

US Economic Time Series Analysis

Divya Pariti - 23200831

Introduction

This report explores the US economic time series dataset available in the `ggplot2` package. The dataset provides several economic indicators over time, which are crucial for understanding trends in the US economy.

Overview of the Dataset

Here are the main components of the economics dataset:

1. `date` : The date of the observation, recorded monthly.
2. `pce` : Personal consumption expenditures (in billions of dollars). This measures the total amount of spending by individuals in the U.S. on goods and services.
3. `pop` : Total population of the U.S. at the time of the observation.
4. `psavert` : Personal saving rate, which is the percentage of people's income remaining each month after taxes and spending.
5. `uempmed` : Median duration of unemployment, in weeks. This measures the median time that unemployed people have been looking for work.
6. `unemploy` : Number of unemployed individuals, in thousands.

```
# A tibble: 6 x 6
  date       pce    pop psavert uempmed unemploy
<date>    <dbl> <dbl>   <dbl>   <dbl>   <dbl>
1 1967-07-01  507. 198712    12.6     4.5    2944
2 1967-08-01  510. 198911    12.6     4.7    2945
3 1967-09-01  516. 199113    11.9     4.6    2958
4 1967-10-01  512. 199311    12.9     4.9    3143
5 1967-11-01  517. 199498    12.8     4.7    3066
6 1967-12-01  525. 199657    11.8     4.8    3018
```

```
# Display a summary of the 'economics' dataset.
# The summary includes statistics like minimum, maximum, median, mean, and quartiles for e
summary(economics)
```

date	pce	pop	psavert
Min. :1967-07-01	Min. : 506.7	Min. :198712	Min. : 2.200
1st Qu.:1979-06-08	1st Qu.: 1578.3	1st Qu.:224896	1st Qu.: 6.400
Median :1991-05-16	Median : 3936.8	Median :253060	Median : 8.400
Mean :1991-05-17	Mean : 4820.1	Mean :257160	Mean : 8.567
3rd Qu.:2003-04-23	3rd Qu.: 7626.3	3rd Qu.:290291	3rd Qu.:11.100
Max. :2015-04-01	Max. :12193.8	Max. :320402	Max. :17.300

uempmed	unemploy
Min. : 4.000	Min. : 2685
1st Qu.: 6.000	1st Qu.: 6284
Median : 7.500	Median : 7494
Mean : 8.609	Mean : 7771
3rd Qu.: 9.100	3rd Qu.: 8686
Max. :25.200	Max. :15352

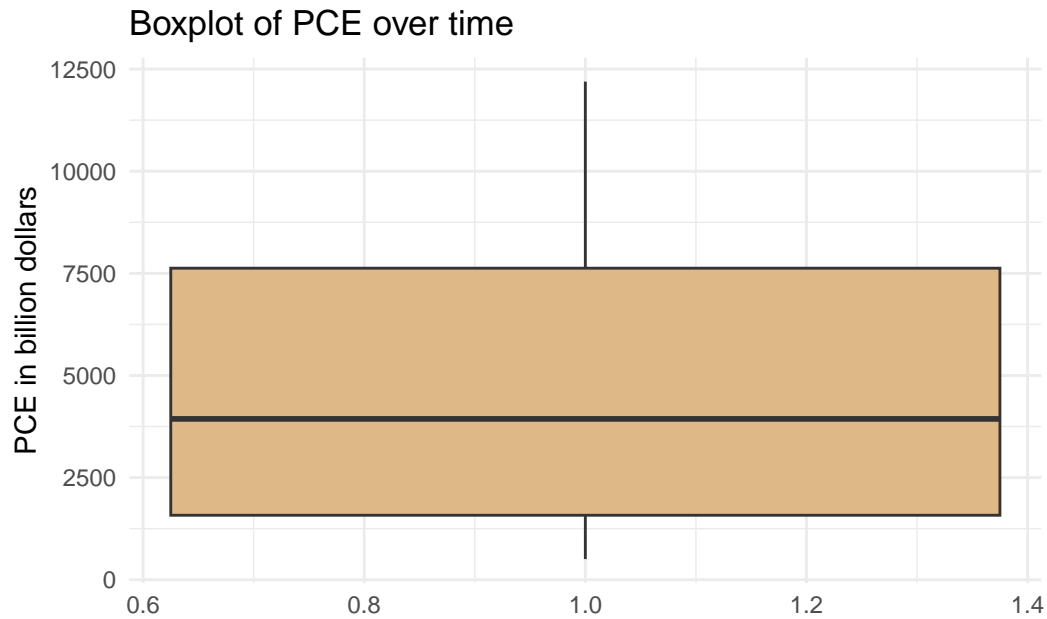
```
# Compute correlation matrix
corr_mat = cor(economics[c("pce", "pop", "psavert", "uempmed", "unemploy")])

# Print correlation matrix
print(corr_mat)
```

	pce	pop	psavert	uempmed	unemploy
pce	1.0000000	0.9872421	-0.7928546	0.7269616	0.6145176
pop	0.9872421	1.0000000	-0.8363147	0.6950085	0.6337165
psavert	-0.7928546	-0.8363147	1.0000000	-0.3251377	-0.3093769
uempmed	0.7269616	0.6950085	-0.3251377	1.0000000	0.8693097
unemploy	0.6145176	0.6337165	-0.3093769	0.8693097	1.0000000

Personal Consumption Expenditures

```
# Boxplot of Personal Consumption Expenditures (PCE)
ggplot(economics, aes(x = 1, y = pce)) +
  geom_boxplot(fill = "burlywood") +
  labs(x = "", y = "PCE in billion dollars",
       title = "Boxplot of PCE over time") +
  theme_minimal()
```



Economic Trends Over Time

Unemployment Rate

The following plot shows the unemployment rate over time, which is a key indicator of economic health.

Analysis:

- This plot illustrates the changes in the unemployment rate over time.
- Understanding these trends is vital for economic planning and policy-making.
- The graph begins with a relatively low unemployment rate, which slowly rises.
- Before the 2000s, there is a period of relative stability with lower unemployment rates, suggesting a healthy economic phase.
- After the peak in 2009, the unemployment rate shows a declining trend, the rate decreases steadily, suggesting economic improvement and job market stabilization.

Conclusion:

- The `economics` dataset comprises monthly records of several key economic indicators such as unemployment rate, personal savings rate, and personal consumption expenditures.

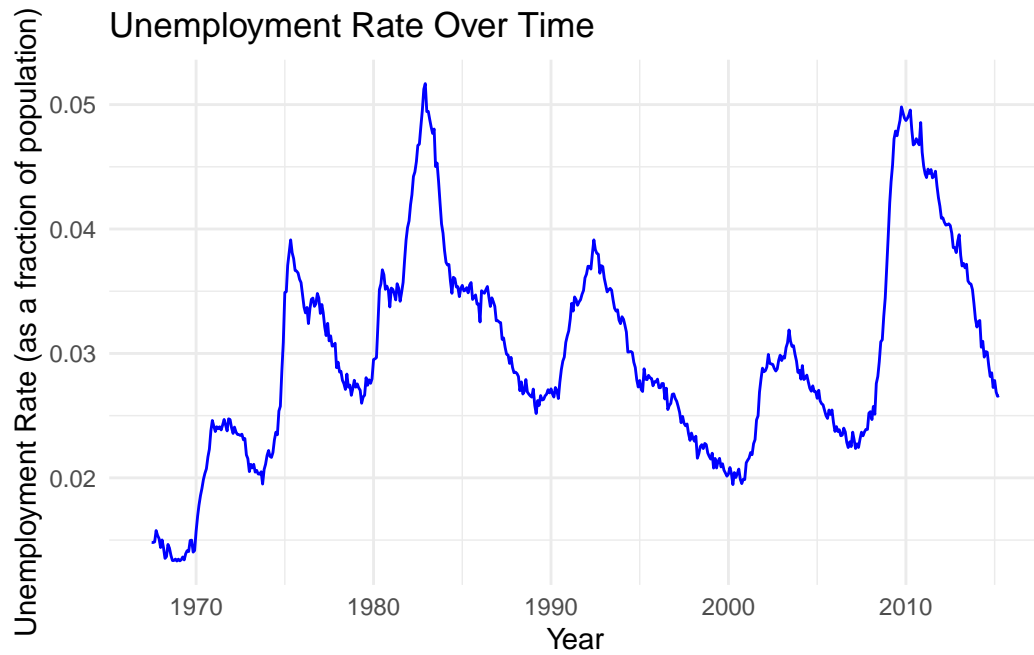


Figure 1: Figure 1: Unemployment Rate Over Time

- The unemployment rate is a crucial indicator of economic health, reflecting underlying economic conditions, policy changes, and global economic impacts.
- The fluctuations observed in the graph correspond with historical economic events, demonstrating the sensitivity of employment to economic cycles.
- The overall downward trend in recent years suggests effective economic policies and recovery mechanisms.