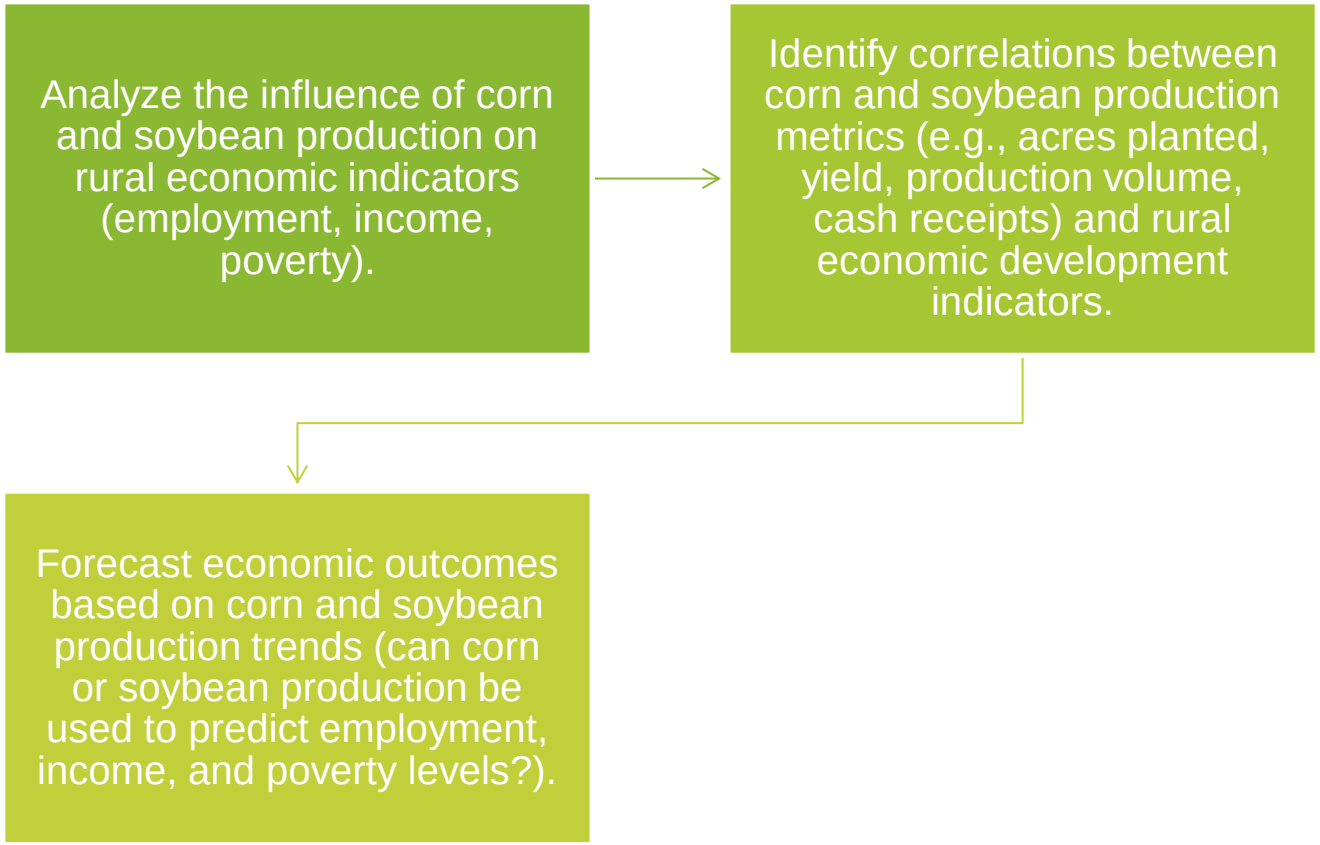
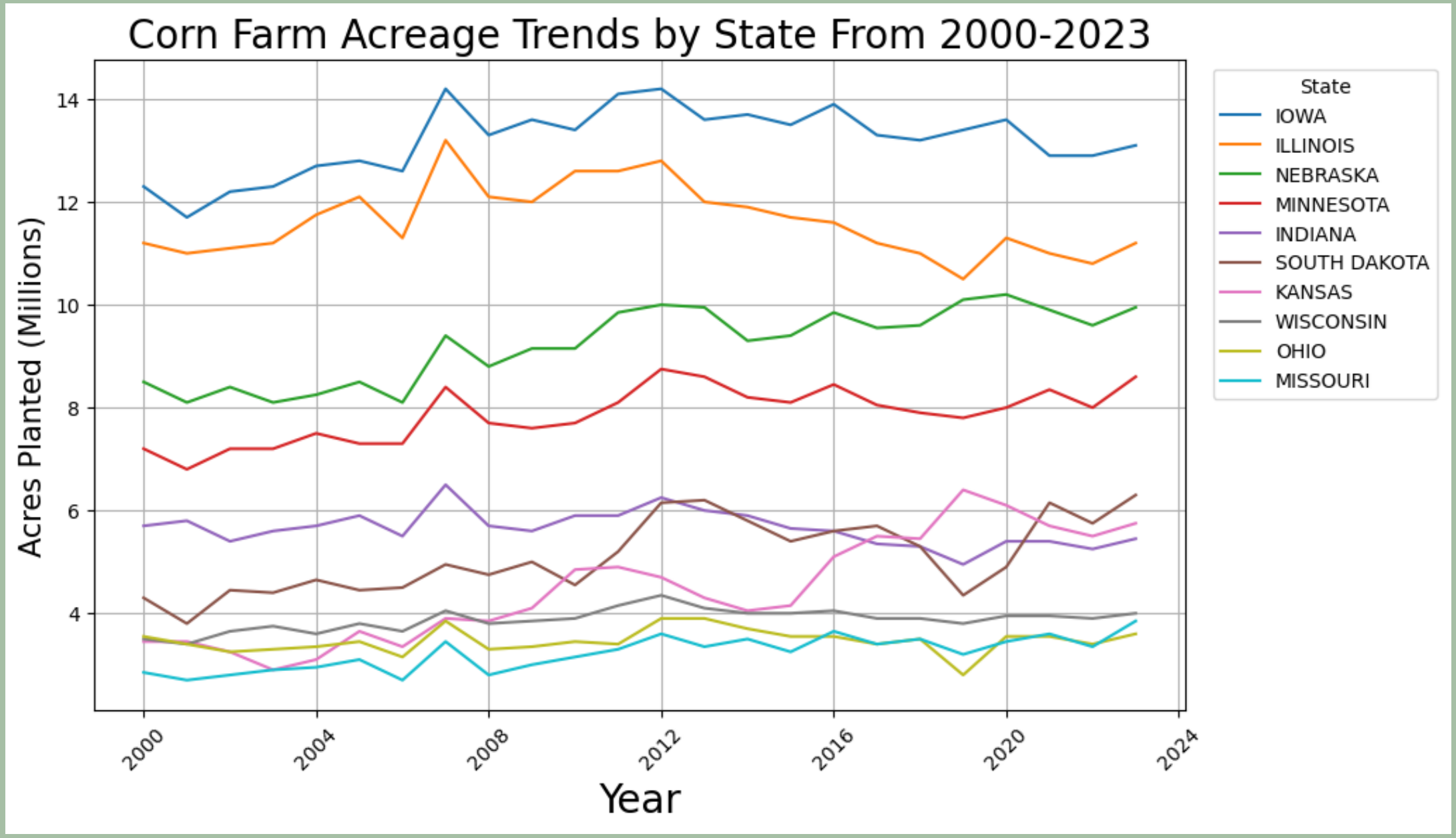
Harvesting Insights: The Economic Impact of Corn and Soybeans on Rural America

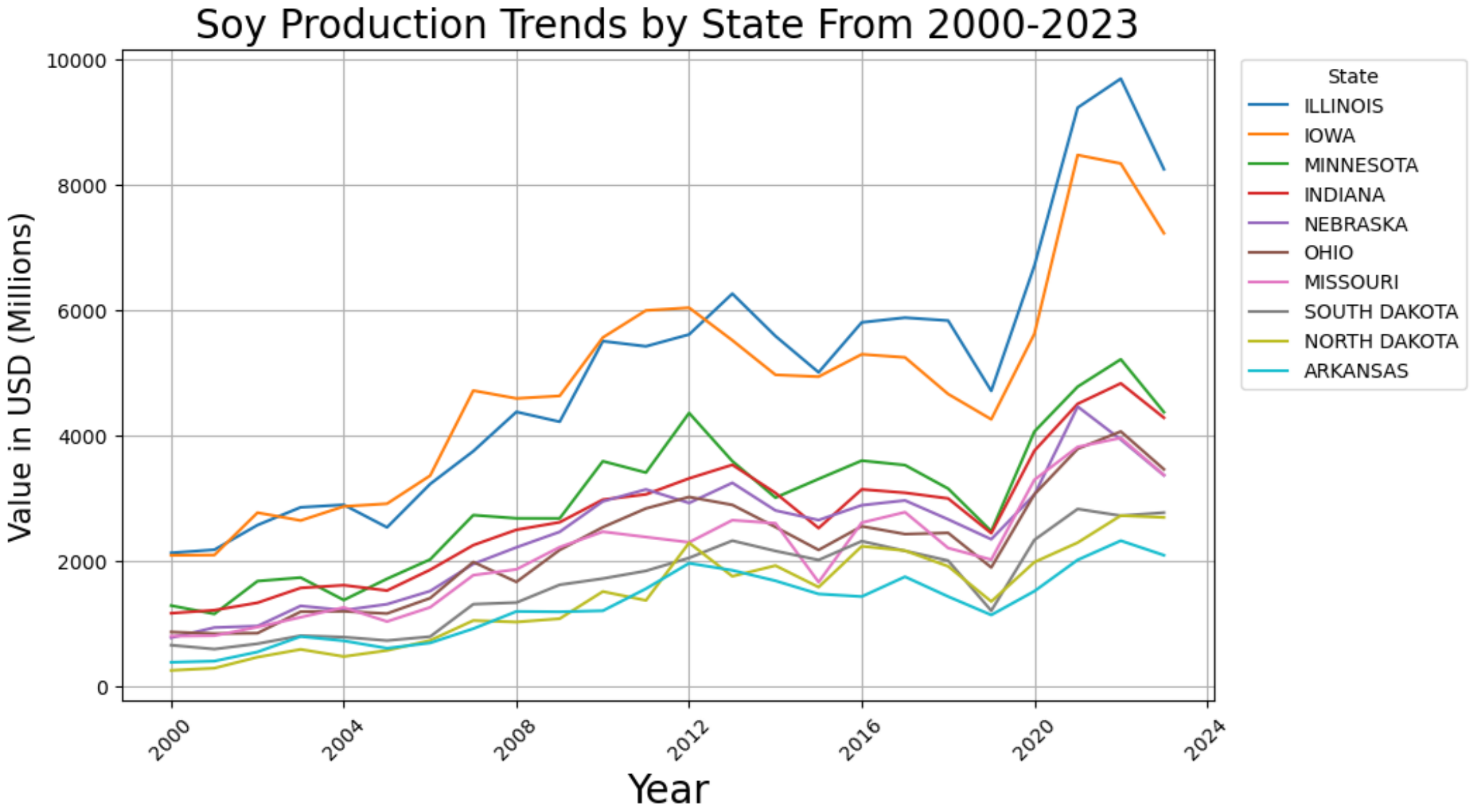
Analyzing 15 Years of Crop Trends to Predict Economic Outcomes from Corn and Soybean Production

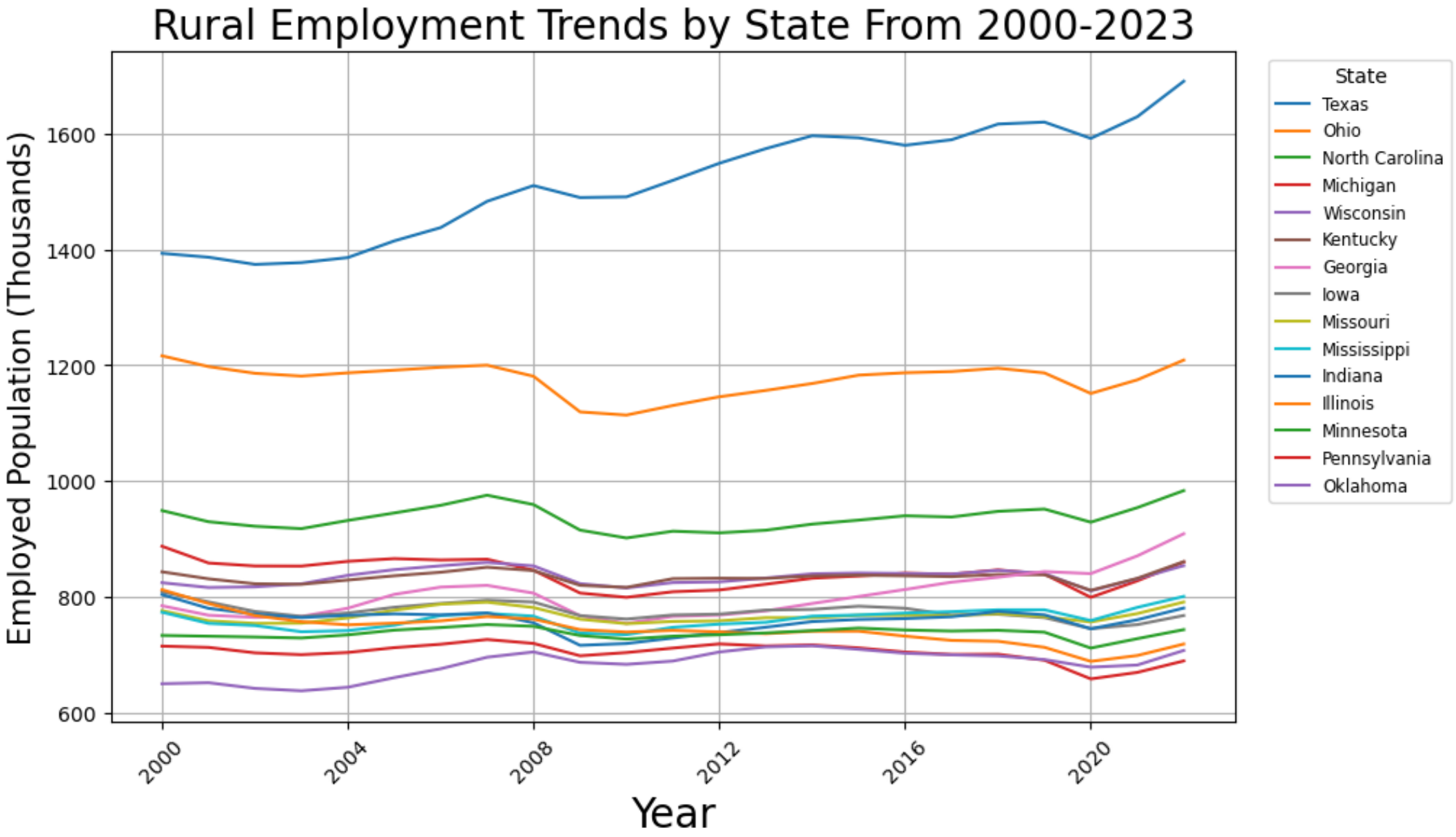
Problem Statement

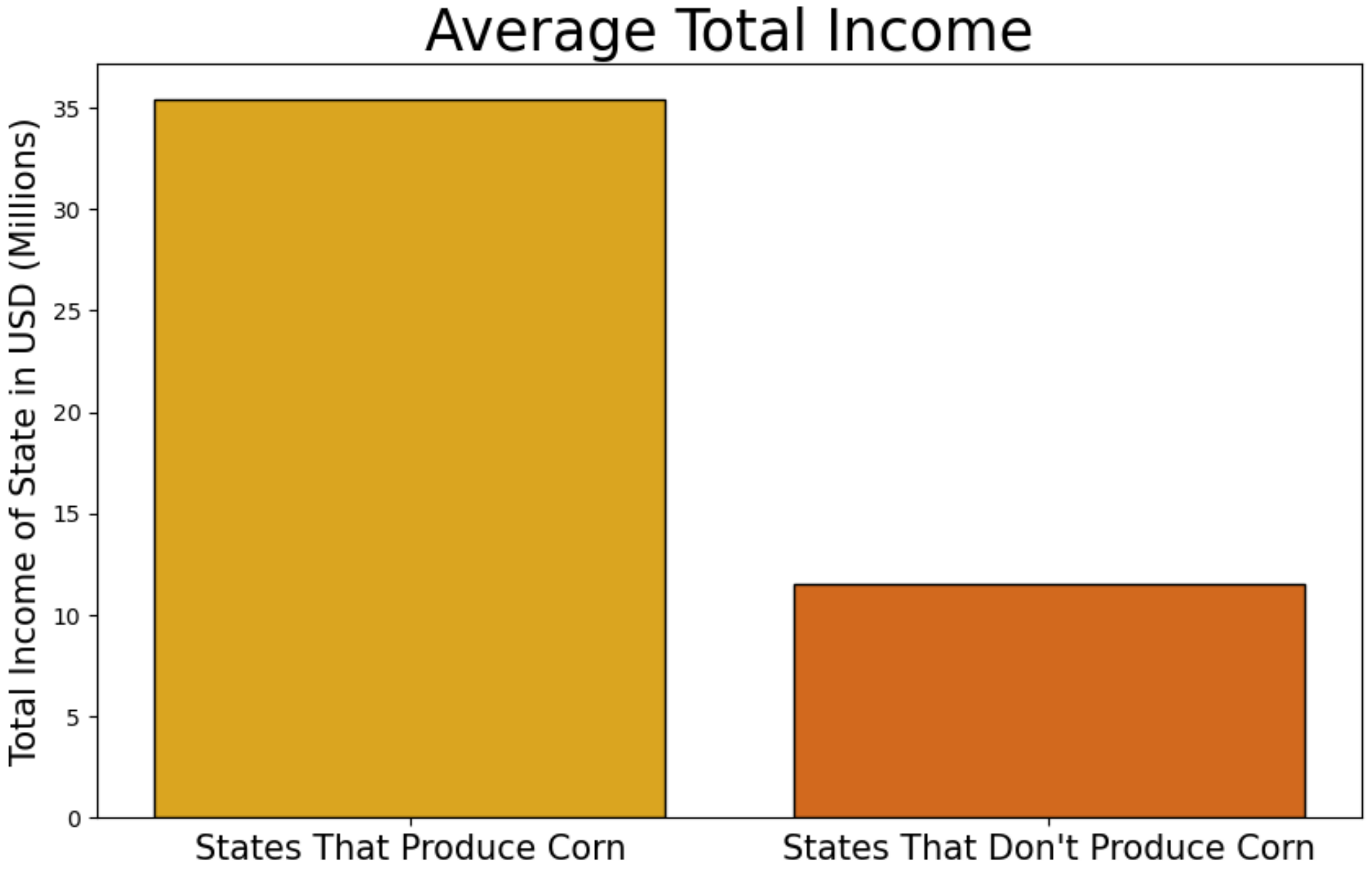


Exploratory Data Analysis


Corn Farm Acreage Trends by State From 2000-2023
Acres Planted (Millions)
14
12
10
8
6
4
2000
2004
2008
2012
2016
2020
2024
Year
State
IOWA
ILLINOIS
NEBRASKA
MINNESOTA
INDIANA
SOUTH DAKOTA
KANSAS
WISCONSIN
OHIO
MISSOURI


Soy Production Trends by State From 2000-2023
Value in USD (Millions)
10000
8000
6000
4000
2000
0
2000
2004
2008
2012
2016
2020
2024
Year
State
ILLINOIS
IOWA
MINNESOTA
INDIANA
NEBRASKA
OHIO
MISSOURI
SOUTH DAKOTA
NORTH DAKOTA
ARKANSAS


Rural Employment Trends by State From 2000-2023
Employed Population (Thousands)
1600
1400
1200
1000
800
600
2000
2004
2008
2012
2016
2020
Year
State
Texas
Ohio
North Carolina
Michigan
Wisconsin
Kentucky
Georgia
Iowa
Missouri
Mississippi
Indiana
Illinois
Minnesota
Pennsylvania
Oklahoma


Average Total Income
Total Income of State in USD (Millions)
0
5
10
15
20
25
30
35
States That Produce Corn
States That Don't Produce Corn

Corn Industry in 2023

GDP

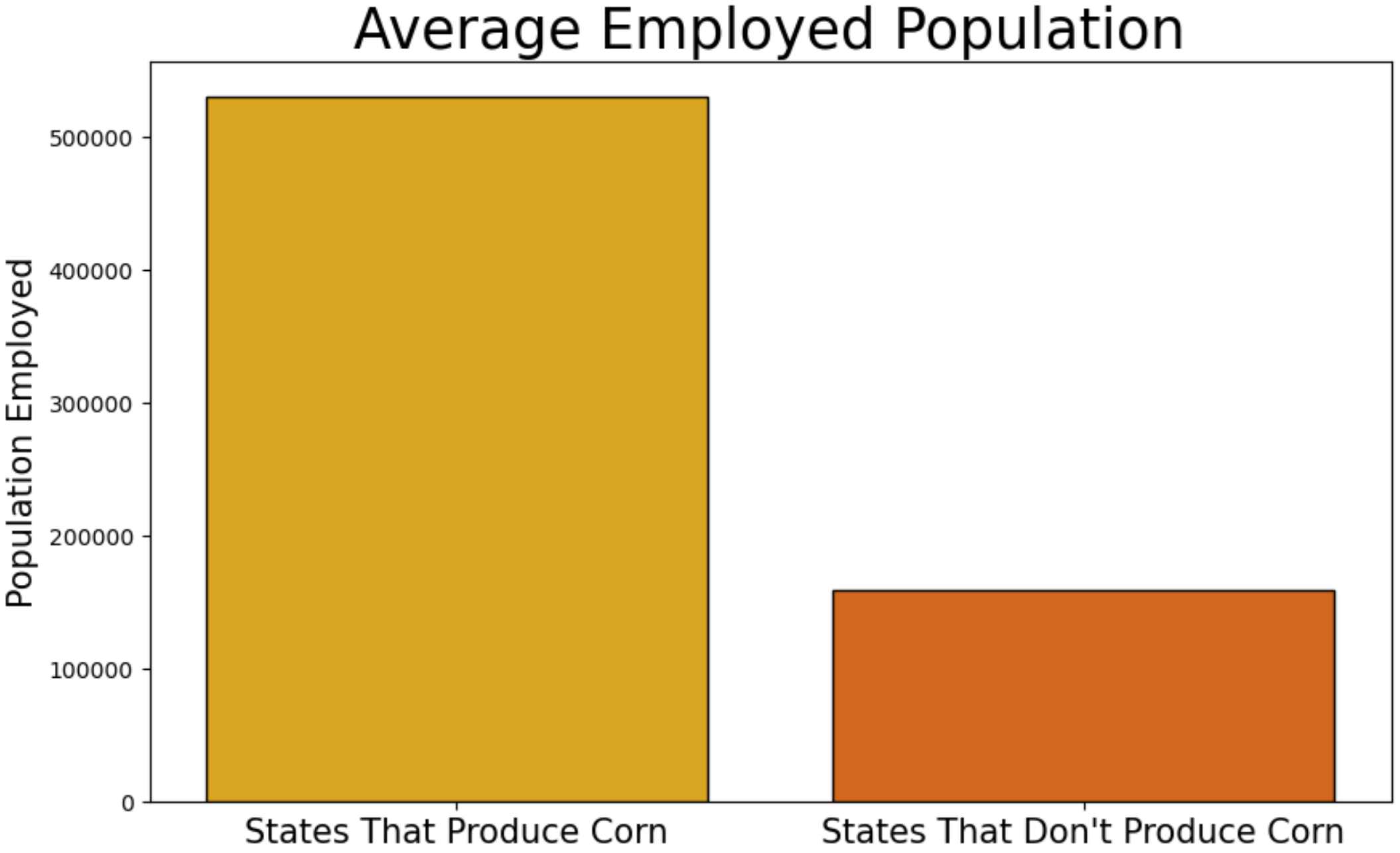
$62 billion contributed

Jobs

600,000 nationwide

Economic Output

$151 billion


Average Employed Population
Population Employed
500000
400000
300000
200000
100000
0
States That Produce Corn
States That Don't Produce Corn

Positively Correlated Factors

Corn & Soy Farm Acreage, Production, & Value —— **0.26** —— Personal Rural Income

Corn & Soy Farm Acreage, Production, & Value —— **0.42** —— Rural Employment

EDA Summary

Production:
Corn & soy production is trending upwards.
Employment:
Agriculture jobs are stabler than other industries.
Economic Impacts:
Intertwined nature of agricultural productivity, economic stability, and employment.

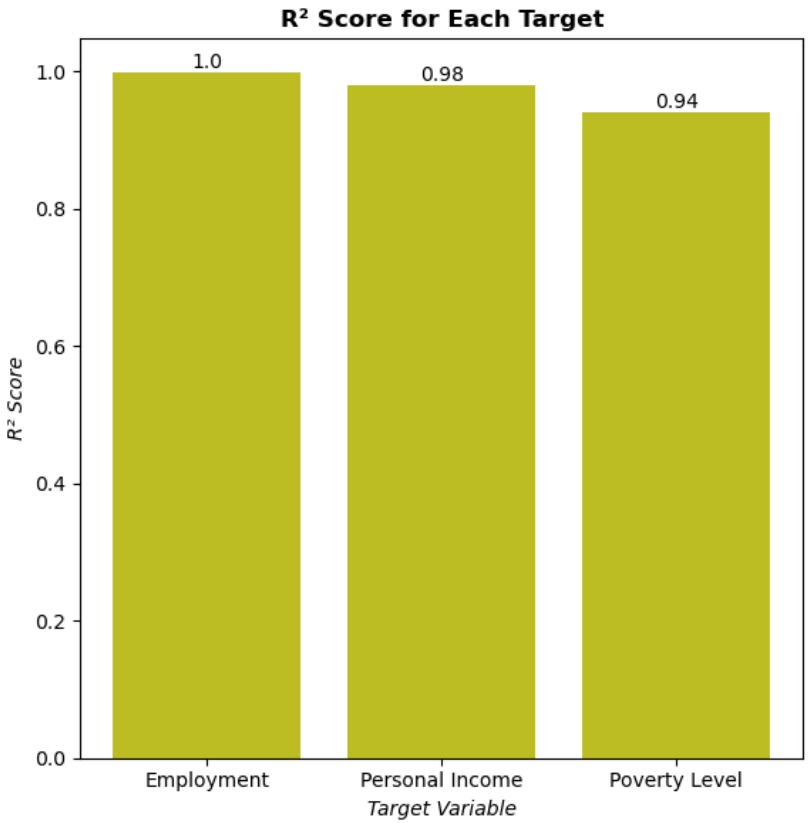
Preprocessing Data

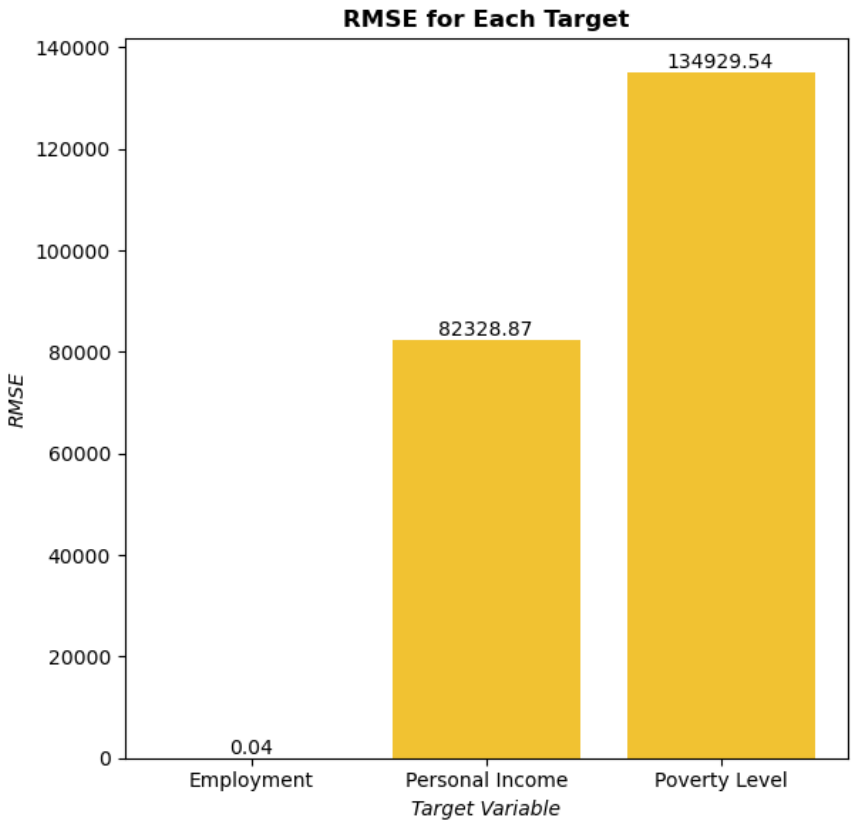
Getting Data Ready for Modeling

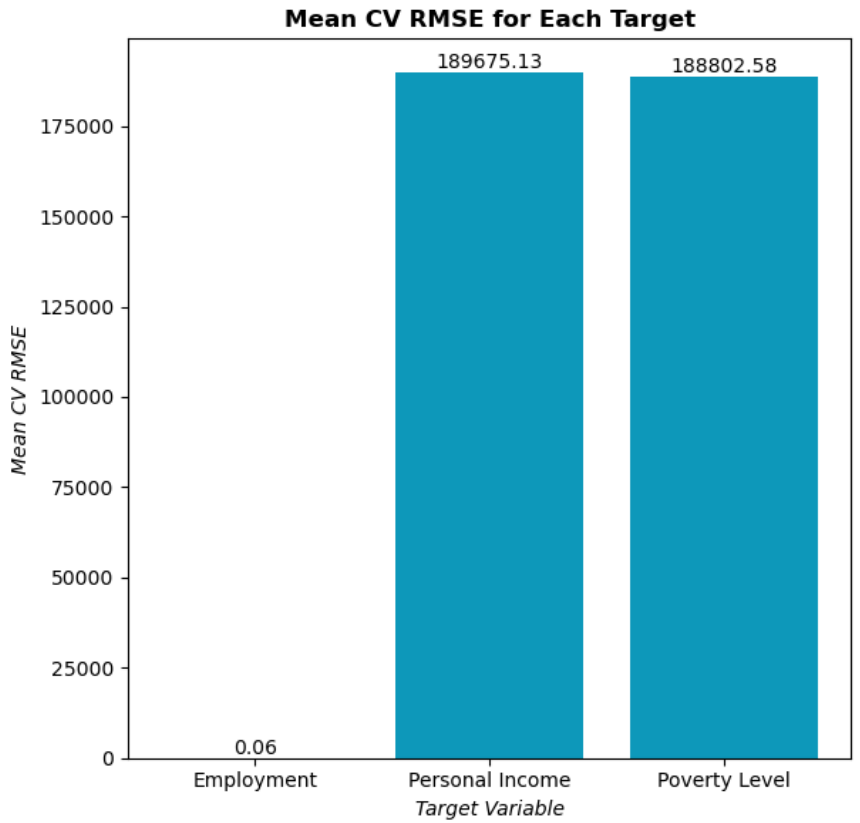
1. Merging Data
2. Handling Missing Values
3. Removing Duplicates
4. Renaming / Categorizing Columns
5. Scaling & Normalization
6. Feature Selection & Engineering
7. Dealing with Collinearity

Predictive Modeling

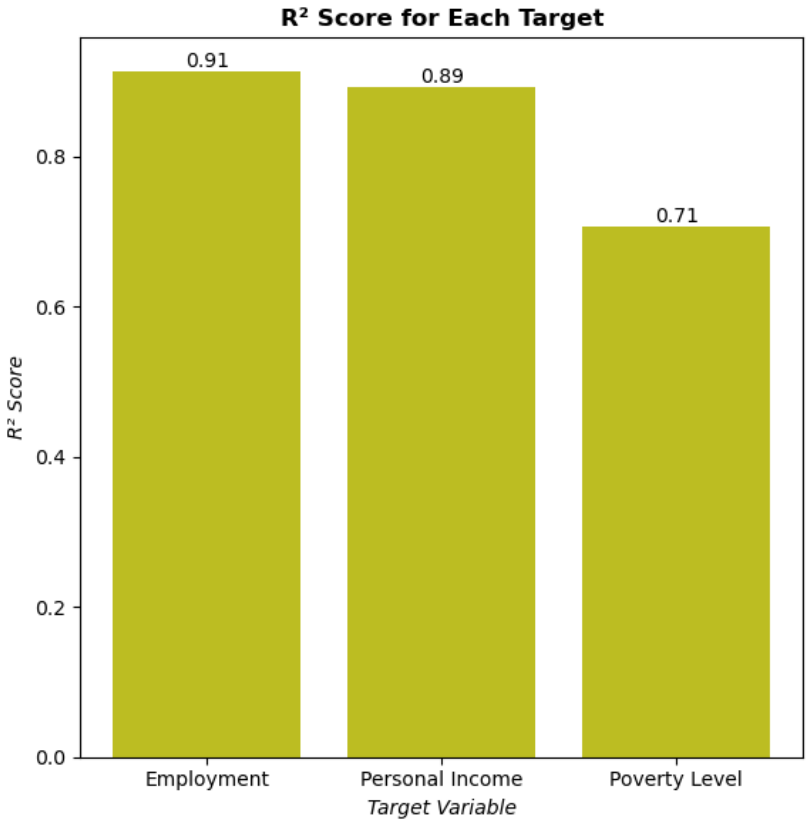
Ridge Regression Model Results

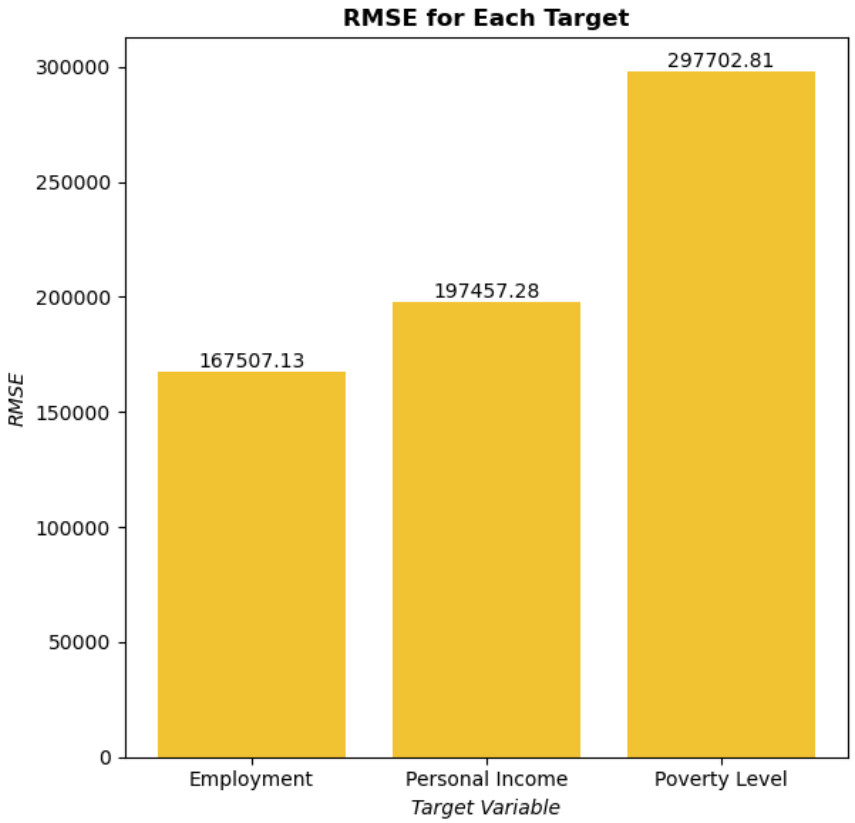


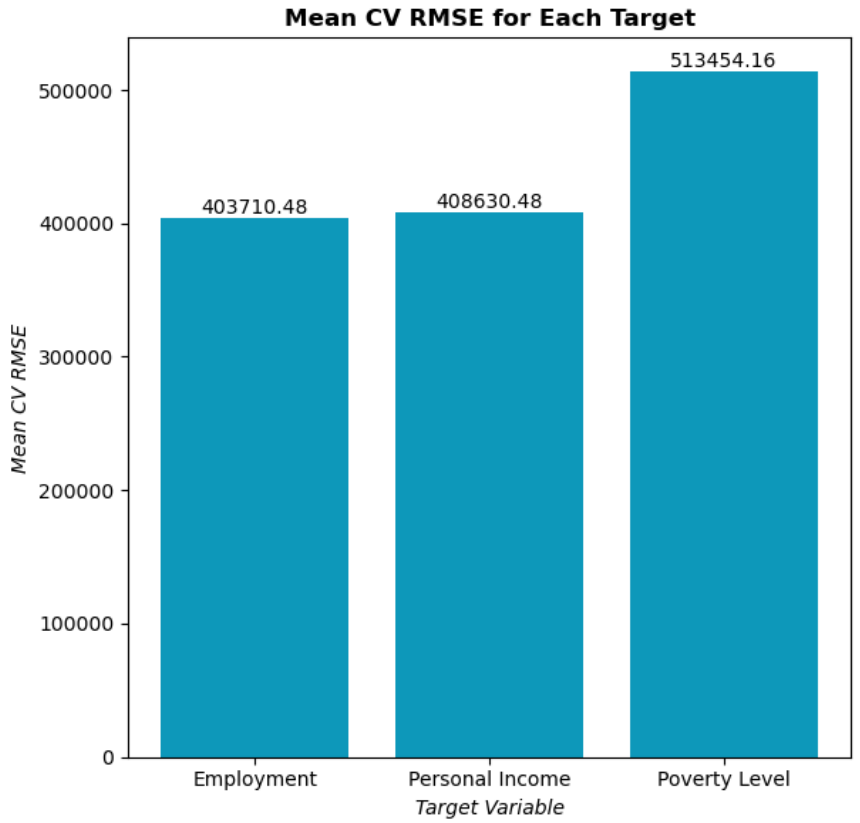




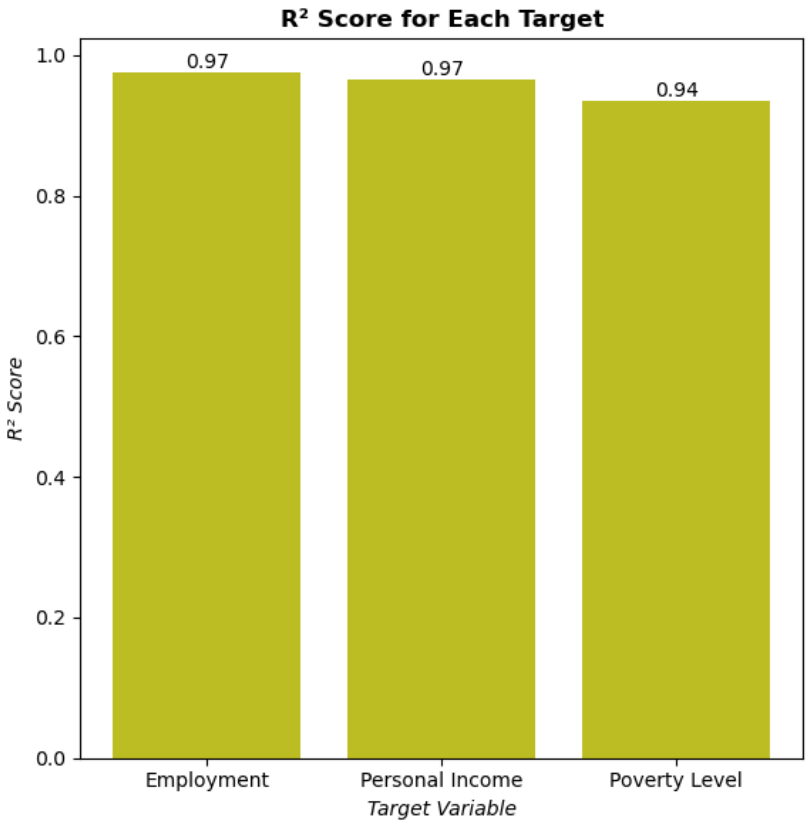
Decision Tree Model Results

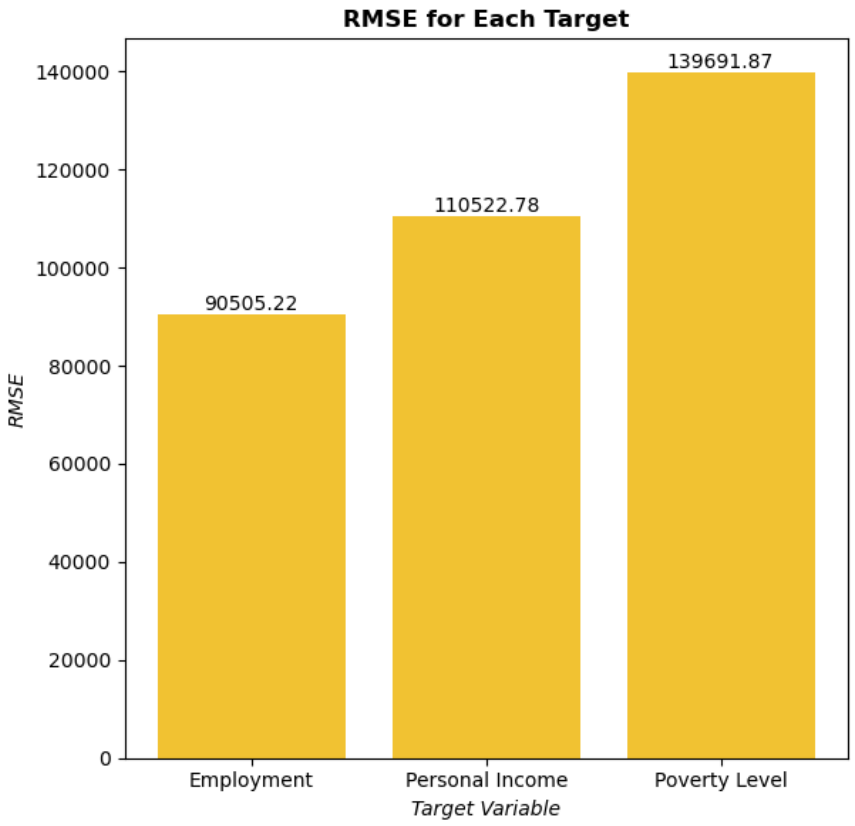


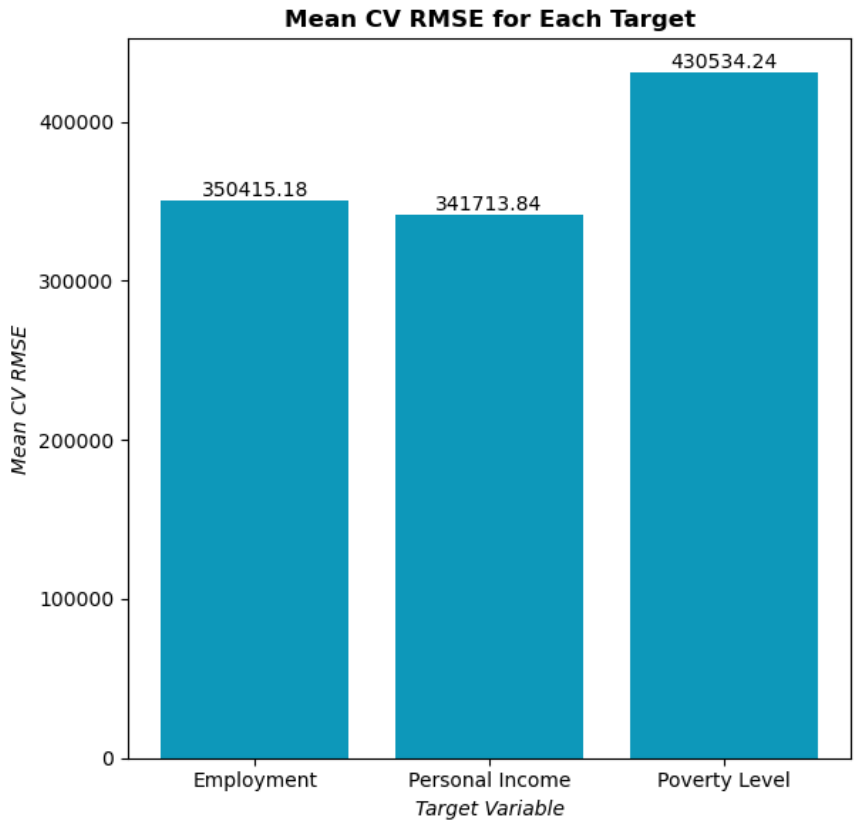




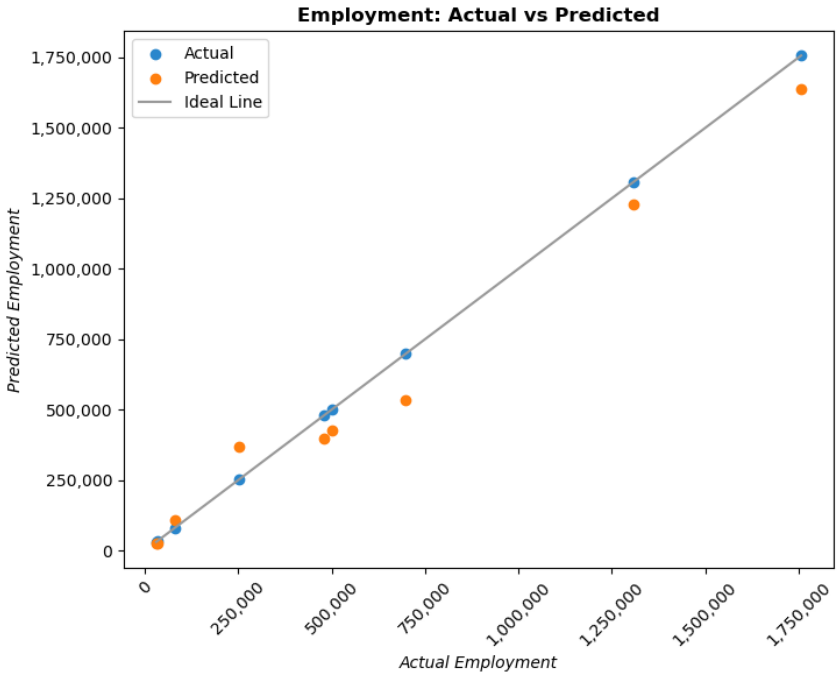
Random Forest Model Results

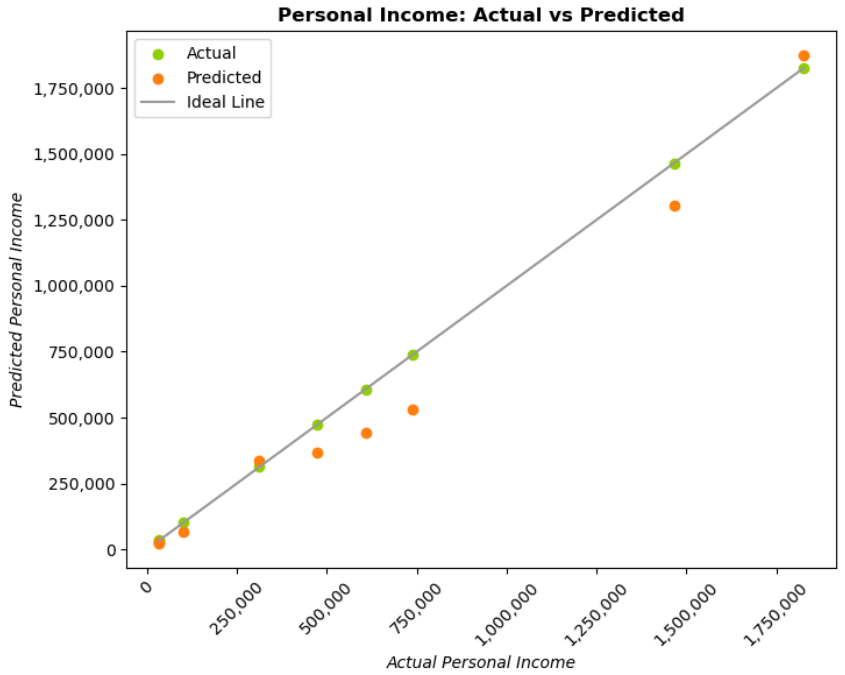


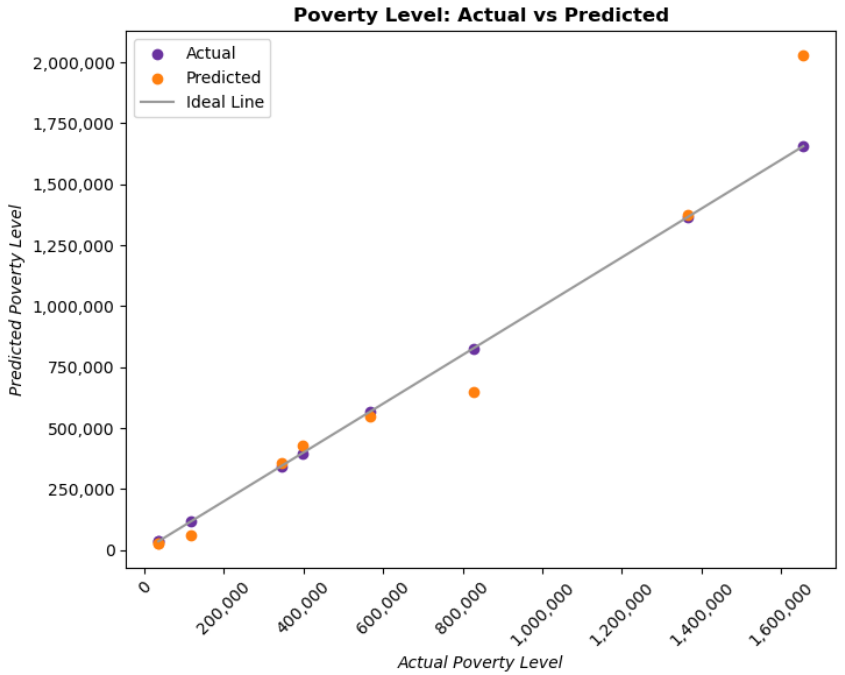




Best Model: Random Forest







Conclusion

EDA

- Corn and soy farming are significant contributors to the U.S. economy, their economic influence is felt beyond just farming communities, raising incomes in corn-producing regions.
- Following a recession, the corn and soy industries are resilient and dependable due to their necessities in maintaining a stable country.
- Income and employment show positive correlations with corn and soybean production metrics.

Modeling

- Corn and soybean production data have strong predictive potential for employment and moderate potential for personal income in rural areas because they are likely closely tied to the agricultural sector, making crop production trends good indicators of rural employment and income.
- Poverty levels, seem to be influenced by more complex factors beyond crop productivity like policy, local economic conditions, and demographic factors.
- Future research could explore integrating other datasets like government assistance programs and local economic policies.