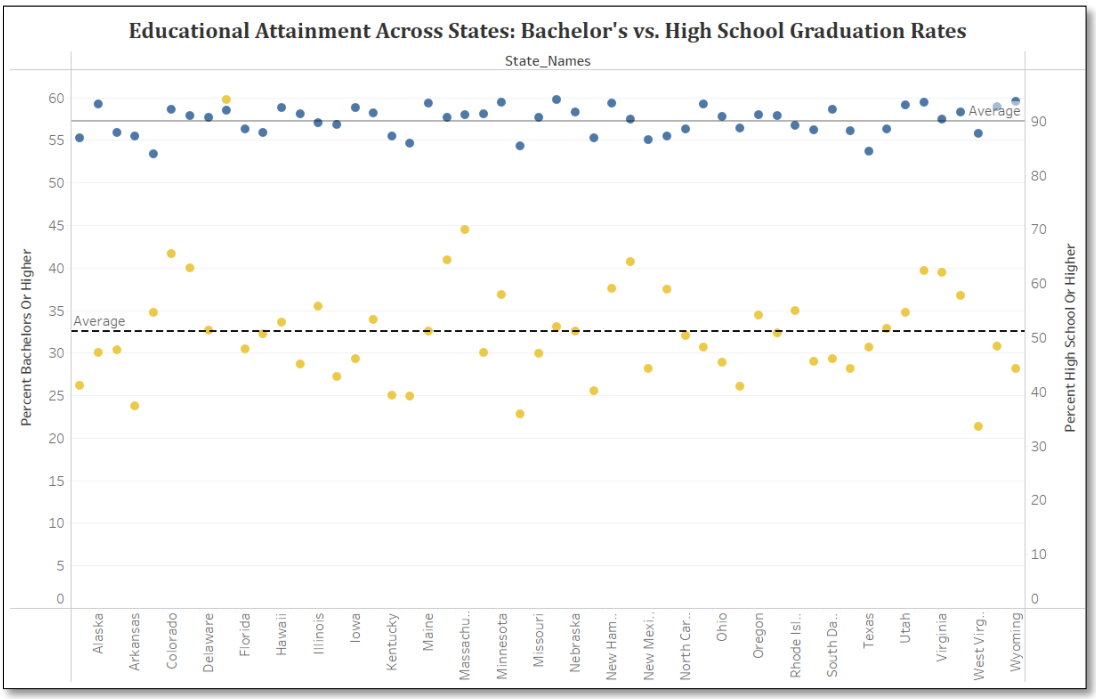
Formula Used:

IF [Unemployement rate] >= 4 THEN 'Above 4%'

ELSE 'Below 4%'

END

3.9 Educational Attainment Across States: Bachelor's vs. High School Graduation Rates

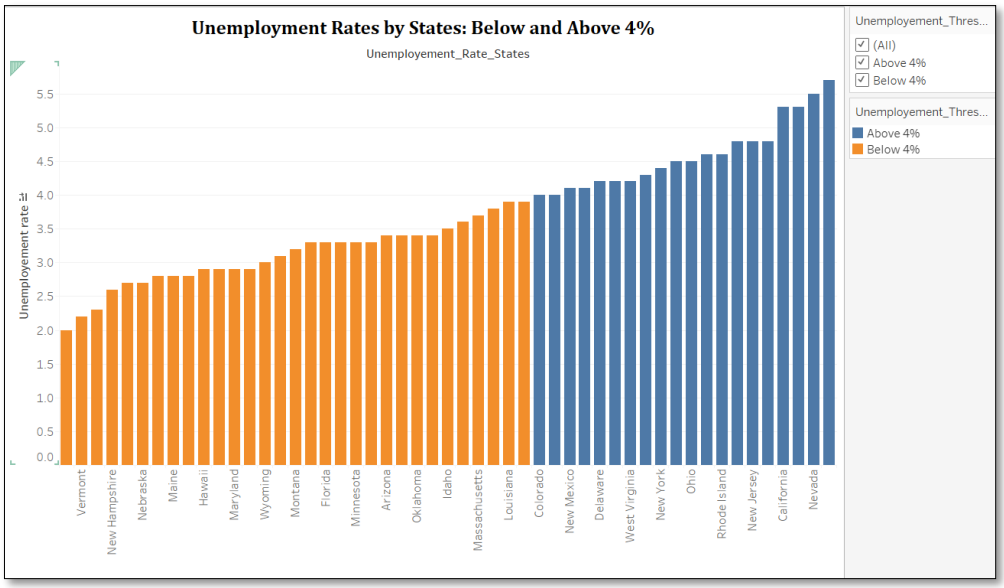


This visualization addresses the research question: *How do bachelor's degree attainment rates compare with high school graduation rates across U.S. states?*

The dual-axis scatter plot contrasts the percentage of residents with bachelor's degrees (yellow) and those with high school diplomas (blue) for each state. High school graduation rates consistently hover above the national average of 90%, while bachelor's degree attainment varies significantly, with several states falling below the average of 35%.

The chart highlights the gap between basic and higher education levels, emphasizing that while most states excel in high school education, efforts are needed to boost college-level attainment. For example, states like Massachusetts and Colorado outperform others in both metrics, whereas states like West Virginia lag in bachelor's degree attainment despite strong high school graduation rates. This visualization is crucial for policymakers to identify states requiring targeted support for improving access to higher education.

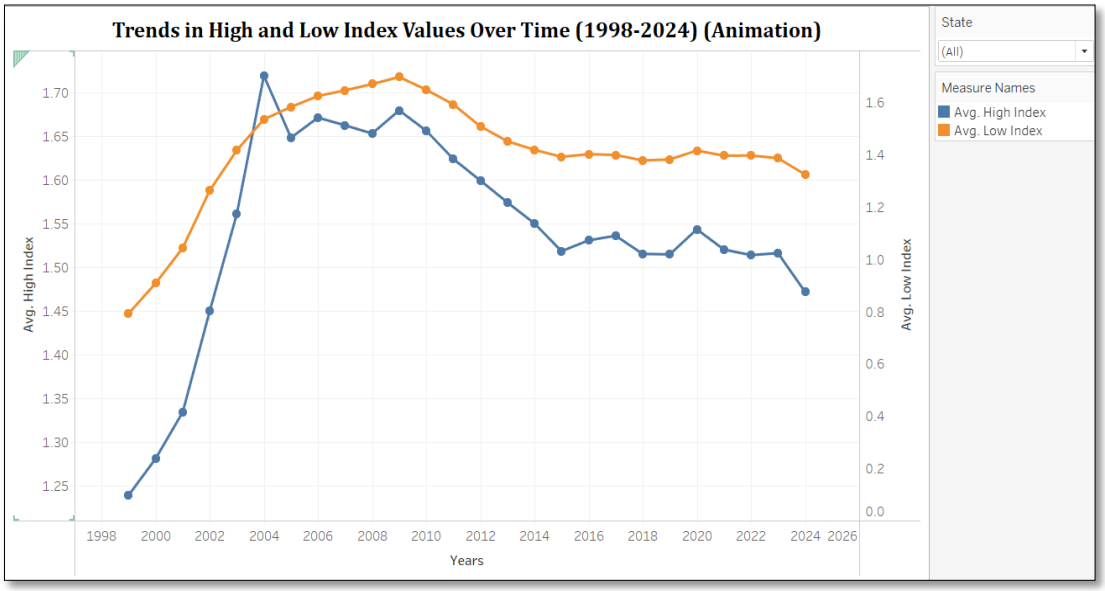
3.10 Unemployment Rates by States: Below and Above 4%



This visualization addresses the research question: *Which states have unemployment rates below or above the 4% threshold?* The bar chart categorizes states into two groups based on their unemployment rates: those below 4% (orange) and those above 4% (blue). States such as Vermont, New Hampshire, and Nebraska boast the lowest unemployment rates, consistently below 4%, indicating robust economic conditions. In contrast, states like California and Nevada exhibit higher rates exceeding 4%, signaling potential economic challenges.

The clear segmentation provides actionable insights into regional employment conditions, enabling policymakers to identify states requiring targeted interventions for job creation. This visualization is effective in visually distinguishing state performance, emphasizing the threshold's role as a key indicator of economic health.

3.11 Trends in High and Low Index Values Over Time (1998-2024)

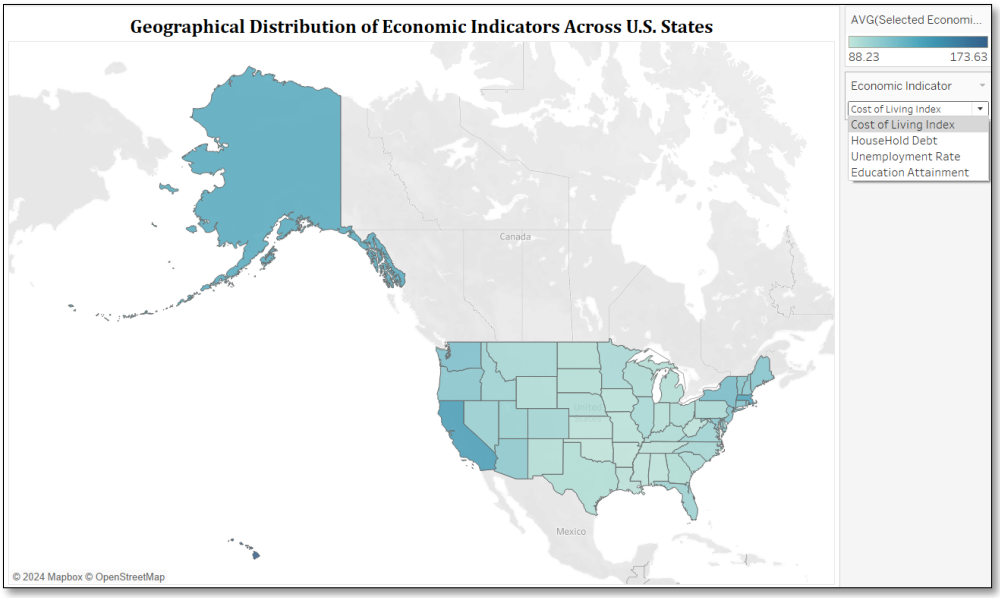


This visualization addresses the research question: *How have high and low economic index values evolved over time?*

The animated line chart tracks the average high and low index values from 1998 to 2024, revealing distinct patterns. High index values peaked around 2005, reflecting a period of economic expansion, before gradually declining and stabilizing. In contrast, low index values showed a more consistent downward trend, with occasional fluctuations.

The divergence between high and low indices highlights shifts in economic disparity and financial trends over the years. The chart effectively illustrates long-term trends and their correlation with historical events such as the 2008 financial crisis and the 2020 pandemic. This animation enhances understanding of economic dynamics, serving as a valuable tool for monitoring and predicting financial performance.

3.12 Geographical Distribution of Economic Indicators Across U.S. States



This visualization addresses the research question: *How are economic indicators such as the cost of living, household debt, unemployment rates, and education attainment geographically distributed across the United States?* The choropleth map enables the exploration of state-level disparities by visualizing selected economic indicators, such as the cost-of-living index, using a colour gradient. Darker shades represent higher values, while lighter shades indicate lower values.

For instance, states like California and Alaska exhibit higher costs of living, highlighted by the deeper hues, while central states such as Nebraska and Kansas have relatively lower indices. This visualization provides a comprehensive geographical perspective, facilitating the identification of regional economic challenges and advantages. Such insights can guide localized policymaking and resource allocation to address economic disparities effectively.

4. Conclusion

This project highlights the critical relationships between education, employment, and economic stability in the U.S. Higher educational attainment strongly correlates with lower unemployment rates and higher earnings, emphasizing the *importance of investing in education*. State wise spread was evident, with southern states showing lower educational attainment and higher unemployment, while northeastern and west coast states performed better. Debt trends revealed stabilization post-2010, reflecting improved management, but economic shocks like the 2008 recession and COVID-19 highlighted instability, underscoring the need for robust safety nets. States with unemployment rates below 4% often benefited from effective policies and economic advantages. Advanced education, particularly professional and doctoral degrees, significantly boosted income and job security. Policymakers must address regional disparities, enhance financial literacy, and implement targeted policies to promote education access and economic resilience across the nation. These findings reinforce the need for a sophisticated approach to building a balanced and sustainable economy. This comparison encourages to study better for future scope with create new opportunities in employment. Study find that education attainment matters in case of employment and earning. Cost of living index is higher in area of education attainment which indicates good lifestyle of people with higher independent living.

Key Findings

I. States with higher education attainment levels tend to have lower unemployment rates and higher earnings.
II. Economic disparity is evident in educational attainment and earnings across states.
III. Debt levels show a stabilization trend in recent years after a period of rapid growth.
IV. Education is a critical determinant of economic outcomes, with professional degrees leading to better job security and income.

Addition Research Questions

I. What factors contribute to variations in unemployment rates across states with similar educational attainment levels?
II. How does the ratio of high-income earners to low-income earners vary by state, and what impact does it have on economic inequality?
III. What is the correlation between housing affordability and state unemployment rates?
IV. How do economic indicators in urban areas compare to rural areas within the same state?
V. What is the impact of federal programs (e.g., student loan forgiveness, stimulus checks) on state-level economic health indicators?

5. References for Data Source

i. **U.S. Census Bureau -** *https://www.bls.gov/emp/chart-unemployment-earnings-education.htm*

ii. **Bureau of Labor Statistics (BLS) -** https://www.bls.gov/charts/state-employment-and-unemployment/state-unemployment-rates-animated.htm

iii. **Federal Reserve Government -** https://www.federalreserve.gov/releases/z1/dataviz/household_debt/state/map/#year:2024

iv. **Federal Reserve Board -** https://www.federalreserve.gov/releases/housedebt/default.htm

v. **World Population Review -** https://worldpopulationreview.com/state-rankings/cost-of-living-index-by-state