Google Capstone Project:

Mendocino County Poverty - The Result of Government Spending?

ABSTRACT

The Mendocino County Board of Supervisors hired Neural Profit Engines to examine the factors underlying Mendocino County's subpar economic growth over the past decade. The Board has read past economic studies that discuss the County's subpar economic growth and lack of economic opportunity in the County. The Board wants to know the economic drivers affecting the slow economic growth and hear any policy actions that the County can take to address to improve economic opportunity in Mendocino County.

Vernon Budinger

Goggle Capstone Project: Data Analysts Course

January 15, 2023

Google Capstone Project:
Mendocino County Poverty –
Are Outsized Government Payments
Creating Appalachia in Northern California?

Assignment:
As a junior data analyst at Neural Profit Engines, a business intelligence consulting company, I have been asked to lead a project for a new client, The Board of Supervisors of Mendocino County.

The Task:
The Mendocino County Board of Supervisors hired Neural Profit Engines to examine the factors underlying Mendocino County's subpar economic growth over the past decade. The Board has read past economic studies that discuss the County's subpar economic growth and lack of economic opportunity in the County. The Board wants to know the economic drivers affecting the slow economic growth and hear any policy actions that the County can take to address to improve economic opportunity in Mendocino County.

Deliverables:

1. Analysis that provides insight into the data and identifies the economic drivers that stunt economic growth in Mendocino County.
2. Idea for policy decisions that support economic growth

Introduction: Questions to Frame the Assignment

Background:
How poor is Mendocino County? Exhibit I informs that, in terms of GDP growth, Mendocino County ranks 20th out of 58 counties in California and stands in stark contrast to Sonoma, its neighbor to the south. The surprising aspect of this statistic is that Mendocino is adjacent to Sonoma County, one of the more affluent counties in California, yet Mendocino's economic growth continues to lag the state and the country.

Even more surprising, in terms of economic affordability and livability, Mendocino County's economy is one of the poorest counties in the United States and compares unfavorably to the poorest regions of Appalachia. Wheeler County, Georgia is part of Southern Appalachia and is often ranked as the poorest county in the United States in terms of per capita income. Table I and Exhibit II shows that, in terms of rent, Wheeler County is more affordable than Mendocino County.

Exhibit I

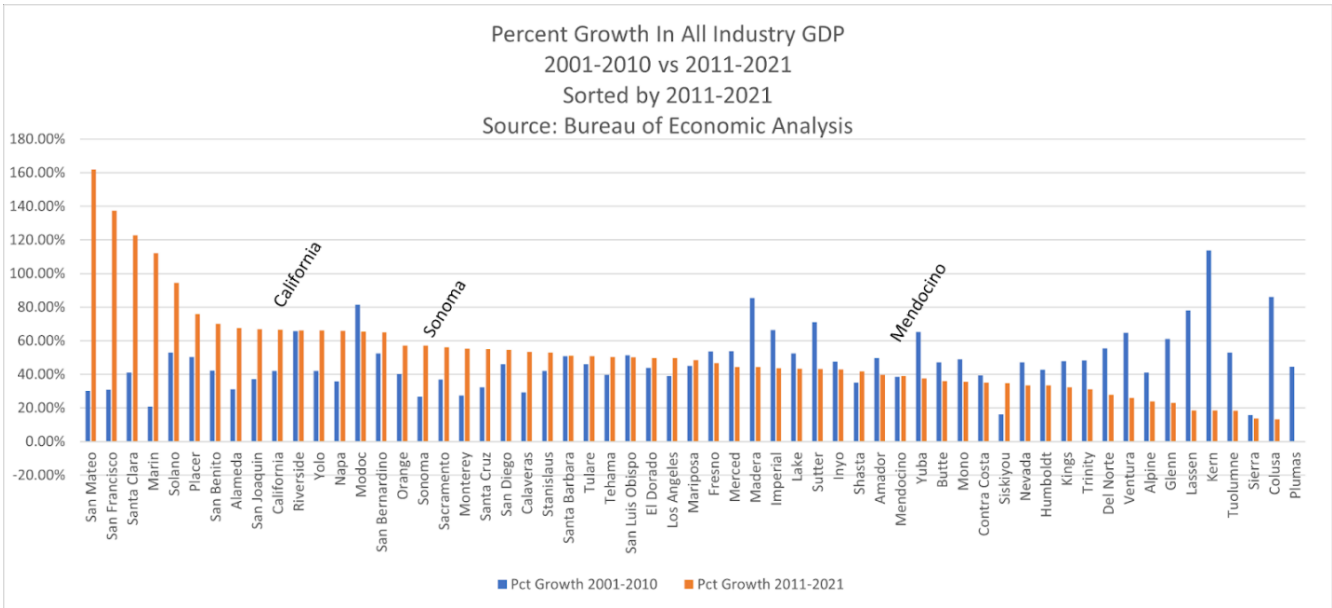
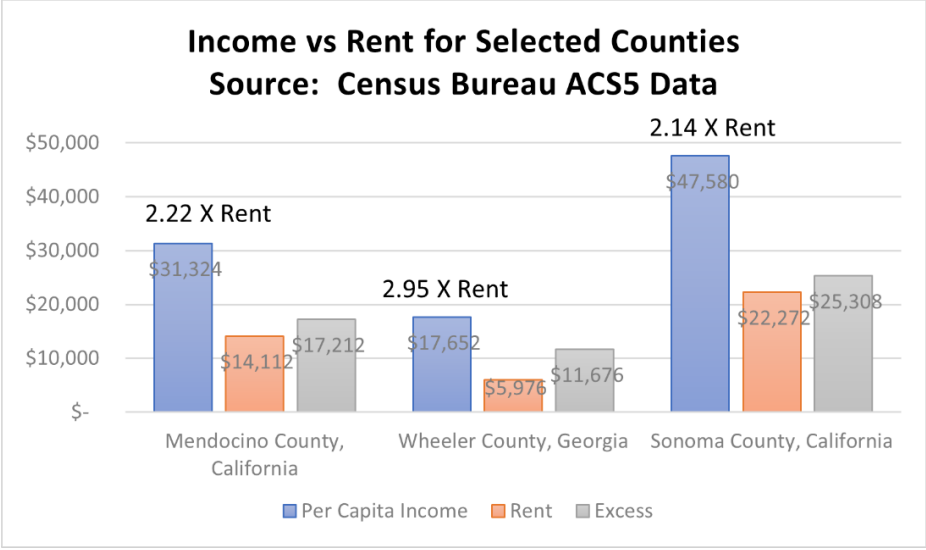


Table I

Income versus Rent

County	Per Capita Income	Annual Median Rent	Rent-based Affordability
Mendocino County,	$ 31,324	$ 14,112	2.22
Wheeler County, Georgia	$ 17,652	$ 5,976	2.95

Exhibit II



Sources:
https://www.census.gov/quickfacts/mendocinocountycalifornia
https://www.census.gov/quickfacts/fact/table/wheelercountygeorgia,mendocinocountycalifornia/PST045222,PST045221
https://www.census.gov/quickfacts/sonomacounty

According to the US Census Bureau, the per capita income in Mendocino County was $31,324 a year and the median gross rent is $14,112 a year. This gives a rent-based livability index of 2.22 (income 2.22 times higher than rent expense). In contrast, Wheeler County Georgia, which sits squarely in the bottom third of Appalachia - is the poorest county in the United States based solely on per capita personal income. The per capita income is $17,652 but rent is only $5,976 a year, for a livability index of 2.95 and higher than Mendocino.

How can Mendocino County be so poor when it lies adjacent to one of the most economically successful counties in California?

Key Factors

Stakeholders

Board of Supervisors
The primary stakeholders are the Board of Supervisors, composed of 5 members, who are elected to a four-year term. The Supervisors have varying levels of economic knowledge and mixed political backgrounds.

County Executives
One of the key factors to consider in this engagement is that the Client does not have executive powers to implement any program or any solutions. The client provides guidance to the Mendocino County Government, headed by the County's Chief Executive Officer. The Board of Supervisors provide the guidance, but the County CEO and other Mendocino County Executives hold the power to implement policy.

County Residents
The ultimate stakeholders are the residents, the employees and business owners of Mendocino County. The final product of the economy is jobs, business opportunities, and hopefully affordable goods.

County Resources

Few entities in Mendocino County have the skills or resources to access or collect public data. As a result, publicly available economic data needed for making informed investment decisions is scarce. Sadly, this data regarding the factors the economic factors that power economic activity in the County is free and readily available. Hopefully, this study will help fill some of this need.

Access to resources is also a factor. One example would be the cannabis industry. Mendocino County is known as the bottom of the Emerald Triangle, an area that at one point accounted for 45% of the cannabis grown in the United States. However, Mendocino County's regulation of the cannabis industry increased the economic burden, in terms of economic costs for licensing and environmental

requirements for production, to the point that many farmers lacked the financial means to continue farming and the regulations are widely criticized for killing the “goose that laid the golden egg.”

Education and training are also issues; Mendocino County does not have any 4-year higher education institutions like other neighboring counties. The most accomplished educational facility in Mendocino is Mendocino College, a two-year community college located in Ukiah. Many of the studies have noted that “Educational attainment in Mendocino County currently lags behind that of California … many students not currently in school lack the essential skills to be successful in the workforce.”
Source: County of Mendocino Economic Development Analysis
https://www.move2030.org/wp-content/uploads/2021/07/Mendicino-County-Covid-recovery-REPORT-low-rez.pdf

Business Task:

Use data analysis and statistical tests identify relationships between economic opportunities, Mendocino’s economic characteristics and policy decisions.

Business Objectives:

1. What are the underlying drivers of underperformance?
2. Is there a trend in economic underperformance?
3. Is it a long-term trend in the drivers of economic performance?

Prepare

Identify County Level Data with Economic Data and Spending Data

Review of Past Studies:

A recent study titled “County of Mendocino Economic Development Analysis” was conducted by Beacon Economics and commissioned by West Business Development Center of Ukiah looks at many of the issues but does not identify any one particular issue as the cause of lower economic growth.

The study provides these “Key Takeaways”

1. Despite Aggregate readings for the State of California, the general economic experience at the county level is direr [sic] for Mendocino.
2. Mendocino is undergoing a significant demographic change, at rates that outpace the state overall; outmigration and age dynamics are leading to stagnation and more recently depopulation.
3. Mendocino’s labor force and job base has experienced suboptimal growth following the decline of timber-focused manufacturing.
4. A lack of growth and diversification in traded, export-oriented industries will continue to diminish Mendocino over the long-run.
5. Staunch existential challenges - ranging from wildfires to housing affordability to broadband connectivity - are also working toward the county’s detriment.
6. Despite having many agents, the local economic development ecosystem is severely fragmented. Meanwhile, there exists a grave need for a concerted effort toward the tackling of the county’s basal issues. Moreover, there needs to be the commitment of resources toward economic development.

https://www.move2030.org/wp-content/uploads/2021/07/Mendicino-County-Covid-recovery-REPORT-low-rez.pdf

Employing the “5 Whys” technique, we can explore Mendocino County’s dire prognosis. The “5 Whys” technique requires that the analyst ask why 5 times when confronted with a problem.

1. Why is there a negative net migration of people and workers from Mendocino County?
    1. Answer 1: subpar economic growth and resulting low wages
    2. Answer 2: housing affordability
2. Is there a lack of economic growth (dire economic experience) in Mendocino County or is housing unaffordable because wages are low?
    1. Neighboring counties (Sonoma, Napa, Humboldt) also face housing affordability challenges
    2. Their economies performed better, and they experienced a net population inflow
    3. This indicates there may be other drivers affecting economic opportunity.
3. What other factors or drivers could affect economic growth?
    1. Answer: the local economic development ecosystem is severely fragmented.
    2. Government spending as a percentage of the economy seems high
4. Why is the local economic development ecosystem fragmented?
    1. Answer: Many local entities work to promote economic development but there is almost no collaborative effort, and they lack a broader strategic framework.
    2. Government spending does not allow the markets to work and crowds out business
5. Why is there no collaboration between the economic agents and why is there a lack of a broader strategic framework? Is there a force present that tends to dissuade or block cooperation?
    1. Answer: Yes, government involvement and payments as a percentage of total income could be blocking economic development and collaboration.

A 2018 paper titled “Mendocino County: Economic and Demographic Profile” was commissioned by the Rural County Representatives of California and Golden State Finance Authority; the study was conducted by the Center for Economic Development at California State University, Chico. The paper points to a few key economic factors where Mendocino County differs from California as a whole.

1. Mendocino’s income from wages as a percentage of total income is much lower than the state average
2. Government spending is much higher in Mendocino than in California and the United States on average
3. Much of the increase in government spending seems to be related costs for an aging population

http://www.edfc.org/wp-content/uploads/2015/12/CED-2018-Mendocino-Economic-Demographic-Profile-compressed.pdf

https://www.marquetteassociates.com/impact-of-government-transfer-payments-on-disposable-income/

While there are a few factors that could be responsible for the county’s subpar economic performance, government spending seems to be at the center of the storm. This study will focus on government spending:

1. Where does Mendocino’s economy stand in relation to California and the United States.
2. How does Mendocino rank in terms of government spending as a percentage of total spending?

3. How does government spending affect Wages and Self-Employment and thereby affect GDP growth?

This assignment requires high-quality, county-level data that is broken down into economic sectors, specifically government spending versus income from business operations across counties. California is unique in many ways, as a result, some economic findings for California might provide insight into general economic themes. Since California is unique in many way, the plan is to look at all United States counties to determine

Identify data needed and map the data sources
Planning for Data

Data Needed for an Economic Analysis of Income Sources and GDP growth in Mendocino

1. County level data for every county in the United States
2. Economic data that breaks down income and expenditures into subclasses
    a. Income from all industries
    b. Types of income
    c. Types of expenditures
    d. Per capita and household income broken down into subsectors

The data should be broad enough to understand the general population trends but detailed by industry and production enough to allow an understanding of any subtle economic factors that could be negatively impacting the economy.

Based on our evaluation of previous studies and economic databases, our team identified four sources of high-quality data with the detail needed for this study:

1. U.S. Census Bureau
2. California State
3. Bureau of Economic Analysis
4. Bureau of Labor Statistics

Data Source #1: The American Community Survey is a database that was created by the United States Census Bureau. This study will utilize the Census Bureau tables to look at income and industrial production by county.
https://www.census.gov/programs-surveys/acs/

Quoting the Census Bureau:
“The American Community Survey (ACS) is an ongoing survey that provides vital information on a yearly basis about our nation and its people. Information from the survey generates data that help determine how more than $675 billion in federal and state funds are distributed each year.” The American Community Survey is conducted by the Census Bureau, the same government entity that conducts the Decennial Census.

The American Community Survey (taken directly from the ACS):

- Conducted every month
- Sent to a sample of approximately 3.5 million addresses in 50 states, the District of Columbia, and Puerto Rico.
- Asks about topics not on the 2020 Census, such as education, employment, internet access, and transportation.

The Decennial Census

- Conducted every 10 years
- Counts every person living in the 50 states, District of Columbia, and the five U.S.
- Asks a short set of questions
- Provides an official count of the population

Data Source #2: The California Regional Economic Analysis Project
https://california.reaproject.org/
The cornerstone for the data used on REAP are the state and county level income, earnings, employment, transfer payments and product data compiled and updated annually by the Regional Income and Product Divisions of the Bureau of Economic Analysis, U.S. Department of Commerce (Regional - BEA, DOC)
Bureau of Economic Analysis, U.S. Department of Commerce (Regional - BEA, DOC)

Data Source #3: The Bureau of Economic Analysis
The BEA data play a widespread and pivotal role in private and public sector state, regional and local area market research, economic forecasting, policy analysis and planning. Twenty states impose revenue or spending statutory limits based on the BEA state income data. In FY 2011 alone, over $339 billion in federal funds were distributed to state based upon BEA's region income statistics
The data are comparable for all states and counties and are consistent with national totals, thus insuring the uniformity of the results deriving from the analytic approaches available on this website for calibrating, monitoring and diagnosing current and historical regional economic conditions and trends.
Bureau of Economic Analysis, U.S. Department of Commerce (Regional - BEA, DOC).

Data Source #4: The Bureau of Labor Statistics
https://www.bls.gov/
Data Source #4: Previous studies:
County of Mendocino Economic Development Analysis
Prepared by Beacon Economics
Commissioned by West Enterprise Center, Inc.
https://www.move2030.org/wp-content/uploads/2022/08/Mendocino-County-Economic-Development-Analysis-Beacon-2021.pdf

Other data considered:
MOVE 2030:
Mendocino Opportunities for Building a Vibrant Economy
Marie Jones Consulting
November 2020
https://www.move2030.org/wp-content/uploads/2020/12/MOVE-2030-Community-Economic-Action-Plan-Nov_2020.pdf

SoMo Strong 2025
Sonoma Mendocino Economic Development District
https://www.westcenter.org/wp-content/uploads/2022/06/CEDS-Public-Review-Draft.pdf

Process

The raw data is housed in the Census Bureau Databases, the Bureau of Economic Analysis, and the Real. BigQuery was not available to me for analyzing this data because the BEA data and Census Bureau tables require an API key and Big Query charges for data resources that require keys.

ROCCC Analysis of the Data

Reliable: Government data, the primary source of all the data used in this analysis. Some secondary data sources were used where the format was more convenient. The data from the U.S. Census Bureau, the Bureau of Economic Analysis, The California Regional Economic Analysis Project, and the Bureau of Labor Statistics is very reliable.

Original: In the case of the Census Bureau Data, BEA, and the Bureau of Labor Statistics, the data is original. The data from The California Regional Economic Analysis Project uses primary and secondary data (some numbers also pulled from the Census Bureau and the Bureau of Labor Statistics).

Comprehensive: The advantage of using the 5-year American Community Survey is that it is more comprehensive. While there were a few locations with missing data, they were mostly small geographic entities associated with Alaskan Native American villages or Puerto Rico.

Current: I used the ACS5 data, which is a 5 year average, it is not as current as the ACS 1 year data, but there was detailed information for all counties. While it was based on surveys and relied on sampling, the comprehensive dataset was needed and validated working with slightly older data.

Cited: The Census Bureau and the Bureau of Labor Statistics are frequently cited and used as the basis for many social and economic surveys.

Note: The estimates were another possible compromising issue for the ACS data since it is data based on a sample. To evaluate the ramifications of using sample data, I evaluated each data item with the margin of error supplied by ACS. In no case did I find that the expected possible change in errors would change the analysis.

I accessed the U.S. Census Bureau ACS data with R, the scripts are available in Appendix B and C. The BEA CAGDP2 data was downloaded from the BEA website into an Excel file.

Data Cleaning

Data sources were checked for missing data suspected bad data. I chose R to evaluate and clean the ACS data because it easily handled the large datasets, and I was able to activate the API keys for no cost. I utilized Tidycensus to access the data and features of Tidyverse to evaluate and clean the Census ACS data. In addition, R features advanced graphics and

sophisticated packages of analytics. I also used Excel to evaluate, manipulate and analyze the smaller components of the ACS data set.

The main challenge with the Census ACS data and the BEA CAGDP2 data was that some of the geographic locations were so small that the data was not available and there tended to be quite a bit of missing data.

I cleaned and verified the data by sorting the data to look for outliers and I used Excel functions to calculate the Maximum, Minimum, Median, and Standard Deviation for each data series. The biggest problem with the BEA data, as with the ACS data, was the lack of data for some smaller non-county governments and cities that are classified as counties in some states. Since I had close to 3,000 observations and the counties/locations with missing data were small in terms of population and economic importance, I decided to delete geographic entities with missing data. The deleted data is in Appendix A. The R analysis of all of the variables is in Appendix D.

The economic growth by county was matched to the ACS data using the VLOOKUP function in Excel. I checked the matching by sampling the spreadsheet and manually recalculating all the statistics for Mendocino and other sample counties, California as a state, and the United States to verify the uploaded data, my calculations in Excel Spreadsheets, and the R statistical programing language.

It is important to note that total the components of income reported by the ACS do not equal exactly Aggregate Income, however, Aggregate Income serves as a government calculated estimate for income from all sources that can be used to understand the contribution coming from the other components of Aggregate Income.

Sample of R Data Evaluation Process

```
summary(types_county_Act2_income_5yrwide_New)
   GEOID              NAME           Agg_Income_19313E   Agg_Income_19313M   Agg_HH_Income_19025E
 Length:3221        Length:3221        Min.   :2.386e+06   Min.   :1.347e+06   Min.   :2.277e+06
 Class :character   Class :character   1st Qu.:2.854e+08   1st Qu.:2.297e+07   1st Qu.:2.695e+08
 Mode  :character   Mode  :character   Median :7.000e+08   Median :4.619e+07   Median :6.679e+08
                                       Mean   :3.867e+09   Mean   :9.044e+07   Mean   :3.755e+09
                                       3rd Qu.:2.055e+09   3rd Qu.:9.644e+07   3rd Qu.:1.992e+09
                                       Max.   :3.800e+11   Max.   :2.178e+09   Max.   :3.660e+11

 Agg_HH_Income_19025M Earnings_HouseholdsE Earnings_HouseholdsM Wage_Salary_HouseholdsE
 Min.   :1.423e+06    Min.   :    31       Min.   : 16.0        Min.   :    31
 1st Qu.:2.446e+07    1st Qu.:  4167       1st Qu.: 182.0       1st Qu.:  4167
 Median :4.903e+07    Median :  9818       Median : 292.0       Median :  9818
 Mean   :9.484e+07    Mean   : 38872       Mean   : 399.5       Mean   : 38872
 3rd Qu.:1.008e+08    3rd Qu.: 25550       3rd Qu.: 481.0       3rd Qu.: 25550
 Max.   :2.340e+09    Max.   :3342811      Max.   :5387.0       Max.   :3342811
```

Analyze Data

Mendocino Data Review

After compiling and cleaning the data, I looked at the data available and examined the definitions to understand the data completely. The key objective of this exercise is to develop a strong understanding of Mendocino's economy and the challenges that it faces.

Table II on the next page breaks down Mendocino's economy and compares it to California and the United States. The data comes from the United States Bureau of Economic analysis and is for 2021.

In addition to alarming levels of poverty, Table II shows that Mendocino County's has several distinct economic attributes and challenges:

1. With wine, lumber, and cannabis farming as the featured industries, Mendocino County has more concentrated in agriculture.
2. Real Estate investing and income from real estate are more heavily weighted in Mendocino's economy than California or the national average.
3. Healthcare and Healthcare service play a big role in Mendocino's economy, most likely the result of the aging population and Mendocino's growing reputation as a place to retire.
4. Mendocino needs more businesses that provide professional, scientific, and technical services.
5. The Manufacturing and Information industries are heavily underweighted in the County's economic profile.
6. Government spending plays a much larger role in Mendocino's economy than in the State as a whole and across the United States.

All these observations are consistent with previous studies. Many of the studies alluded to the possible stifling effect of government spending, I decided to look at all the counties across the entire United States to understand the effect that government spending has on wages and economic growth.

See Table II on the next page.

Table II

Mendocino vs California and the United States

Source: U.S. Bureau of Economic Analysis

Description - Economic Activity	vs California	vs United States
Private industries	-4.0%	-3.0%
Agriculture, forestry, fishing and hunting	2.4%	2.7%
Mining, quarrying, and oil and gas extraction	-0.2%	-1.3%
Utilities	-0.4%	-0.6%
Construction	1.7%	1.3%
Manufacturing	-2.6%	-1.6%
Durable goods manufacturing	-2.0%	-0.8%
Nondurable goods manufacturing	-0.7%	-0.9%
Wholesale trade	-1.5%	-2.1%
Retail trade	5.0%	4.3%
Transportation and warehousing	-0.3%	-0.4%
Information	-9.5%	-4.4%
Finance, insurance, real estate, rental, and leasing	0.0%	-2.7%
Finance and insurance	-3.3%	-6.0%
Real estate and rental and leasing	3.3%	3.4%
Professional and business services	-4.5%	-3.0%
Professional, scientific, and technical services	-7.4%	-5.4%
Management of companies and enterprises	2.2%	1.9%
Administrative and support and waste management and remediation services	0.6%	0.5%
Educational services, health care, and social assistance	2.3%	1.4%
Educational services	-0.7%	-0.8%
Health care and social assistance	3.0%	2.2%
Arts, entertainment, recreation, accommodation, and food services	2.4%	2.6%
Arts, entertainment, and recreation	-0.1%	0.2%
Accommodation and food services	2.5%	2.5%
Other services (except government and government enterprises)	1.1%	0.8%
Government and government enterprises	4.0%	3.0%
Natural resources and mining	2.2%	1.4%
Trade	3.5%	2.2%
Transportation and utilities	-0.6%	-1.1%
Manufacturing and information	-12.2%	-6.1%
Private goods-producing industries 2/	1.3%	1.1%
Private services-providing industries 3/	-5.3%	-4.1%
Total Private goods+service providing industries	-4.0%	-3.0%

Evaluating Economic Growth

I accessed the Economic Growth by County in the Bureau of Economic Analysis Tables. I used the BEA query tools to download the data to my computer. I then isolated the economic data by county and created a table with economic growth by county. Mendocino County's Gross Domestic Product (GDP) grew at almost the same rate in the decade 2011 to 2021 as in 2001 to 2010.

TABLE III

	Economic Growth	
Geographic Area	2001-2010	2011-2021
Mendocino County	38.60%	39.00%
California	42.04%	66.70%
United States	42.22%	49.46%

Table III data demonstrates that Mendocino's economic growth has lagged California and the economy. This is important because the data shows that this is not a temporary problem but based on long-term issues that deeply ingrained in the county's economy.

Exhibit III

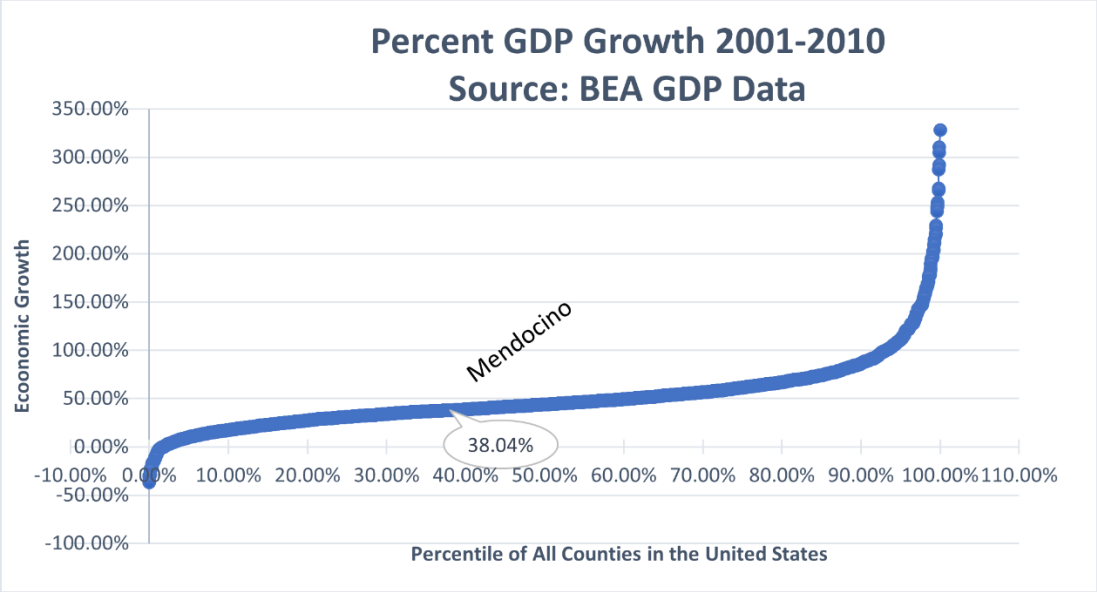
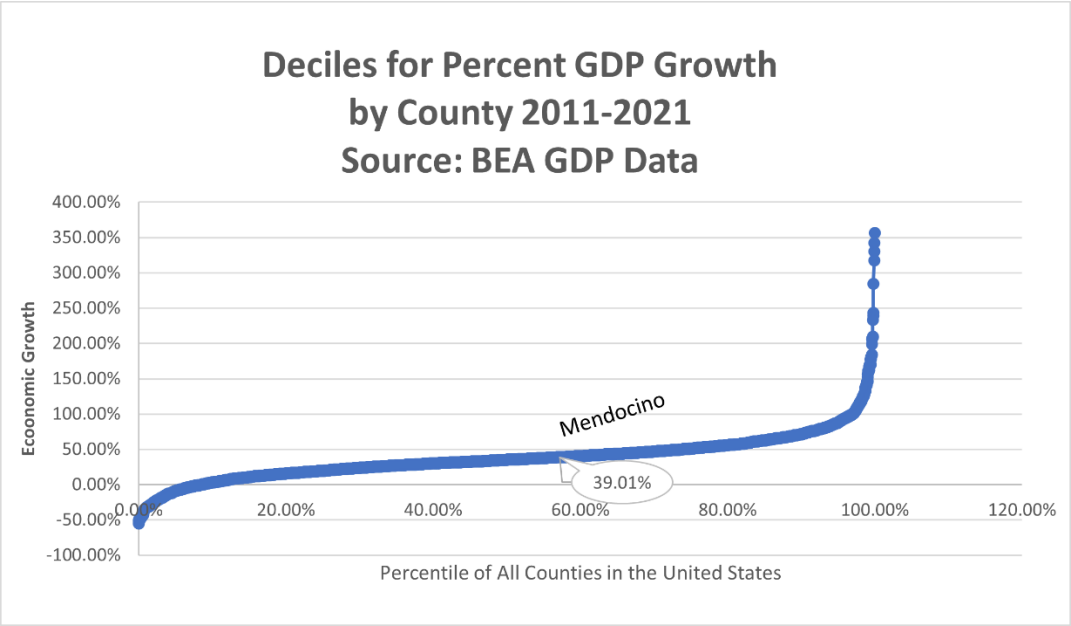
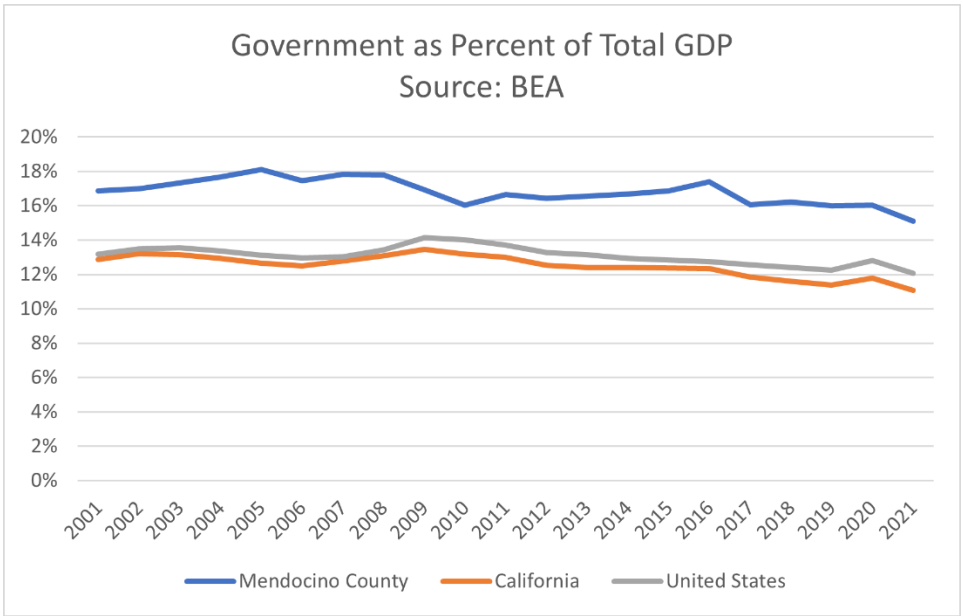


Exhibit IV



While Mendocino's dependence on above normal levels of government spending is declining, government spending at the State and Federal level are also declining. The county's dependence on government spending is also a very long term and deeply ingrained aspect of the county's economy.

Exhibit V



Source: United States Bureau of Economic Analysis

Exhibit VI

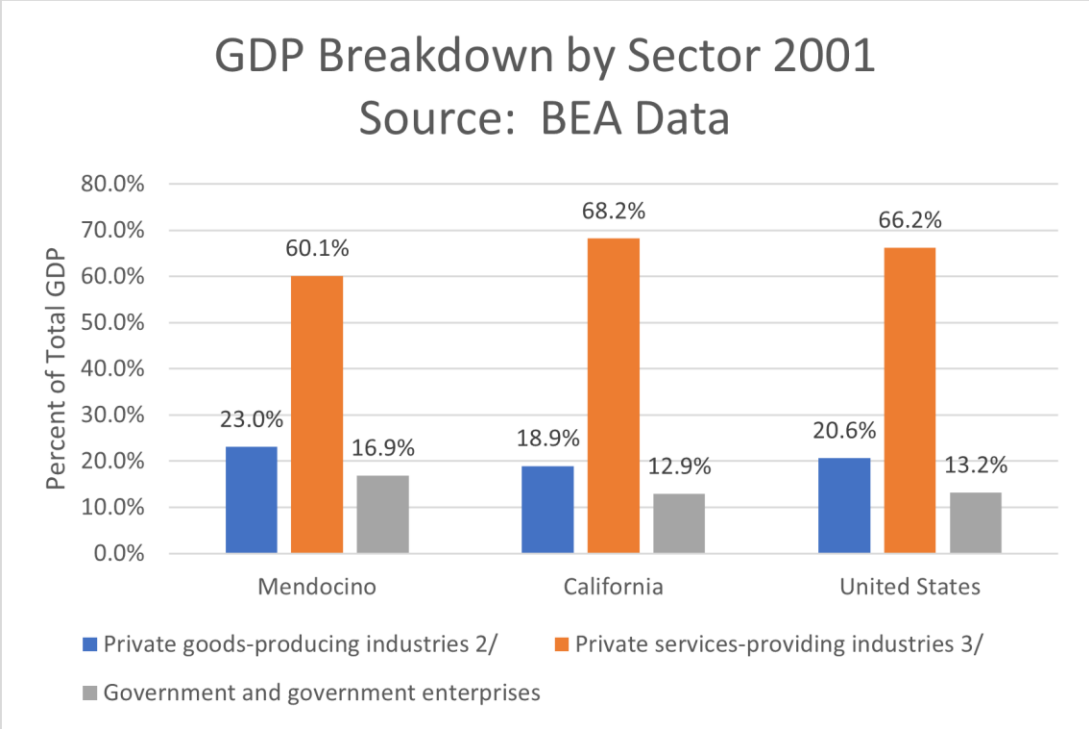
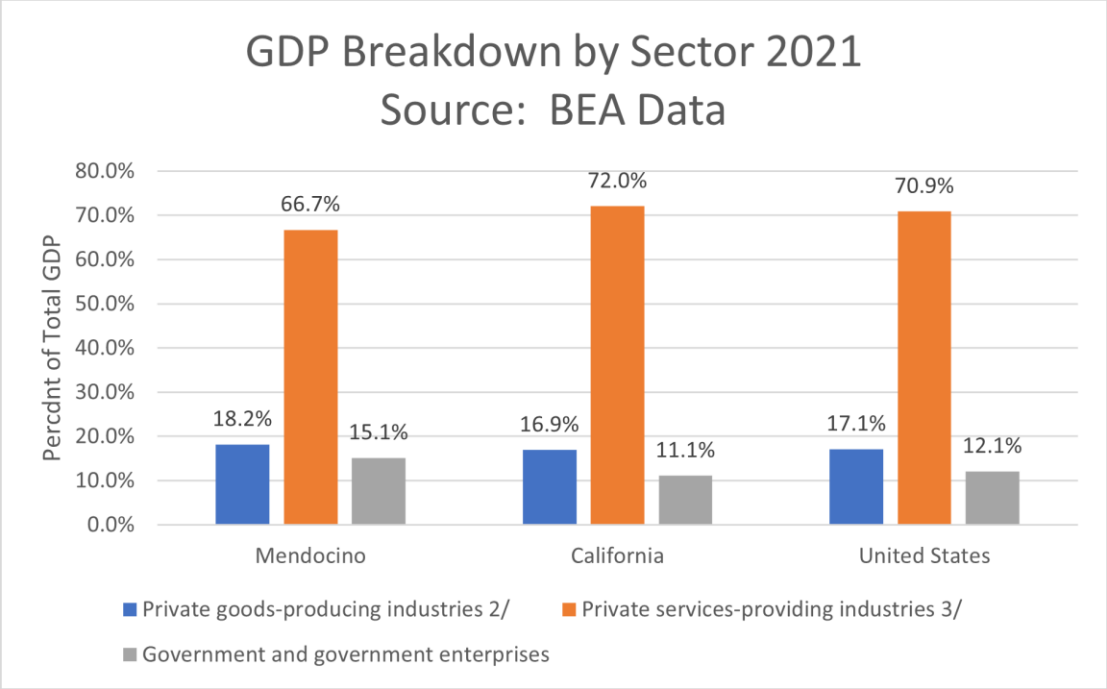
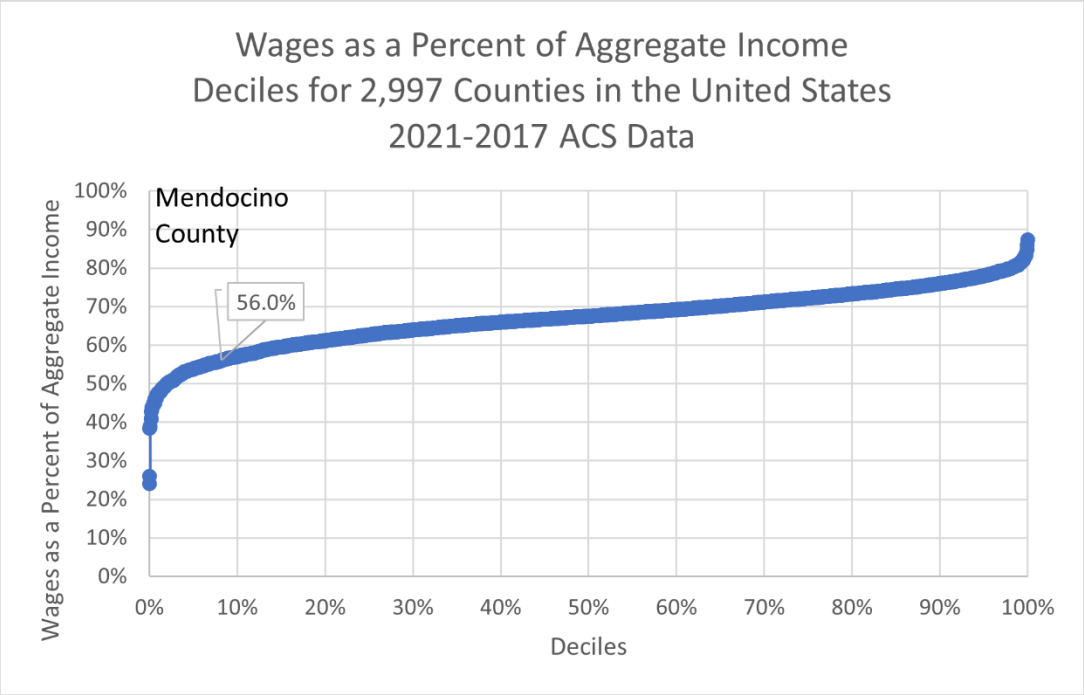


Exhibit VII



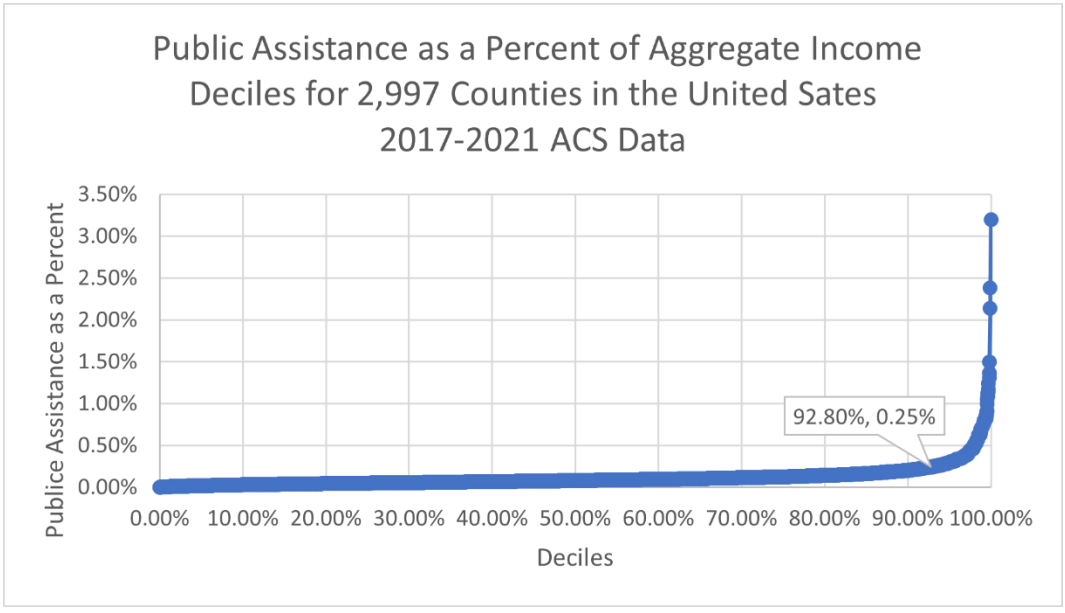
Exhibits VIII and IX rank Mendocino County relative to 2,997 counties in the United States. Note that Mendocino ranks poorly in terms of low levels of Wages and high levels of Public Assistance as a percentage of Aggregate Income.

Exhibit VIII



Source: Census Bureau American Community Survey

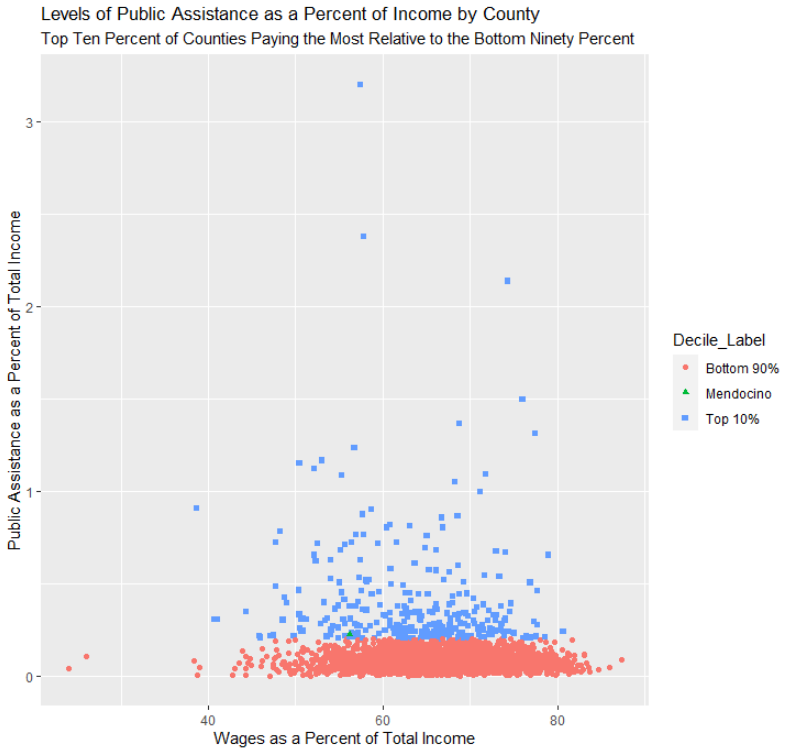
Exhibit IX



Source: Census Bureau American Community Survey

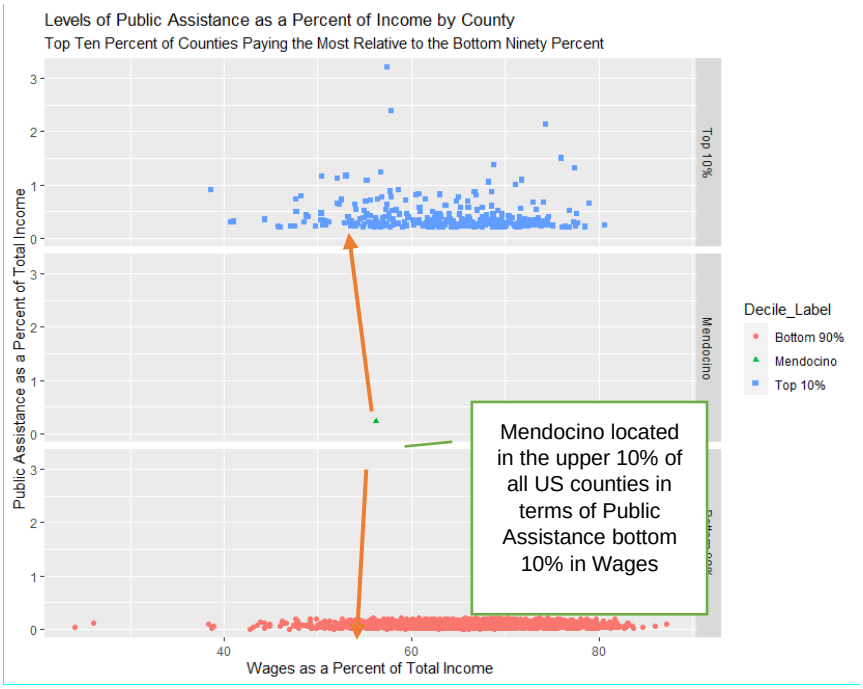
Exhibit X displays the overall distribution of Public Assistance vs Wages as a percentage of Aggregate Income. Since Mendocino is buried in the 2,997 observations, Exhibit XI breaks out the data to show Mendocino's location.

Exhibit X



Source: Census Bureau American Community Survey

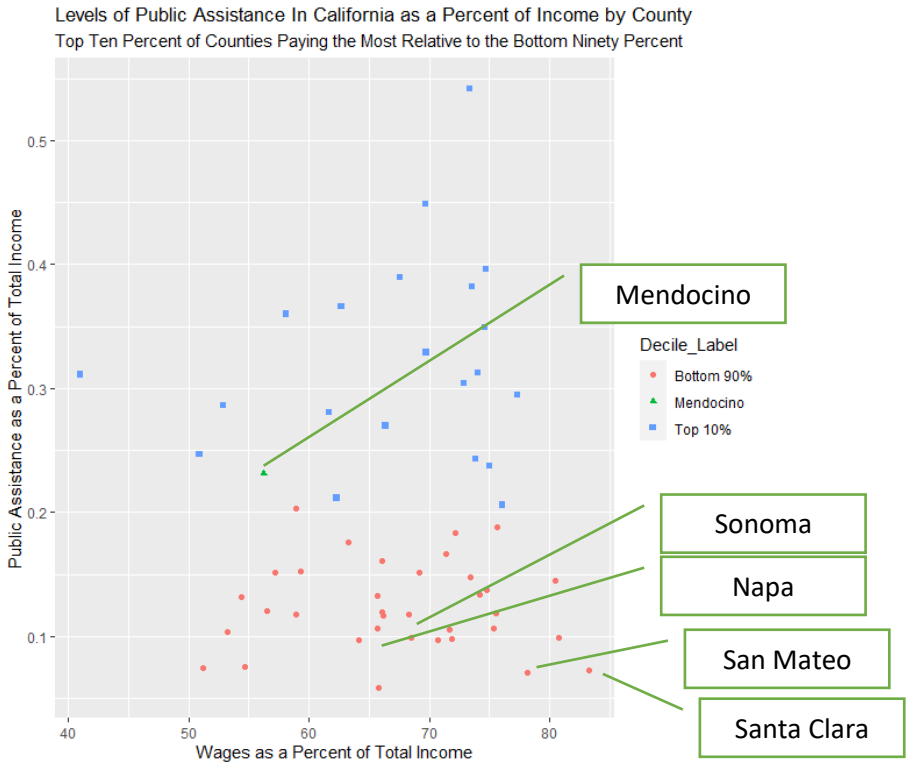
Exhibit XI



Source: Census Bureau American Community Survey

Exhibit XII shows the challenges that Mendocino faces from other nearby superstar counties.

Exhibit XII



Source: Census Bureau American Community Survey

Wages as a Percent of Aggregate Income are low in Mendocino County relative to California and the rest of the United States. When the nearby counties are higher growth counties such as Sonoma, Marin, Napa, San Francisco and San Mateo, workers will migrate to the other counties for better wages and business opportunities.

Sharing and Explaining the Drivers of Economic Underperformance - Regression Tests

The analysis up to this point only discusses some coincidental evidence of possible causes of Mendocino's lagging economic performance. Regression helps understand the nature of the relationship between the economic performance and government spending.

Regression Results

I used regression analysis to look for a relationship between economic the components of economic activity and GDP growth in each county. Interestingly, there was no relationship between Wages as Percent of Aggregate Income (Wages) and GDP growth. However, there were very strong negative relationships between the sum of Social Security, Public Assistance, and Other Sources as a Percent of Aggregate Income versus County Wages as a Percent of Aggregate Income and the Growth as measured by the Change in GDP for each county from

2011 (Data Source: Bureau of Economic Analysis – the CAGPD2 Table, All Industry data – The Census Data is the B19065_001E, B19067_001E, B19070_001).

The relationship between Wages and Self-Employed earnings and government transfer payments, such as the sum Social Security, Public Assistance, and Other Income, is almost tautological since Aggregate Income, by definition, approximately equals the sum of Wages, Self-Employed Earnings, Public Assistance, Other Income plus a host of other variables such as Retirement Income, Dividend Income. It is expected that there will be a negative relationship between Wages and Salary as a Percent of Aggregate Income and the sum of the items considered to be transfer payments. The usefulness of this regression is to verify the relationship and to establish the strength of the relationship. See Exhibit XIII

Exhibit XIII

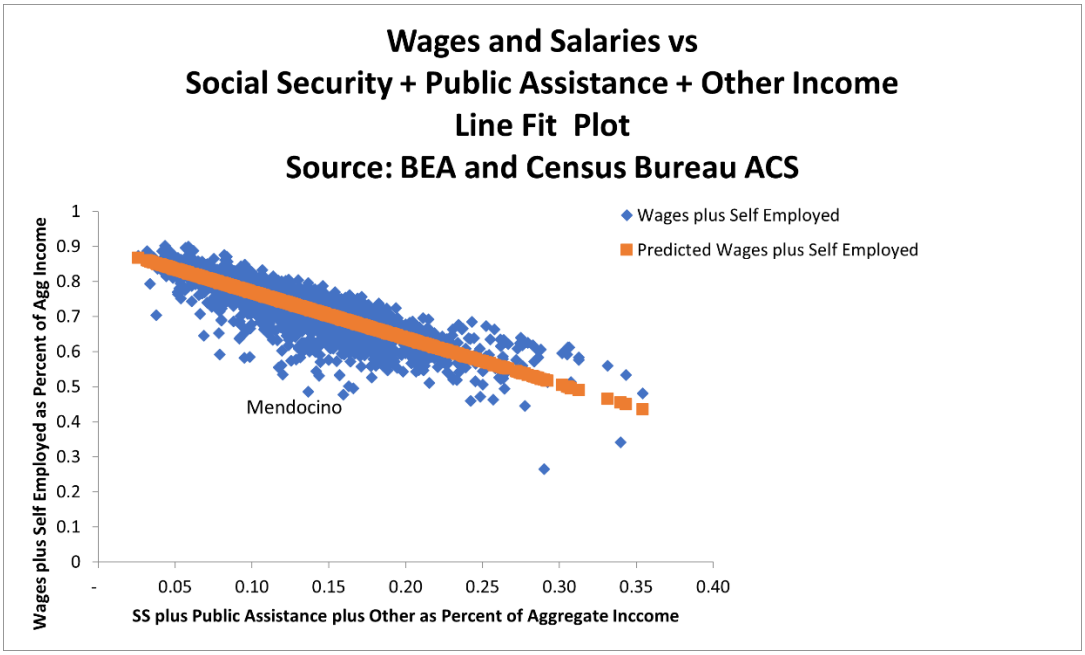


Exhibit XIII demonstrates that the relationship between these variables is very strong and very negative. With a coefficient of -1.316, there is more than a 1 to 1 relationship in the reduction of Wages and Self-Employed earnings when government transfer earnings increase. I labeled Mendocino's datapoint to show that the county seems to be more affected than other counties since it is almost an outlier at the edge of the other county data. This could indicate that other factors are at play in Mendocino.

The R Square data highlighted in blue in Table IV shows that the final model explains 65.5% of the variance in the volatility of the in Wages as Percent of Agg Income across all counties. The yellow highlighted F Statistics indicate that the relationship is statistically significant, meaning that this is not a spurious result and that we can be very confident in the model estimates. Exhibit XV, for statistical purity, shows that there is no serious bias entering the relationship because the residuals form an even band around the X axis.

Table IV

Wages and Salaries vs
Social Security + Public
Assistance + Other Income
SUMMARY OUTPUT

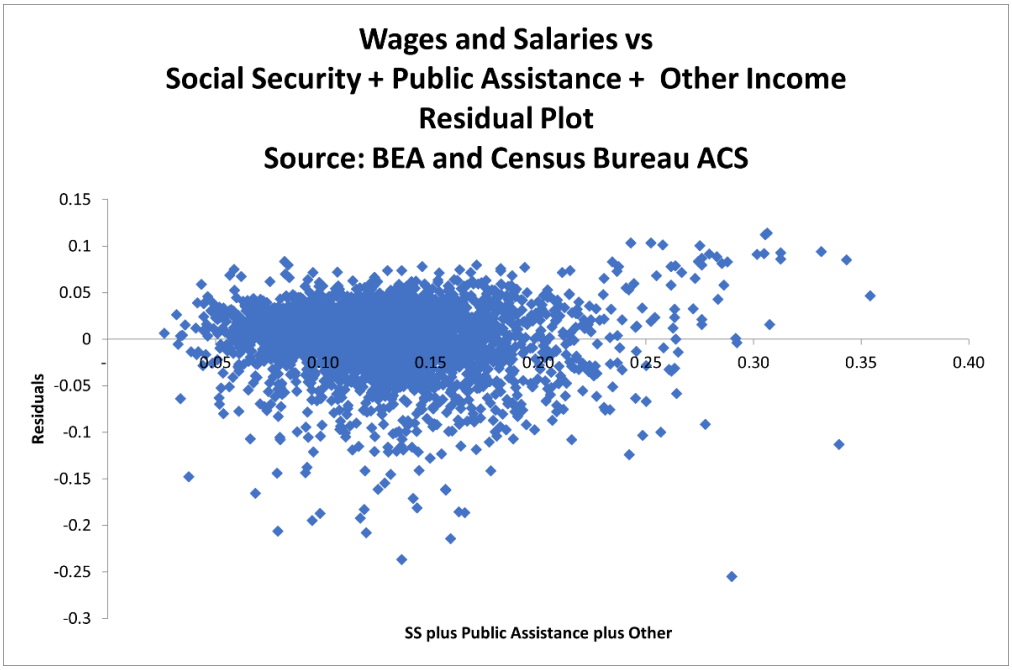
Regression Statistics	
Multiple R	0.828
R Square	0.685
Adjusted R Square	0.685
Standard Error	0.038
Observations	2997

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	9.358	9.358	6523.417	0
Residual	2995	4.296	0.001		
Total	2996	13.654			

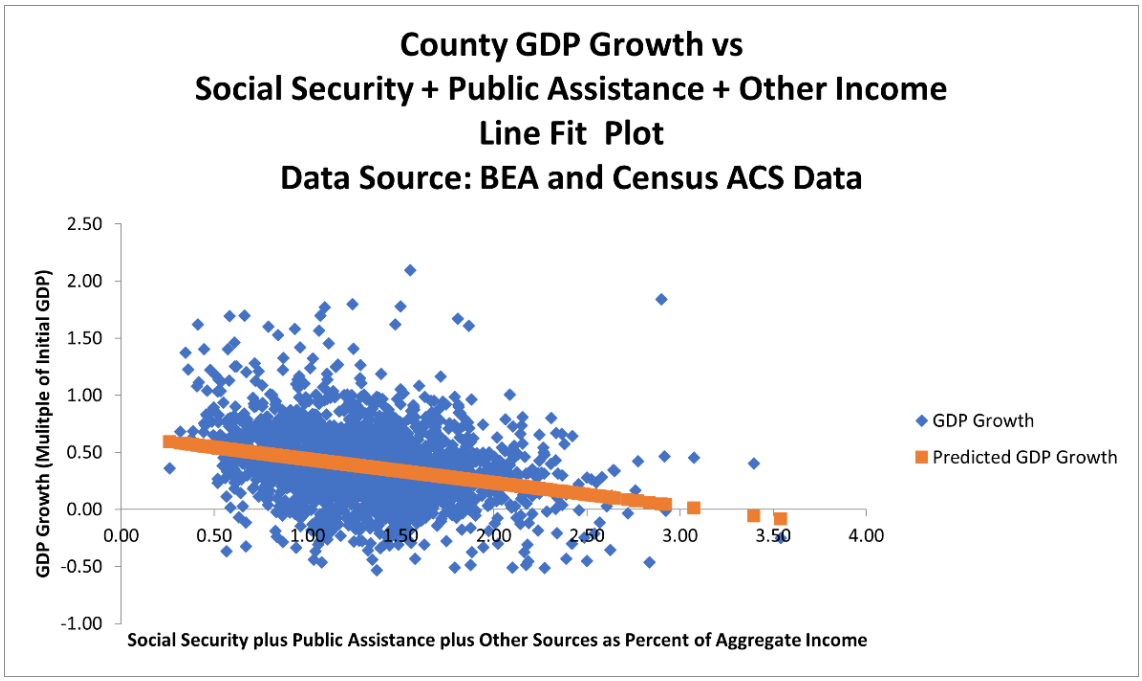
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	0.901	0.002	403.916	0.000	0.897
SS plus Public Assistance plus Other	-1.316	0.016	-80.768	0.000	-1.348

Exhibit XV



While the previous regression explored the degree to which transfer payments negatively influence the wages and earnings from self-employment, it doesn't demonstrate the possible negative economic effects when transfer payments and other government expenditures compose an outsized portion of a county's economic income stream.

Exhibit XVI



I used the GDP growth from 2011 to 2021 at the county level as they dependent variable versus the sum of Social Security, Public Assistance, and Other Income (the Independent Variable) to explore the effect of proportionally high levels of income from government on economic growth. Since outliers can dramatically influence regression results in Ordinary Least Squares regression, I eliminated some observations that were outliers (most were economic growth above 2 – or two times 2010 levels (this would have made the relationship more negative). The regression results show that high levels of transfer payments negatively impacted economic growth in the period.

The negative regression coefficient (in yellow in Table V) is negative -0.20684, means that increase of 1% in Social Security, Public Assistance, and Other Income as a proportion of Aggregate Income will depress economic growth by an estimated 0.21%. The T-Statistic is 15.277 indicates that we can be very sure of this statistical relationship even though there will be high bands of confidence because the R Square is not as high. The pronounced cloud-like pattern of blue observations around the orange trend line shows that there needs to be a large margin of error attached to estimates from the model.

The amorphous, cloud-like nature of the distribution of the residuals around the X axis in Exhibit XVII indicates that there are no serious bias issues with the model and that the model was not unduly influenced by some of the remaining outlying observations.

Table V

Analysis of the Regression
GDP Growth vs Non-Wage and Salary Income Components
SUMMARY OUTPUT

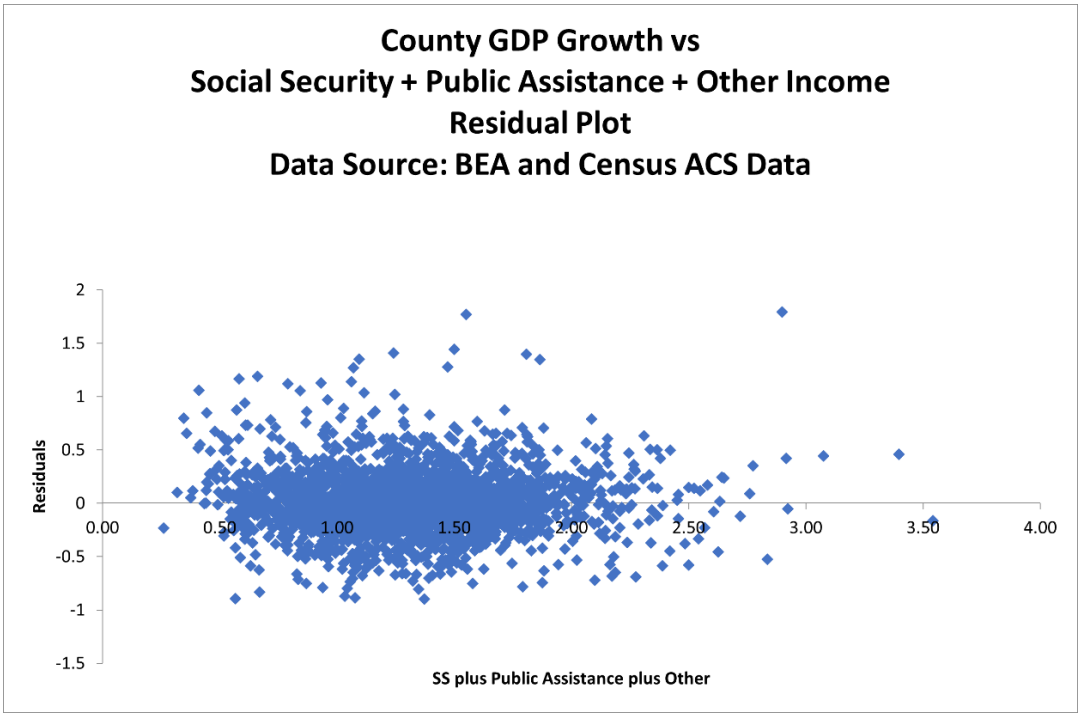
Regression Statistics	
Multiple R	0.281
R Square	0.079
Adjusted R Square	0.079
Standard Error	0.277
Observations	2727.0

ANOVA

	df	*SS*	*MS*	*F*
Regression	1	17.876	17.876	233.385
Residual	2725	208.720	0.077	
Total	2726	226.596		

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.64654	0.01836	35.20908	0.00000
SS plus Public Assistance plus Other	(0.20684)	0.01354	(15.27695)	0.00000

Exhibit XVII



Conclusions

We can reach several conclusions with a high degree of confidence.

1. Mendocino County is a relatively poor county in terms of income relative to California counties and all counties in the United States.
2. Wages relative to housing and other costs are low for California and the United States.
3. Government spending is much larger as a percentage of the County's economy than the average for the state.
4. The high level of government-related transfer payments is depressing economic performance and wage levels in the county.
5. Wages as a percent of Aggregate Income are higher in adjacent counties and nearby high-growth regions such as Silicon Valley and San Francisco and presents attractive alternatives for workers in Mendocino.
6. Mendocino County clearly spends a relatively large portion of the county budget on public assistance.

The chicken or the egg question can be validly applied to Mendocino because the regressions, on their own, only show correlation – we must ask if government spending is high because the county is so poor, or is the county poor because government spending is high. There is no smoking gun that directly condemns government spending as the source of Mendocino County's economic woes. However, when the sample size consists of over 2,000 counties, the relational evidence, the weight of the circumstantial evidence points to the conclusion that high government spending is impeding economic growth.

Proposed solutions (other sources are starred):

1. Improve access and speed of the local internet, internet access in Ukiah is monumentally slow, unreliable, and expensive.* Faster, reliable internet would provide necessary infrastructure for diversifying the County's economy.
2. Use some funds slated for promoting Cannabis and Wine to promote Professional, Scientific, and Technical Services and diversify the economy.
3. While some government transfer payments are due to changing demographics – the population is aging as younger residents leave and as Mendocino County has become known as a place to retire, the County Government might look at avenues for reducing Public Assistance, especially with regard to the homeless.

* https://www.move2030.org/wp-content/uploads/2022/08/Mendocino-County-Economic-Development-Analysis-Beacon-2021.pdf

Background:

Vernon H. Budinger has an MBA in Finance from the Stern School of Business at New York University with emphasis in Statistics and Operations Research. He has designed and led large-scale commercial projects to build mortgage-backed securities prepayment models and risk monitoring platforms. Vernon took the Google Data Analytics Course to brush up on his skills, specifically to learn R, Tableau and tune up his SQL skills.

Appendix A Deleted Data

Census Bureau - American Community Survey Data Deleted

Name			
Aleutians East Borough, Alaska	1.23E+08	8757875	11197287
Yakutat City and Borough, Alaska	22452000	6118337	4930305
Howard County, Arkansas	3.22E+08	24487490	28505463
Sierra County, California	1.06E+08	18421679	21152550
Archuleta County, Colorado	4.56E+08	33010527	47353414
Crook County, Wyoming	2.29E+08	18494579	24941361
Niobrara County, Wyoming	65827200	9781772	9899008
Teton County, Wyoming	1.55E+09	1.49E+08	154560893
Adjuntas Municipio, Puerto Rico	1.36E+08	10827581	9119485
Aguada Municipio, Puerto Rico	4.1E+08	23291303	26104433
Añasco Municipio, Puerto Rico	3.01E+08	23204019	24041346
Barceloneta Municipio, Puerto Rico	2.81E+08	34958456	30264035
Camuy Municipio, Puerto Rico	3.84E+08	25752867	24190773
Canóvanas Municipio, Puerto Rico	6.77E+08	51384269	49671445
Ciales Municipio, Puerto Rico	1.61E+08	25496268	24942269
Comerío Municipio, Puerto Rico	1.64E+08	17096661	14657631
Culebra Municipio, Puerto Rico	21011500	6056314	4127498
Fajardo Municipio, Puerto Rico	4.34E+08	50644124	42923023
Florida Municipio, Puerto Rico	1.17E+08	10573677	15616634
Guánica Municipio, Puerto Rico	1.07E+08	9646088	10607610
Guayanilla Municipio, Puerto Rico	1.67E+08	11654719	13498612
Jayuya Municipio, Puerto Rico	1.17E+08	10465855	11417203
Juncos Municipio, Puerto Rico	4.52E+08	31615045	34178540
Lajas Municipio, Puerto Rico	2E+08	17118462	15467929
Las Marías Municipio, Puerto Rico	71400100	7133065	7555748
Las Piedras Municipio, Puerto Rico	4.55E+08	33200397	38876874
Loíza Municipio, Puerto Rico	2.53E+08	16245859	18102810
Maricao Municipio, Puerto Rico	47363500	5328971	5101244
Maunabo Municipio, Puerto Rico	1.08E+08	8608121	10807486
Moca Municipio, Puerto Rico	4.57E+08	58769879	55315638
Morovis Municipio, Puerto Rico	3.14E+08	21121902	24036074
Naguabo Municipio, Puerto Rico	2.28E+08	17395648	18715471
Orocovis Municipio, Puerto Rico	1.92E+08	23446044	17181922
Patillas Municipio, Puerto Rico	1.74E+08	16137634	16854251
Quebradillas Municipio, Puerto Rico	2.49E+08	17139262	18122074
Rincón Municipio, Puerto Rico	2.19E+08	23346450	23610883
Utuado Municipio, Puerto Rico	2.7E+08	22265824	17122557
Vieques Municipio, Puerto Rico	73473100	13747950	9447893
Villalba Municipio, Puerto Rico	2.72E+08	37674327	40169479

Yabucoa Municipio, Puerto Rico	3.26E+08	24145016	21748315
Peñuelas Municipio, Puerto Rico	2.11E+08	19218248	19129830
Sumter County, Florida	5.08E+09	2.03E+08	220954144
Catron County, New Mexico	81572400	13548817	12826976
Arroyo Municipio, Puerto Rico	1.67E+08	20044806	20993225
Guayama Municipio, Puerto Rico	4.12E+08	31789930	33396868
Kusilvak Census Area, Alaska	1.29E+08	36725831	14803905

Bureau of Economic Analysis Data Deleted

Emporia city	Virginia	Emporia city
Bethel Census Area	Alaska	Bethel Census Area
Ponce Municipio	Puerto Rico	Ponce Municipio
Yauco Municipio	Puerto Rico	Yauco Municipio
Lake and Peninsula Borough	Alaska	Lake and Peninsula Borough
Dillingham Census Area	Alaska	Dillingham Census Area
Cataño Municipio	Puerto Rico	Cataño Municipio
Toa Alta Municipio	Puerto Rico	Toa Alta Municipio
Franklin city	Virginia	Franklin city
San Sebastián Municipio	Puerto Rico	San Sebastián Municipio
Corozal Municipio	Puerto Rico	Corozal Municipio
San Lorenzo Municipio	Puerto Rico	San Lorenzo Municipio
Natchitoches Parish	Louisiana	Natchitoches Parish
Sabine Parish	Louisiana	Sabine Parish
Danville city	Virginia	Danville city
Nome Census Area	Alaska	Nome Census Area
Sabana Grande Municipio	Puerto Rico	Sabana Grande Municipio
Vega Alta Municipio	Puerto Rico	Vega Alta Municipio
Yukon-Koyukuk Census Area	Alaska	Yukon-Koyukuk Census Area
Cabo Rojo Municipio	Puerto Rico	Cabo Rojo Municipio
Isabela Municipio	Puerto Rico	Isabela Municipio
Northwest Arctic Borough	Alaska	Northwest Arctic Borough
Mayagüez Municipio	Puerto Rico	Mayagüez Municipio
Webster Parish	Louisiana	Webster Parish
Prince of Wales-Hyder Census Area	Alaska	Prince of Wales-Hyder Census Area
Claiborne Parish	Louisiana	Claiborne Parish
Staunton city	Virginia	Staunton city
Aguas Buenas Municipio	Puerto Rico	Aguas Buenas Municipio
Vega Baja Municipio	Puerto Rico	Vega Baja Municipio
Naranjito Municipio	Puerto Rico	Naranjito Municipio
Aguadilla Municipio	Puerto Rico	Aguadilla Municipio

Petersburg Borough	Alaska	Petersburg Borough
Hatillo Municipio	Puerto Rico	Hatillo Municipio
Waynesboro city	Virginia	Waynesboro city
Greensville County	Virginia	Greensville County
Barranquitas Municipio	Puerto Rico	Barranquitas Municipio
Lynchburg city	Virginia	Lynchburg city
Santa Isabel Municipio	Puerto Rico	Santa Isabel Municipio
Hormigueros Municipio	Puerto Rico	Hormigueros Municipio
San Germán Municipio	Puerto Rico	San Germán Municipio
Toa Baja Municipio	Puerto Rico	Toa Baja Municipio
Buena Vista city	Virginia	Buena Vista city
Pittsylvania County	Virginia	Pittsylvania County
Hoonah-Angoon Census Area	Alaska	Hoonah-Angoon Census Area
Arecibo Municipio	Puerto Rico	Arecibo Municipio
Luquillo Municipio	Puerto Rico	Luquillo Municipio
Carolina Municipio	Puerto Rico	Carolina Municipio
Salinas Municipio	Puerto Rico	Salinas Municipio
Mingo County	West Virginia	Mingo County
Kenai Peninsula Borough	Alaska	Kenai Peninsula Borough
Lexington city	Virginia	Lexington city
Matanuska-Susitna Borough	Alaska	Matanuska-Susitna Borough
Roanoke city	Virginia	Roanoke city
Cameron Parish	Louisiana	Cameron Parish
Ketchikan Gateway Borough	Alaska	Ketchikan Gateway Borough
Cayey Municipio	Puerto Rico	Cayey Municipio
Manatí Municipio	Puerto Rico	Manatí Municipio
Maui County	Hawaii	Maui County
Copper River Census Area	Alaska	Copper River Census Area
Southampton County	Virginia	Southampton County
Wrangell City and Borough	Alaska	Wrangell City and Borough
Río Grande Municipio	Puerto Rico	Río Grande Municipio
Aibonito Municipio	Puerto Rico	Aibonito Municipio
Trujillo Alto Municipio	Puerto Rico	Trujillo Alto Municipio
Lares Municipio	Puerto Rico	Lares Municipio
Anchorage Municipality	Alaska	Anchorage Municipality
Juana Díaz Municipio	Puerto Rico	Juana Díaz Municipio
Martinsville city	Virginia	Martinsville city
Juneau City and Borough	Alaska	Juneau City and Borough
Sitka City and Borough	Alaska	Sitka City and Borough
Cidra Municipio	Puerto Rico	Cidra Municipio
St. John the Baptist Parish	Louisiana	St. John the Baptist Parish
San Juan Municipio	Puerto Rico	San Juan Municipio
St. James Parish	Louisiana	St. James Parish
Southeast Fairbanks Census Area	Alaska	Southeast Fairbanks Census Area
Baltimore city	Maryland	Baltimore city

Chugach Census Area	Alaska	Chugach Census Area
Caguas Municipio	Puerto Rico	Caguas Municipio
Bristol Bay Borough	Alaska	Bristol Bay Borough
Humacao Municipio	Puerto Rico	Humacao Municipio
Coamo Municipio	Puerto Rico	Coamo Municipio
Hopewell city	Virginia	Hopewell city
Bayamón Municipio	Puerto Rico	Bayamón Municipio
St. Bernard Parish	Louisiana	St. Bernard Parish
Grant Parish	Louisiana	Grant Parish
Harrisonburg city	Virginia	Harrisonburg city
North Slope Borough	Alaska	North Slope Borough
Norfolk city	Virginia	Norfolk city
Fairbanks North Star Borough	Alaska	Fairbanks North Star Borough
Caddo Parish	Louisiana	Caddo Parish
Sublette County	Wyoming	Sublette County
Ceiba Municipio	Puerto Rico	Ceiba Municipio
Portsmouth city	Virginia	Portsmouth city
Winn Parish	Louisiana	Winn Parish
Skagway Municipality	Alaska	Skagway Municipality
Ouachita Parish	Louisiana	Ouachita Parish
Kodiak Island Borough	Alaska	Kodiak Island Borough
Assumption Parish	Louisiana	Assumption Parish
Madison Parish	Louisiana	Madison Parish
District of Columbia	District of Columbia	District of Columbia
Union Parish	Louisiana	Union Parish
East Carroll Parish	Louisiana	East Carroll Parish
Orleans Parish	Louisiana	Orleans Parish
Richmond city	Virginia	Richmond city
Carson City	Nevada	Carson City
Prince George County	Virginia	Prince George County
Franklin Parish	Louisiana	Franklin Parish
Bristol city	Virginia	Bristol city
Guaynabo Municipio	Puerto Rico	Guaynabo Municipio
Winchester city	Virginia	Winchester city
Washington Parish	Louisiana	Washington Parish
St. Landry Parish	Louisiana	St. Landry Parish
St. Louis city	Missouri	St. Louis city
St. Mary Parish	Louisiana	St. Mary Parish
West Carroll Parish	Louisiana	West Carroll Parish
Musselshell County	Montana	Musselshell County
Petersburg city	Virginia	Petersburg city
Broomfield County	Colorado	Broomfield County
Jackson Parish	Louisiana	Jackson Parish
Hampton city	Virginia	Hampton city
Fairfax city	Virginia	Fairfax city

Calcasieu Parish	Louisiana	Calcasieu Parish
Newport News city	Virginia	Newport News city
Allen Parish	Louisiana	Allen Parish
Dorado Municipio	Puerto Rico	Dorado Municipio
Terrebonne Parish	Louisiana	Terrebonne Parish
Storey County	Nevada	Storey County
Evangeline Parish	Louisiana	Evangeline Parish
Beauregard Parish	Louisiana	Beauregard Parish
Salem city	Virginia	Salem city
Denali Borough	Alaska	Denali Borough
Gurabo Municipio	Puerto Rico	Gurabo Municipio
Ascension Parish	Louisiana	Ascension Parish
Haines Borough	Alaska	Haines Borough
Iberville Parish	Louisiana	Iberville Parish
Bossier Parish	Louisiana	Bossier Parish
Charlottesville city	Virginia	Charlottesville city
Caldwell Parish	Louisiana	Caldwell Parish
Radford city	Virginia	Radford city
Virginia Beach city	Virginia	Virginia Beach city
Richland Parish	Louisiana	Richland Parish
Jefferson Davis Parish	Louisiana	Jefferson Davis Parish
Jefferson Parish	Louisiana	Jefferson Parish
Lafourche Parish	Louisiana	Lafourche Parish
St. Charles Parish	Louisiana	St. Charles Parish
Roanoke County	Virginia	Roanoke County
Acadia Parish	Louisiana	Acadia Parish
De Soto Parish	Louisiana	De Soto Parish
Alexandria city	Virginia	Alexandria city
Bienville Parish	Louisiana	Bienville Parish
Chesapeake city	Virginia	Chesapeake city
Spotsylvania County	Virginia	Spotsylvania County
Covington city	Virginia	Covington city
Vermilion Parish	Louisiana	Vermilion Parish
Aleutians West Census Area	Alaska	Aleutians West Census Area
McKenzie County	North Dakota	McKenzie County
Plaquemines Parish	Louisiana	Plaquemines Parish
Tangipahoa Parish	Louisiana	Tangipahoa Parish
Pointe Coupee Parish	Louisiana	Pointe Coupee Parish
East Baton Rouge Parish	Louisiana	East Baton Rouge Parish
San Augustine County	Texas	San Augustine County
Colonial Heights city	Virginia	Colonial Heights city
St. Tammany Parish	Louisiana	St. Tammany Parish
Suffolk city	Virginia	Suffolk city
Red River Parish	Louisiana	Red River Parish
Albemarle County	Virginia	Albemarle County

Reeves County	Texas	Reeves County
Lafayette Parish	Louisiana	Lafayette Parish
Avoyelles Parish	Louisiana	Avoyelles Parish
Manassas city	Virginia	Manassas city
Rapides Parish	Louisiana	Rapides Parish
Lincoln Parish	Louisiana	Lincoln Parish
Iberia Parish	Louisiana	Iberia Parish
Livingston Parish	Louisiana	Livingston Parish
West Baton Rouge Parish	Louisiana	West Baton Rouge Parish
Mountrail County	North Dakota	Mountrail County
Concordia Parish	Louisiana	Concordia Parish
Morehouse Parish	Louisiana	Morehouse Parish
LaSalle Parish	Louisiana	LaSalle Parish
Vernon Parish	Louisiana	Vernon Parish
Galax city	Virginia	Galax city
St. Helena Parish	Louisiana	St. Helena Parish
Williamsburg city	Virginia	Williamsburg city
James City County	Virginia	James City County
St. Martin Parish	Louisiana	St. Martin Parish
Fredericksburg city	Virginia	Fredericksburg city
Norton city	Virginia	Norton city
West Feliciana Parish	Louisiana	West Feliciana Parish
East Feliciana Parish	Louisiana	East Feliciana Parish

Appendix B

R Code for Retrieving ACS Data

```
### ACS Data
### 1 Install Packages
install.packages("tidyverse")
install.packages("plotly")
install.packages("tidycensus")
install.packages("tidyBLS")
install.packages("bea.R")
### Loading Packages
library(tidycensus)
library(bea.R)
census_api_key("XXXXXXXXXXXXXXXXXXXXXXXXX", install = TRUE)
readRenviron("~/.Renviron")



Help(bea.R)
##### Use Data

#### Get Decennial Data

#### ACS Data County for California
types_county_income_wide <- get_acs(
  geography = "county",
  table = "B19051",
  year = 2021,
  output = "wide"
)
```

```
### Get wide-form data by County
types_county_Act2_income_5yrwide <- get_acs(
  geography = "county",
  variables = c(Agg_Income_19313 = "B19313_001",
                Agg_HH_Income_19025 = "B19025_001",
                Earnings_Households = "B19051_001",
                Wage_Salary_Households = "B19052_001",
                SelfEmployed_Households = "B19053_001",
                Int_Div_Inc_Households = "B19054_001",
                Soc_Sec_Households = "B19055_001",
                Sup_Soc_Sec_Households = "B19056_001",
                Public_Assistance_Inc_HH = "B19057_001",
                Pulic_Asst_Food_Stamps_SNAP = "B19058_001",
                Retirement_Income_HH = "B19059_001",
                Other_Types_Inc_HH = "B19060_001",
                Agg_Earnings_for_HH = "B19061_001",
                Agg_Wage_Salary_Inc = "B19062_001",
                Agg_Self_Employment_Inc = "B19063_001",
                Agg_Int_Div_Inc = "B19064_001",
                Agg_Social_Sec_Inc = "B19065_001",
                Agg_Sup_Social_Sec_Inc = "B19066_001",
                Agg_Public_Assistance_Inc = "B19067_001",
                Agg_Retirement_Inc = "B19069_001",
                Agg_Other_types_Inc = "B19070_001"),
  output = "wide"
)

### Display ACS Data County Level Data
types_county_Act2_income_5yrwide
```

```
write.table(types_county_Act2_income_5yrwide,
        file = "ACS_Income_ACT2Data_Breakdown2.csv",
        sep = "\t",
        row.names = FALSE,
)

income_breakdown_cty = (mutate(types_county_Act2_income_5yrwide, Tot_income = B19052_001 +
B19054_001 ))




### variables = c(Agg_Income_19313 = "B19313_001",
###             Agg_HH_Income_19025 = "B19025_001",
###             Earnings_Households = "B19051_001",
###             Wage_Salary_Households = "B19052_001",
###             SelfEmployed_Households = "B19053_001",
###             Int_Div_Inc_Households = "B19054_001",
###             Soc_Sec_Households = "B19055_001",
###             Sup_Soc_Sec_Households = "B19056_001",
###             Public_Assistance_Inc_HH = "B19057_001",
###           Pulic_Asst_Food_Stamps_SNAP = "B19058_001",
###             Retirement_Income_HH = "B19059_001",
###             Other_Types_Inc_HH = "B19060_001",
###             Agg_Earnings_for_HH = "B19061_001",
###             Agg_Wage_Salary_Inc = "B19062_001",
###             Agg_Self_Employment_Inc = "B19063_001",
###             Agg_Int_Div_Inc = "B19064_001",
###             Agg_Social_Sec_Inc = "B19065_001",
```

```
###              Agg_Sup_Social_Sec_Inc = "B19066_001",
###             Agg_Public_Assistance_Inc = "B19067_001",
###              Agg_Retirement_Inc = "B19069_001",
###              Agg_Other_types_Inc = "B19070_001"),
###)
```

Appendix C

R Code for Graphics

```
### This Script Reads the CSV file Downloaded from ACS Mendo Income Breakdown

### Read the data for all counties  ####

ACS_data_all_counties_income_breakdown_newestt_final <-
read_csv("ACS_Income_Data_Breakdown_Complete_CSV.csv")

### plot the data for % income from wages vs % income from Public Assistance

ggplot(data = ACS_data_all_counties_income_breakdown_newestt_final)+

  geom_point(mapping = aes(x = Wage_Salary_divby_Agg_Earnings, y =
Public_Assistance_div_by_Agg_Earnings, shape = Decile_Label, color = Decile_Label))+

  facet_grid(factor(Decile_Label, levels = c('Top 10%', 'Mendocino', 'Bottom 90%'))~.) +

  labs(title = "Levels of Public Assistance as a Percent of Income by County", subtitle = "Top Ten
Percent of Counties Paying the Most Relative to the Bottom Ninety Percent")+

  xlab("Wages as a Percent of Total Income") + ylab("Public Assistance as a Percent of Total Income")

### annotate("text", x = .4,y = .003, label="Mendocino earns less from Wages")+

###  annotate("text", x = .4,y = .002000, label="and more from Public Assistance")



### Read the data for California counties  ####

ACS_data_all_CA_counties_income_breakdown <-
read_csv("ACS_Income_CA_Data_Breakdown_Complete_CSV.csv")


ggplot(data = ACS_data_all_CA_counties_income_breakdown)+

  geom_point(mapping = aes(x = Wage_Salary_divby_Agg_Earnings, y =
Public_Assistance_div_by_Agg_Earnings, shape = Decile_Label, color = Decile_Label))+

  facet_grid(factor(Decile_Label, levels = c('Top 10%', 'Mendocino', 'Bottom 90%'))~.) +

  labs(title = "Levels of Public Assistance as a Percent of Income by County", subtitle = "Top Ten
Percent of Counties Paying the Most Relative to the Bottom Ninety Percent")+

  xlab("Wages as a Percent of Total Income") + ylab("Public Assistance as a Percent of Total Income")

### annotate("text", x = .4,y = .003, label="Mendocino earns less from Wages")+

###  annotate("text", x = .4,y = .002000, label="and more from Public Assistance")
```

```
### Ggplot for California for counties no facets

ggplot(data = ACS_data_all_CA_counties_income_breakdown)+

  geom_point(mapping = aes(x = Wage_Salary_divby_Agg_Earnings, y =
Public_Assistance_div_by_Agg_Earnings, shape = Decile_Label, color = Decile_Label))+

  labs(title = "Levels of Public Assistance In California as a Percent of Income by County", subtitle =
"Top Ten Percent of Counties Paying the Most Relative to the Bottom Ninety Percent")+

  xlab("Wages as a Percent of Total Income") + ylab("Public Assistance as a Percent of Total Income")

### annotate("text", x = .4,y = .003, label="Mendocino earns less from Wages")+

###  annotate("text", x = .4,y = .002000, label="and more from Public Assistance")



### Decile Plot for all counties for % of public assistance

### ACS_data_all_CA_counties_income_breakdown$income_decile_PA <- get_decile


### Percent to reformat graphs


### Rerun Graph

ggplot(data = ACS_data_all_counties_income_breakdown_newestt_final)+

  geom_point(mapping = aes(x = Wage_Salary_divby_Agg_Earnings_Pct, y =
Public_Assistance_div_by_Agg_Earnings_Pct, shape = Decile_Label, color = Decile_Label))+

  facet_grid(factor(Decile_Label, levels = c('Top 10%', 'Mendocino', 'Bottom 90%'))~.) +

  labs(title = "Levels of Public Assistance as a Percent of Income by County", subtitle = "Top Ten
Percent of Counties Paying the Most Relative to the Bottom Ninety Percent")+

  xlab("Wages as a Percent of Total Income") + ylab("Public Assistance as a Percent of Total Income")



ACS_data_all_counties_income_breakdown_newestt_final <-
mutate(ACS_data_all_counties_income_breakdown_newestt_final,
Wage_Salary_divby_Agg_Earnings_Pct = Wage_Salary_divby_Agg_Earnings *100,
Public_Assistance_div_by_Agg_Earnings_Pct = Public_Assistance_div_by_Agg_Earnings * 100)
```

```
#########################################################################

### Mutate Example

#########################################################################

###hrv <- mutate(hrv, upper_limit = round(HRVRM + 1.5 * HRVSD, 3),

###            lower_limit = round(HRVRM - 1.5 * HRVSD, 3),

###            lower_limit2 = round(HRVRM - .75 * HRVSD, 3))

#########################################################################

###
mutate(ACS_data_all_counties_income_breakdown_newestt_final,Wage_Salary_divby_Agg_Earnings
_Pct = Wage_Salary_divby_Agg_Earnings *100, Public_Assistance_div_by_Agg_Earnings_Pct =
Public_Assistance_div_by_Agg_Earnings * 100)


###
select(ACS_data_all_counties_income_breakdown_newestt_final:Wage_Salary_divby_Agg_Earnings)

###View(ACS_data_all_counties_income_breakdown_newestt_final)

###colnames(ACS_data_all_counties_income_breakdown_newestt_final)

### small_acs_data_all_counties <-
data.frame(Wage_Salary_divby_Agg_Earnings,Public_Assistance_div_by_Agg_Earnings )


#####################################################################

### Plot with the new percentage number

#####################################################################

ggplot(data = ACS_data_all_counties_income_breakdown_newestt_final)+

  geom_point(mapping = aes(x = Wage_Salary_divby_Agg_Earnings_Pct, y =
Public_Assistance_div_by_Agg_Earnings_Pct, shape = Decile_Label, color = Decile_Label))+

  facet_grid(factor(Decile_Label, levels = c('Top 10%', 'Mendocino', 'Bottom 90%'))~.) +

  labs(title = "Levels of Public Assistance as a Percent of Income by County", subtitle = "Top Ten
Percent of Counties Paying the Most Relative to the Bottom Ninety Percent")+

  xlab("Wages as a Percent of Total Income") + ylab("Public Assistance as a Percent of Total Income")


#####################################################################

### Plot with the new percentage number without grd
```

```
#################################################################

ggplot(data = ACS_data_all_counties_income_breakdown_newestt_final)+

  geom_point(mapping = aes(x = Wage_Salary_divby_Agg_Earnings_Pct, y =
Public_Assistance_div_by_Agg_Earnings_Pct, shape = Decile_Label, color = Decile_Label))+

  labs(title = "Levels of Public Assistance as a Percent of Income by County", subtitle = "Top Ten
Percent of Counties Paying the Most Relative to the Bottom Ninety Percent")+

  xlab("Wages as a Percent of Total Income") + ylab("Public Assistance as a Percent of Total Income")




#################################################################

### Graphics for California Counties

#################################################################


ACS_data_all_CA_counties_income_breakdown <-
mutate(ACS_data_all_CA_counties_income_breakdown, Wage_Salary_divby_Agg_Earnings_Pct =
Wage_Salary_divby_Agg_Earnings *100, Public_Assistance_div_by_Agg_Earnings_Pct =
Public_Assistance_div_by_Agg_Earnings * 100)


View(ACS_data_all_CA_counties_income_breakdown)


ggplot(data = ACS_data_all_CA_counties_income_breakdown)+

  geom_point(mapping = aes(x = Wage_Salary_divby_Agg_Earnings_Pct, y =
Public_Assistance_div_by_Agg_Earnings_Pct, shape = Decile_Label, color = Decile_Label))+

  labs(title = "Levels of Public Assistance In California as a Percent of Income by County", subtitle =
"Top Ten Percent of Counties Paying the Most Relative to the Bottom Ninety Percent")+

  xlab("Wages as a Percent of Total Income") + ylab("Public Assistance as a Percent of Total Income")
```

Appendix D

R Data Cleaning and Exploration

```
summary(types_county_Act2_income_5yrwide_New)
   GEOID              NAME           Agg_Income_19313E   Agg_Income_19313M   Agg_HH_Income_19025E
 Length:3221        Length:3221        Min.   :2.386e+06   Min.   :1.347e+06   Min.   :2.277e+06
 Class :character   Class :character   1st Qu.:2.854e+08   1st Qu.:2.297e+07   1st Qu.:2.695e+08
 Mode  :character   Mode  :character   Median :7.000e+08   Median :4.619e+07   Median :6.679e+08
                                       Mean   :3.867e+09   Mean   :9.044e+07   Mean   :3.755e+09
                                       3rd Qu.:2.055e+09   3rd Qu.:9.644e+07   3rd Qu.:1.992e+09
                                       Max.   :3.800e+11   Max.   :2.178e+09   Max.   :3.660e+11

 Agg_HH_Income_19025M Earnings_HouseholdsE Earnings_HouseholdsM Wage_Salary_HouseholdsE
 Min.   :1.423e+06    Min.   :    31       Min.   :  16.0       Min.   :    31
 1st Qu.:2.446e+07    1st Qu.:  4167       1st Qu.: 182.0       1st Qu.:  4167
 Median :4.903e+07    Median :  9818       Median : 292.0       Median :  9818
 Mean   :9.484e+07    Mean   : 38872       Mean   : 399.5       Mean   : 38872
 3rd Qu.:1.008e+08    3rd Qu.: 25550       3rd Qu.: 481.0       3rd Qu.: 25550
 Max.   :2.340e+09    Max.   :3342811      Max.   :5387.0       Max.   :3342811

 Wage_Salary_HouseholdsM SelfEmployed_HouseholdsE SelfEmployed_HouseholdsM Int_Div_Inc_HouseholdsE
 Min.   :  16.0          Min.   :    31           Min.   :  16.0           Min.   :    31
 1st Qu.: 182.0          1st Qu.:  4167           1st Qu.: 182.0           1st Qu.:  4167
 Median : 292.0          Median :  9818           Median : 292.0           Median :  9818
 Mean   : 399.5          Mean   : 38872           Mean   : 399.5           Mean   : 38872
 3rd Qu.: 481.0          3rd Qu.: 25550           3rd Qu.: 481.0           3rd Qu.: 25550
 Max.   :5387.0          Max.   :3342811          Max.   :5387.0           Max.   :3342811

 Int_Div_Inc_HouseholdsM Soc_Sec_HouseholdsE Soc_Sec_HouseholdsM Sup_Soc_Sec_HouseholdsE
 Min.   :  16.0          Min.   :    31      Min.   :  16.0      Min.   :    31
 1st Qu.: 182.0          1st Qu.:  4167      1st Qu.: 182.0      1st Qu.:  4167
 Median : 292.0          Median :  9818      Median : 292.0      Median :  9818
 Mean   : 399.5          Mean   : 38872      Mean   : 399.5      Mean   : 38872
 3rd Qu.: 481.0          3rd Qu.: 25550      3rd Qu.: 481.0      3rd Qu.: 25550
 Max.   :5387.0          Max.   :3342811     Max.   :5387.0      Max.   :3342811

 Sup_Soc_Sec_HouseholdsM Public_Assistance_Inc_HHE Public_Assistance_Inc_HHM
 Min.   :  16.0          Min.   :    31           Min.   :  16.0
 1st Qu.: 182.0          1st Qu.:  4167           1st Qu.: 182.0
 Median : 292.0          Median :  9818           Median : 292.0
 Mean   : 399.5          Mean   : 38872           Mean   : 399.5
 3rd Qu.: 481.0          3rd Qu.: 25550           3rd Qu.: 481.0
 Max.   :5387.0          Max.   :3342811          Max.   :5387.0

 Pulic_Asst_Food_Stamps_SNAPE Pulic_Asst_Food_Stamps_SNAPM Retirement_Income_HHE Retirement_Income_HHM
 Min.   :    31               Min.   :  16.0               Min.   :    31         Min.   :  16.0
 1st Qu.:  4167               1st Qu.: 182.0               1st Qu.:  4167         1st Qu.: 182.0
 Median :  9818               Median : 292.0               Median :  9818         Median : 292.0
 Mean   : 38872               Mean   : 399.5               Mean   : 38872         Mean   : 399.5
 3rd Qu.: 25550               3rd Qu.: 481.0               3rd Qu.: 25550         3rd Qu.: 481.0
 Max.   :3342811              Max.   :5387.0               Max.   :3342811        Max.   :5387.0

 Other_Types_Inc_HHE Other_Types_Inc_HHM Agg_Earnings_for_HHE Agg_Earnings_for_HHM
 Min.   :    31      Min.   :  16.0      Min.   :1.721e+06    Min.   :1.438e+06
 1st Qu.:  4167      1st Qu.: 182.0      1st Qu.:1.883e+08    1st Qu.:2.144e+07
 Median :  9818      Median : 292.0      Median :4.801e+08    Median :4.219e+07
 Mean   : 38872      Mean   : 399.5      Mean   :2.972e+09    Mean   :8.307e+07
 3rd Qu.: 25550      3rd Qu.: 481.0      3rd Qu.:1.483e+09    3rd Qu.:8.767e+07
 Max.   :3342811     Max.   :5387.0      Max.   :3.037e+11    Max.   :2.006e+09

 Agg_Wage_Salary_IncE Agg_Wage_Salary_IncM Agg_Self_Employment_IncE Agg_Self_Employment_IncM
 Min.   :1.540e+06    Min.   :1.426e+06    Min.   :-9.420e+04       Min.   :   238100
 1st Qu.:1.708e+08    1st Qu.:2.002e+07    1st Qu.: 1.676e+07       1st Qu.:  6545343
 Median :4.406e+08    Median :3.937e+07    Median : 3.716e+07       Median : 12831922
```

```
Mean   :2.792e+09    Mean   :7.827e+07    Mean   : 1.798e+08      Mean   : 26776124
3rd Qu.:1.389e+09    3rd Qu.:8.207e+07    3rd Qu.: 1.005e+08      3rd Qu.: 28113864
Max.   :2.785e+11    Max.   :2.002e+09    Max.   : 2.514e+10      Max.   :653343833
                                  NA's   :5               NA's   :5
Agg_Int_Div_IncE    Agg_Int_Div_IncM    Agg_Social_Sec_IncE Agg_Social_Sec_IncM
Min.   :8.070e+04   Min.   :    81197   Min.   :2.082e+05   Min.   :   165455
1st Qu.:1.055e+07   1st Qu.:  4619816   1st Qu.:3.258e+07   1st Qu.:  3194694
Median :2.992e+07   Median : 12046502   Median :7.570e+07   Median :  5594140
Mean   :1.914e+08   Mean   : 28787881   Mean   :2.546e+08   Mean   :  8488506
3rd Qu.:9.583e+07   3rd Qu.: 31683235   3rd Qu.:2.007e+08   3rd Qu.:  9842020
Max.   :2.055e+10   Max.   :843776560   Max.   :1.619e+10   Max.   :119552464
NA's   :11          NA's   :11          NA's   :1           NA's   :1
Agg_Sup_Social_Sec_IncE Agg_Sup_Social_Sec_IncM Agg_Public_Assistance_IncE Agg_Public_Assistance_IncM
Min.   :3.100e+04       Min.   :   24463        Min.   :    3300          Min.   :    3396
1st Qu.:2.401e+06       1st Qu.:  941358        1st Qu.:  257750          1st Qu.:  176361
Median :6.279e+06       Median : 1893203        Median :  711400          Median :  421402
Mean   :2.142e+07       Mean   : 2863669        Mean   : 4202599          Mean   :  900378
3rd Qu.:1.595e+07       3rd Qu.: 3519146        3rd Qu.: 2321650          3rd Qu.:  987536
Max.   :2.338e+09       Max.   :39030604        Max.   :754114800         Max.   :19699310
NA's   :78              NA's   :78              NA's   :182               NA's   :182
Agg_Retirement_IncE Agg_Retirement_IncM Agg_Other_types_IncE Agg_Other_types_IncM
Min.   :2.918e+05   Min.   :   205205   Min.   :1.030e+05    Min.   :   116425
1st Qu.:2.149e+07   1st Qu.:  4916700   1st Qu.:6.187e+06    1st Qu.:  2131969
Median :5.580e+07   Median : 10314515   Median :1.472e+07    Median :  4124924
Mean   :2.534e+08   Mean   : 20279628   Mean   :5.995e+07    Mean   :  7187754
3rd Qu.:1.679e+08   3rd Qu.: 23101024   3rd Qu.:4.030e+07    3rd Qu.:  8299512
Max.   :1.739e+10   Max.   :415413138   Max.   :5.151e+09    Max.   :106381730
NA's   :3           NA's   :3           NA's   :6            NA's   :6

>
```