

Macro Assignment

Manan Arora

April 2024

1. Inflation

We analyze the inflation trends of the US and India based on the data.

Trends and Fluctuations

- Between 1970-1975, India experienced a spike in inflation. India suffered from high inflation during the 1970s due to the same reasons as the rest of the world: food and energy price shocks.
- For the US, inflation began increasing after the 1960s and reached around 14% in the 1980s, ultimately declining thereafter to an average of 3.5%.

Time Series Properties

ADF Test Results for US Inflation

ADF Statistic: -2.15729287742052

p-value: 0.22210900231410025

ADF Test Results for India Inflation

ADF Statistic: -5.326314033890143

p-value: 4.828668782125092e-06

Variable Comparisons

- Average inflation: US - 3.76%, India - 7.35%
- Standard deviation: US - 2.78, India - 4.86

2. Consumption as a fraction of GDP

We analyze the consumption as a fraction of GDP trends for both US and India.

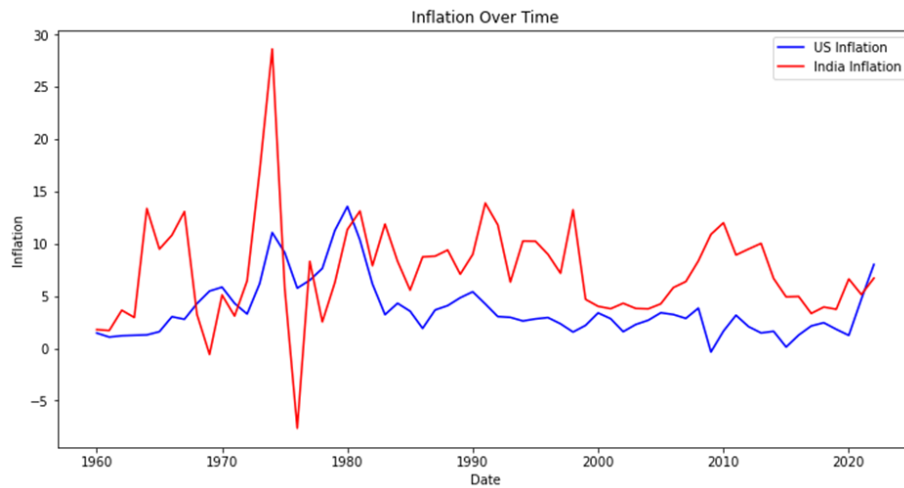


Figure 1: Inflation rate

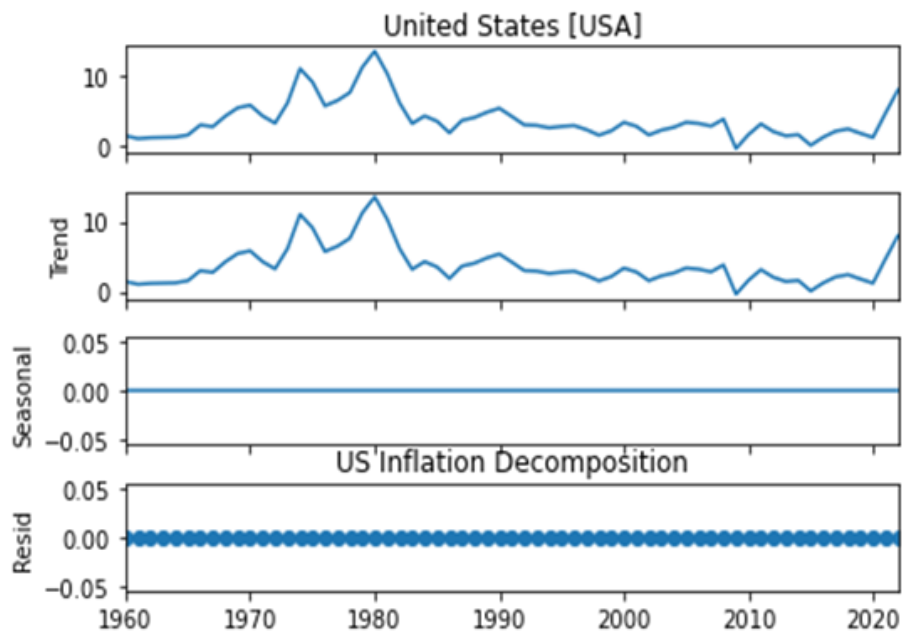


Figure 2: Seasonal Decomposition

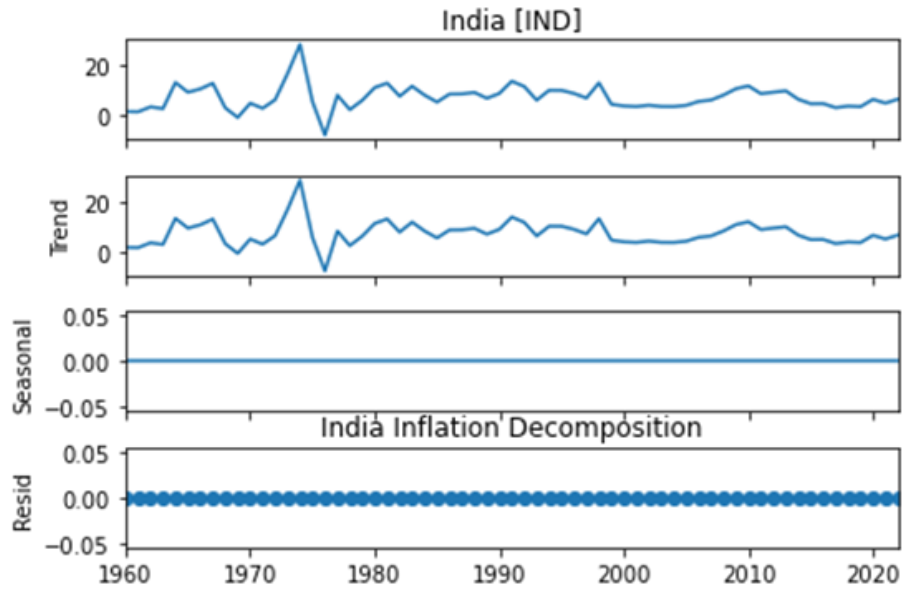


Figure 3: Seasonal Decomposition

Time Series Properties

ADF Test Results for US Consumption per capita

ADF Statistic: -0.4156503628862957

p-value: 0.9074527510385242

ADF Test Results for India Consumption per capita

ADF Statistic: -3.6710722892911063

p-value: 0.004538945195000871

Fluctuations

The lines for both countries seem to be fluctuating around a constant mean, indicating that, on average, the consumption as a fraction of GDP is stable but shows fluctuations over time.

Trends

We observe a downward trend from 2000 to 2011 in India, owing to the Great Recession, followed by a rising trend. For the US, we see a long-term increasing trend with periodic booms and busts in consumption as a fraction of GDP, owing to the business cycle.

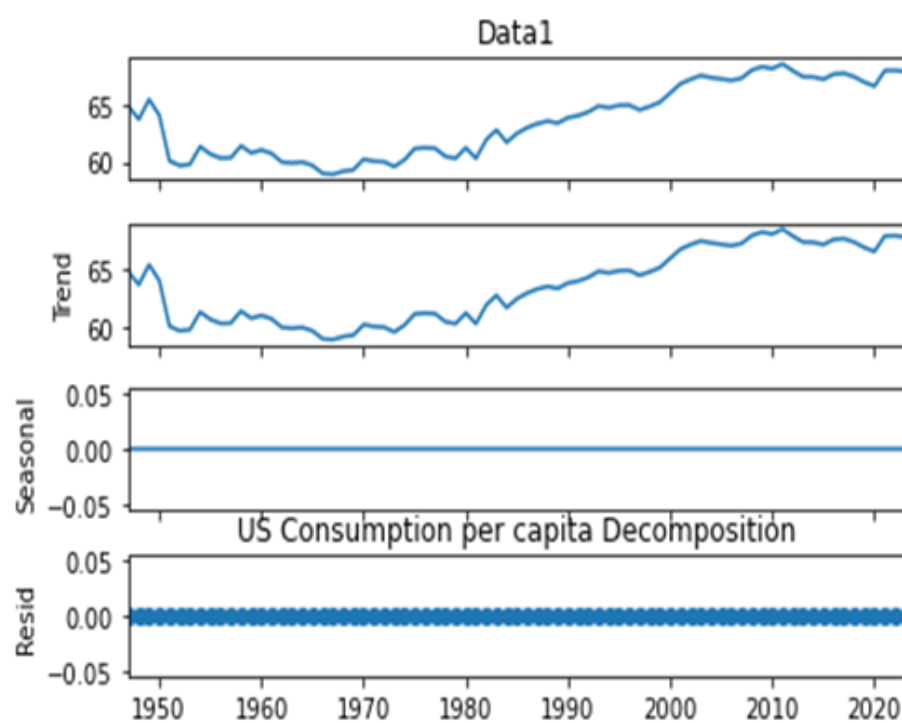


Figure 4: Seasonal Decomposition

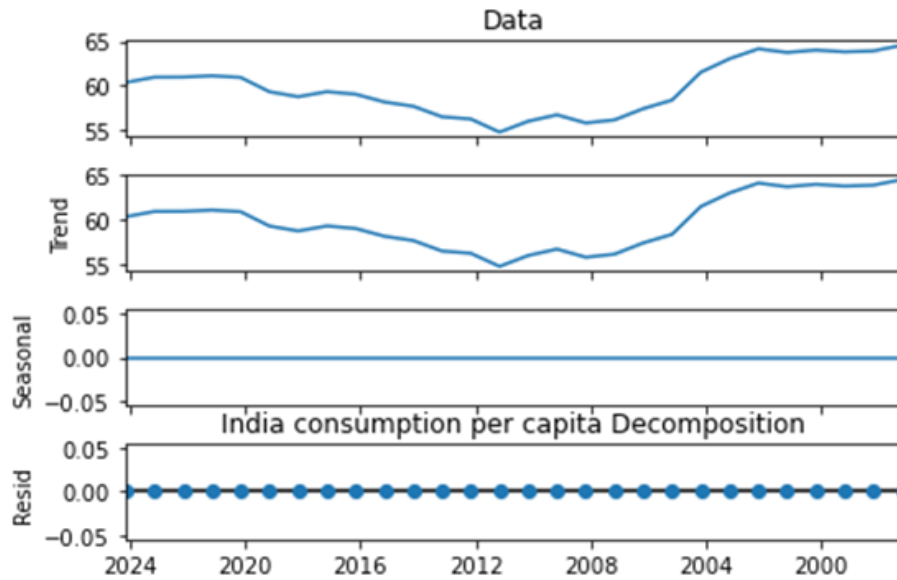


Figure 5: Seasonal Decomposition

Behaviour During the Great Recession

In the late 2000s, India experienced a drop in consumption as a fraction of GDP, whereas for the US, it remained more or less stable, in fact increasing in the long run. **REASONING FOR THE FACTORS:**

For India:

Post 2010s, India consumption as a fraction of GDP started going up owing to decline in urban and rural inequality. The urban Gini coefficient (a measure of inequality) declined from 36.7 to 31.9, and the rural Gini declined from 28.7 to 27.0.

For USA:

Post 2010s, India consumption as a fraction of GDP started going up owing to mainly booms and positive effects of housing values in India.

3. Investment as a fraction of GDP

Time Series Properties

ADF Test Results for US Investment as a fraction of GDP

ADF Statistic: -3.607989107899475

p-value: 0.005610117203564969

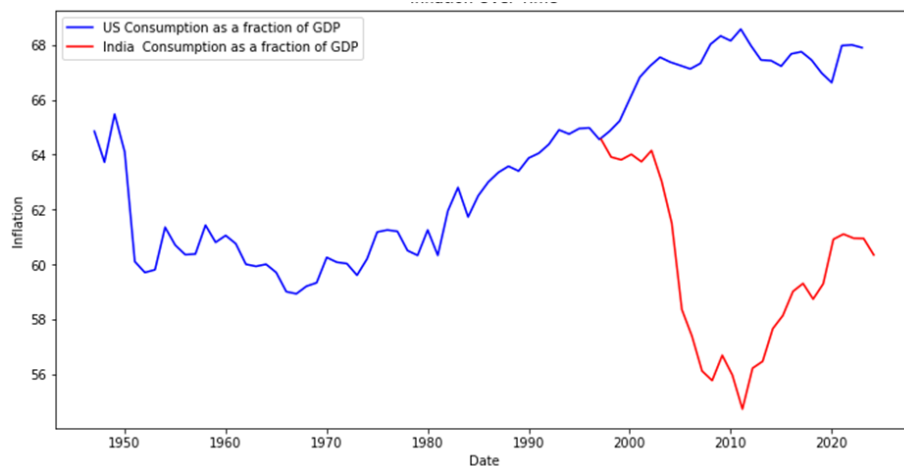


Figure 6: Line Chart

ADF Test Results for India Investment as a fraction of GDP

ADF Statistic: -1.5816086635807944

p-value: 0.4928251588785788

Fluctuations/Trends

Investment as a fraction of GDP remains more or less stable in the US, with usual business cycle fluctuations, whereas, post-2000s, we saw an increasing trend in India followed by a declining trend since 2013-14.

Behaviour During the Great Recession

US investment as a fraction of GDP declined till 2010 during the Great Recession, while India was quick to recover after 2000s and experienced an increasing trend post-2005.

Variable Comparisons:

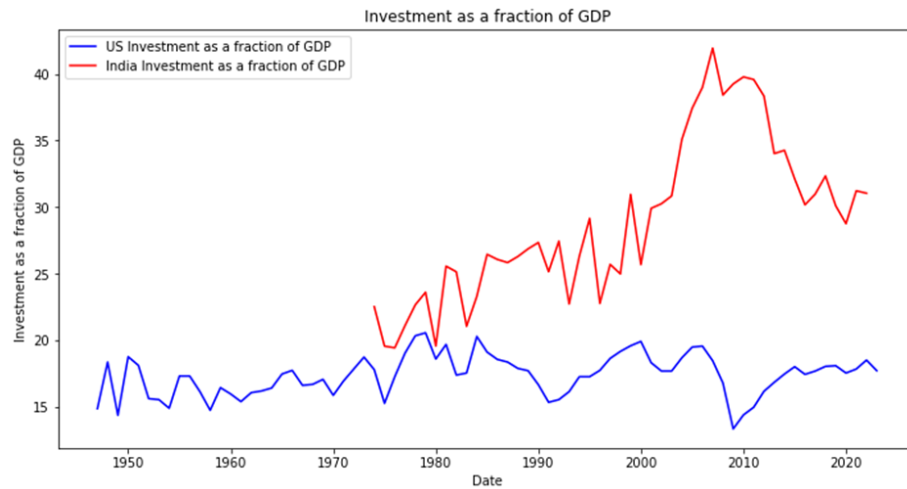
India performs better in these numbers as compared to the US, the average for India is about 28 as a fraction of GDP whereas for US it is only 17.34%.

The mean is close to the median in both these cases and volatility seems to be more in case of India about 6.008 as compared to US with about 1.53.

Reasoning for the factors:

INDIA:

India's GDP registered a growth of 8.4 percent in the third quarter of FY243. The robust demand for residential fuelled the growth of the construction sector by double digits .Over the long run, India's growth has been driven by an increasing share of investment and exports, with a large contribution from con-



sumption. Growth has also been characterized by productivity gains– both in labour productivity as well as in total factor productivity.

US:

The major portion of U.S. gross domestic product (GDP) is accounted for by consumer spending, which significantly affects the business cycle¹. Consumer demand has been extremely volatile since 2000, especially given the booms and busts in housing values and in subprime mortgage lending.

4. Government spending as a fraction of GDP

Time Series Properties

ADF Test Results for US Government spending (all levels) as a fraction of GDP

ADF Statistic: -2.0002244180398034

p-value: 0.2864747083484761

ADF Test Results for India Government spending (all levels) as a fraction of GDP

ADF Statistic: -2.446405786981596

p-value: 0.1290646232475816

Fluctuations/Trends

Government spending as a fraction of GDP remains more or less stable in the US; however, it has a declining trend from the 1980s. In India, we see an increasing trend over time.

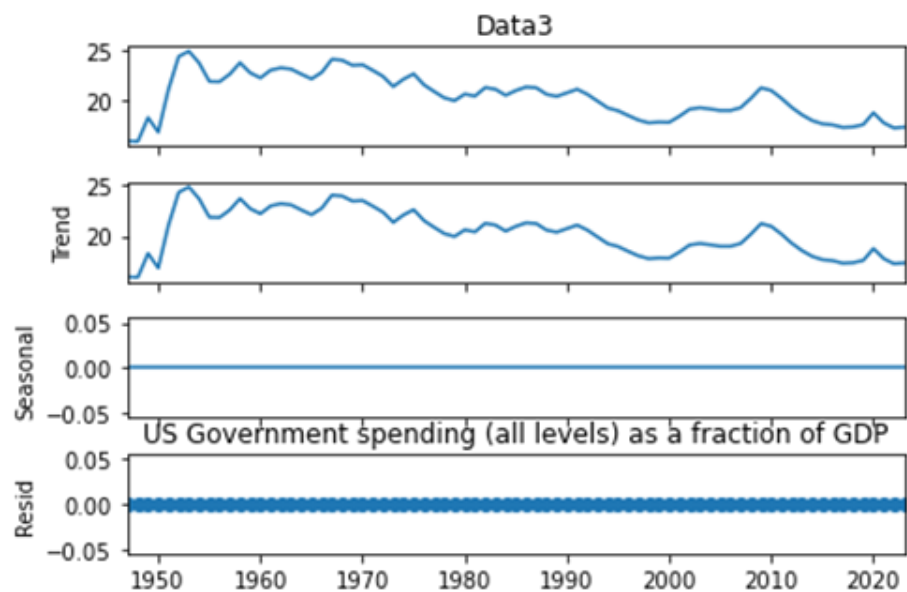


Figure 7: Seasonal Decompositon

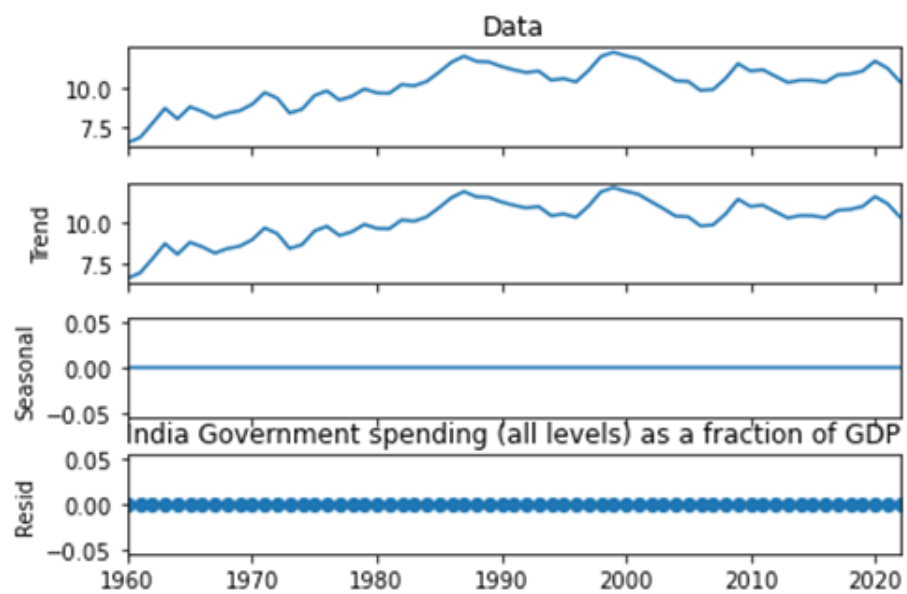


Figure 8: Seasonal Decomposito

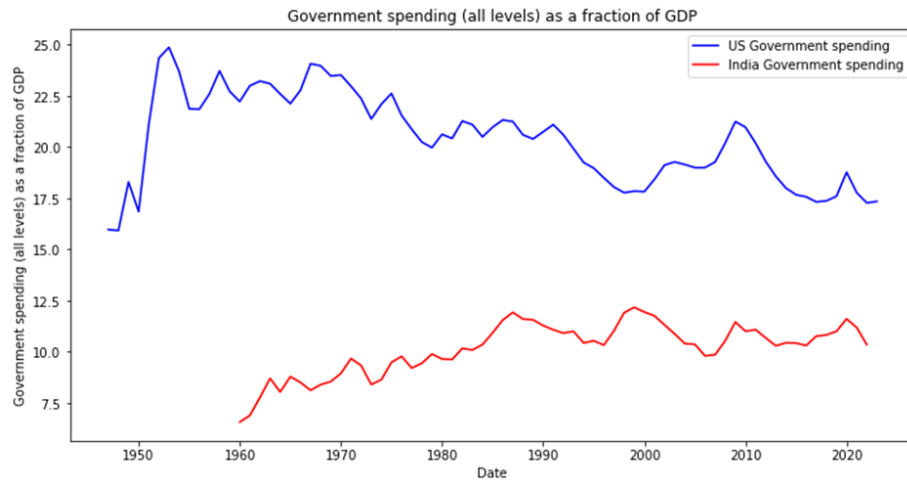


Figure 9: Line chart

Behaviour During the Great Recession

During the Great Recession, there's a noticeable increase in government spending as a fraction of GDP for both the US and India.

Variable Analysis:

The mean government expenditure as a fraction of GDP is about 20 for the US whereas only 10 for India. The standard deviations is relatively less for India as compared to the US in our study.

Reasoning for the factors:

US:

The sharp peak in US government spending around 1950 can be attributed to the Korean War, which led to a significant increase in defence spending. The increase in public spending in the 20th century is largely due to governments spending more resources on social protection, education, and healthcare.

India:

The gradual increase in India's government spending over time can be attributed to the country's economic development and the government's efforts to improve social infrastructure. The decline in central government spending in the pandemic year 2020-21 could be a factor in the recent dip.

5. Payments to labor and capital as a share of GDP

Time Series Properties

ADF Test Results for US Payments to labor and capital as a share of GDP

ADF Statistic: -1.75
p-value: 0.43

ADF Test Results for India Payments to labor and capital as a share of GDP

ADF Statistic: -0.97
p-value: 0.762

Fluctuations/Trends

We observe that payment to labour as a fraction of GDP remains more or less stable in US remaining constant around the mean value of 17, whereas for India we observe an increasing trend from 1980s to 2010s followed by a decreasing trend since 2010.

The fluctuations seems to be relatively more stable in case of both India and US. However India has a long term increasing payment to labour as a fraction of GDP whereas for US it has remained fairly constant **Behaviour During the Great Recession:**

US share of payment declined post 2006 till 2009 owing to the Great recession of 2000s however on the contrary case India's share of payment has been rising since 2000s **VARIABLE ANALYSIS:**

Variable Analysis:

The mean is higher for India about 28% as compared to US, therefore US is able to perform better in these statistics. The standard deviations is lesser as compared to India with latter at 6.008 and former at 1.53.

6. Payments to capital as a share of GDP

Time Series Properties

ADF Test Results for US Payments to labor and capital as a share of GDP

ADF Statistic: -2.71
p-value: 0.071

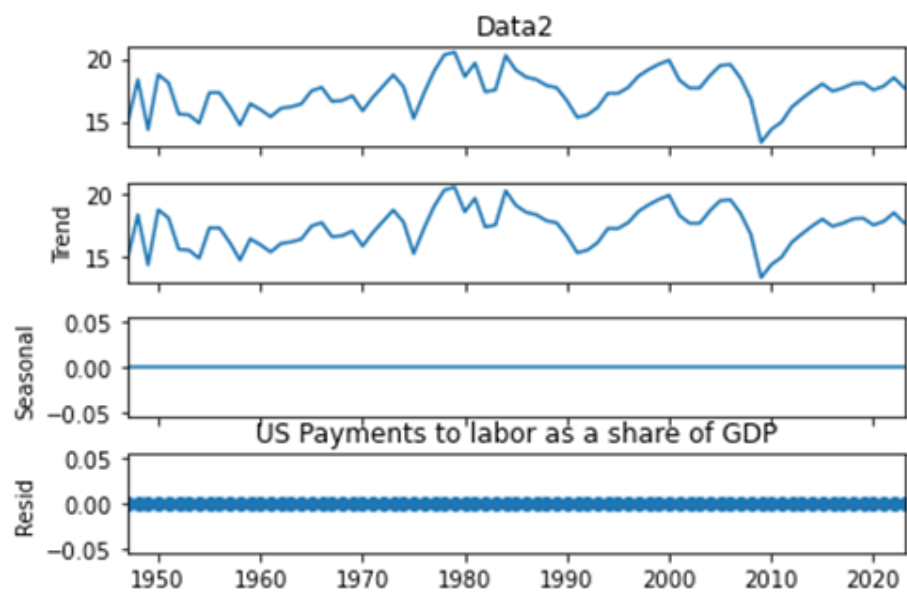


Figure 10: Seasonal Decomposition

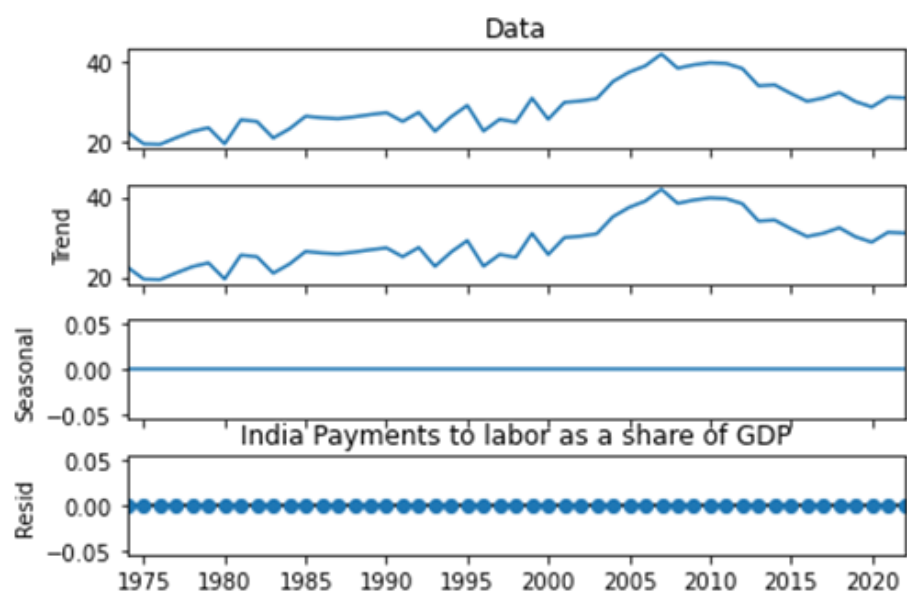


Figure 11: Seasonal Decomposition

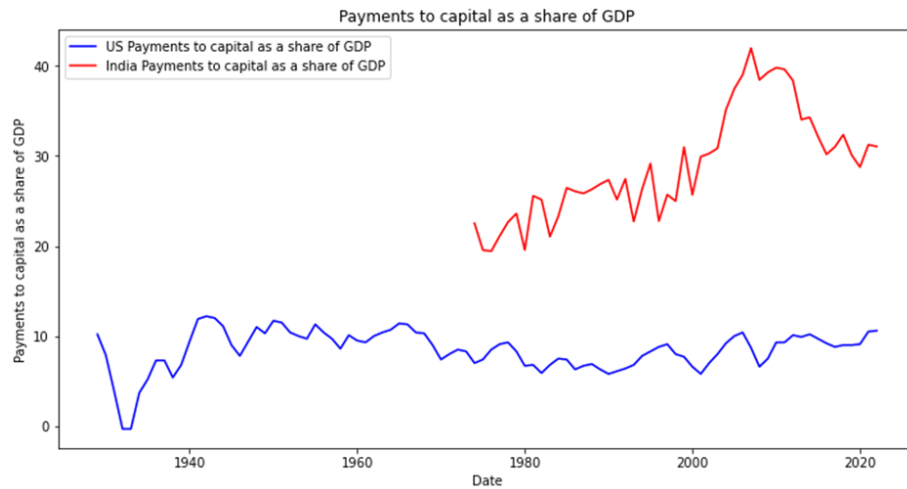


Figure 12: Line Chart

ADF Test Results for India Payments to labor and capital as a share of GDP

ADF Statistic: -1.58

p-value: 0.49

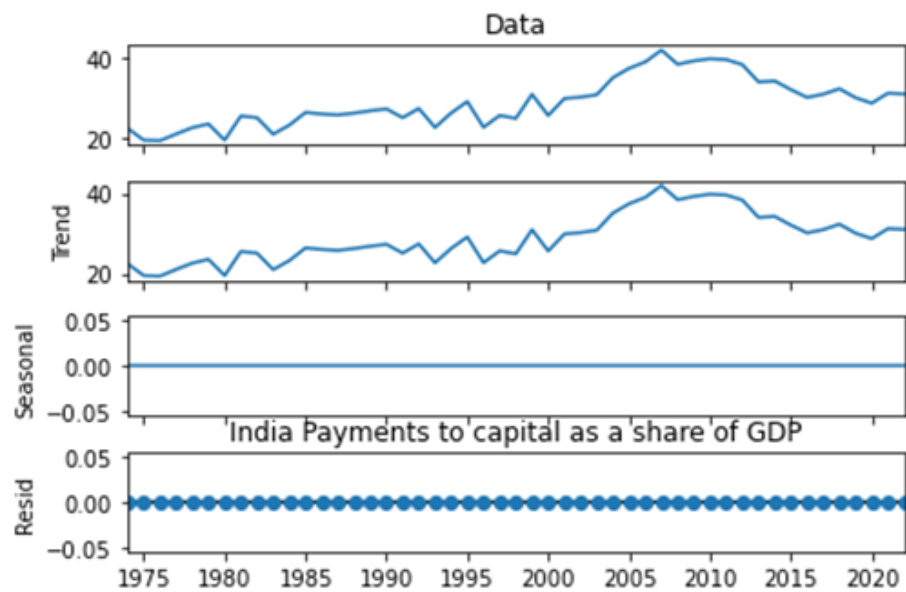
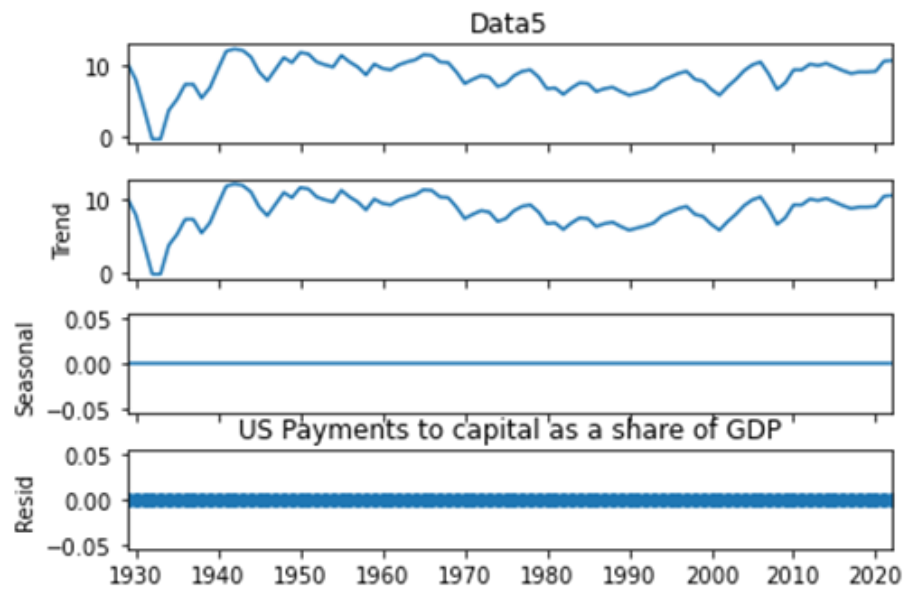
Fluctuations/Trends

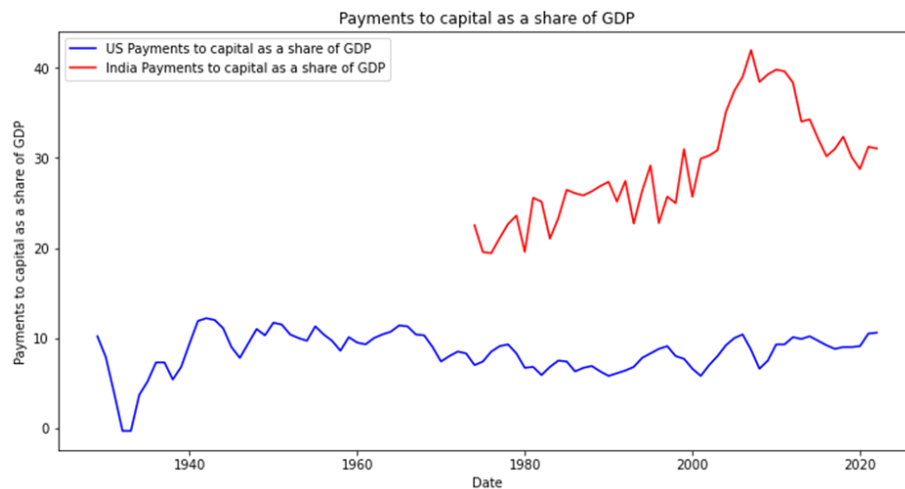
We observe a similar trend to that of payment to labour as a fraction of GDP remains more or less stable in US remaining constant around the mean value of 8.466, whereas for India we observe an stable trend from 1980s to 2000s followed by a increasing trend since 2000s and declining since 2015.

The fluctuations seems to be relatively more stable in case of both India and US. However India has a long term increasing Payments to capital as a share of GDP whereas for US it has remained fairly constant. **Behaviour During the Great Recession:**

US share of payment declined from 2000-2005 and started increasing after 2005 owing to the Great recession of 2000s however on in India sees a similar tend till 2005 after which share started to systematically decline and it is still decline till 2020s. **VARIABLE ANALYSIS:**

The mean is higher for India about 28% as compared to US which is at 8%. The standard deviations is lesser as compared to India with latter at 6.008 and former at 2.24





7. Growth rate of output per capita

Time Series Properties

ADF Test Results for US Growth rate of output per capita

ADF Statistic: -2.681218740305567

p-value: 0.0778769040786888

ADF Test Results for India Growth rate of output per capita

ADF Statistic: -5.147786130929955

p-value: 8.203431452817687e-06

Fluctuations/Trends

The growth rate of output per capita in India is higher than the US but with more fluctuations. The US shows a relatively stable pattern.

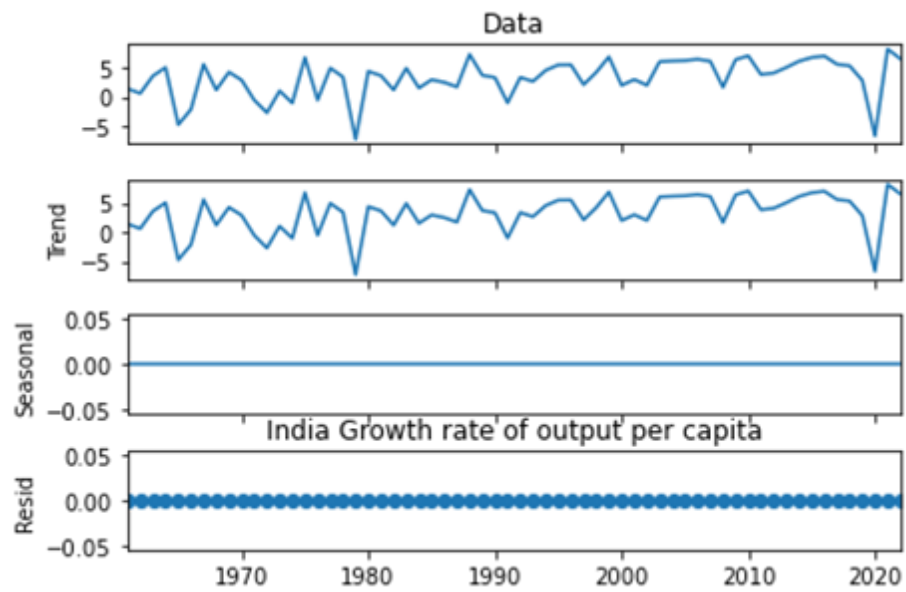
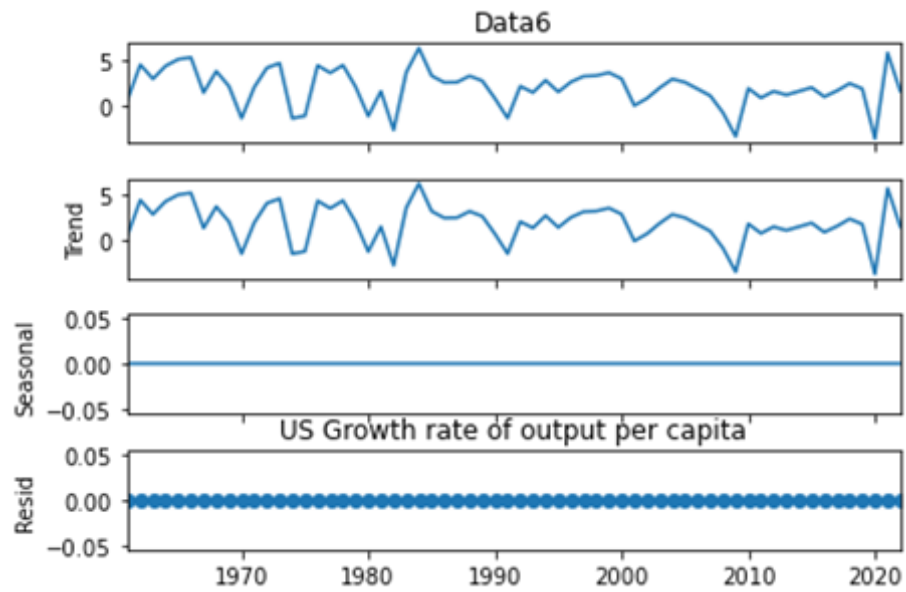
Behaviour During the Great Recession:

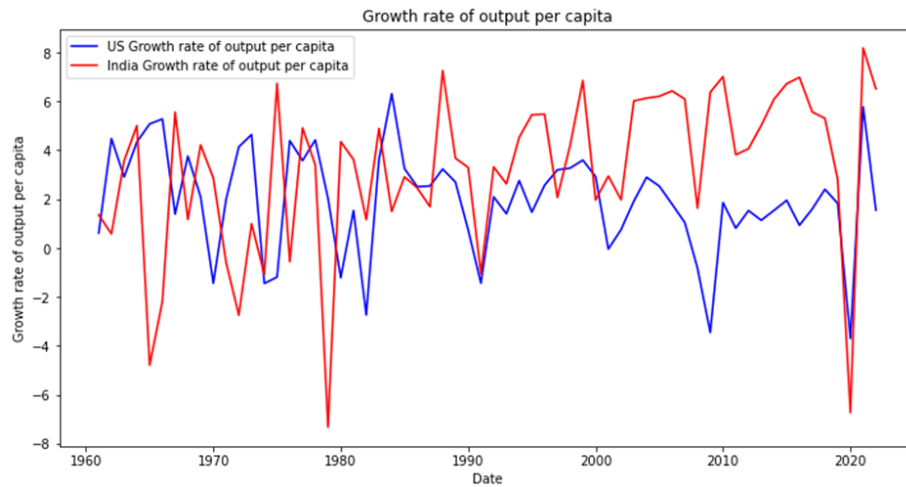
US per capita output growth declined in 2008 and so has India's per capita output growth however we see a good recovery for the US, however India suffered till 2012 with decline in per capita growth. **Variable analysis:**

The mean is higher for India about 3% as compared to US which is at 1%. The standard deviations is lesser as compared to India with latter at 3.30 and former at 2.11.

Reasoning for the factors:

Around 1990, there is a noticeable peak for both countries; however, India's growth rate surpasses that of the US during this period. This could be attributed to the economic liberalization policies adopted by India around that time.





Post-2010, there is a sharp decline in India's growth rate while the US maintains a relatively stable but fluctuating pattern. This could be due to a variety of factors such as changes in government policies, economic slowdown, etc.

8. Growth rate of consumption per capita

Time Series Properties

ADF Test Results for US Growth rate of consumption per capita

ADF Statistic: -3.535147364356817
p-value: 0.006824603303312603

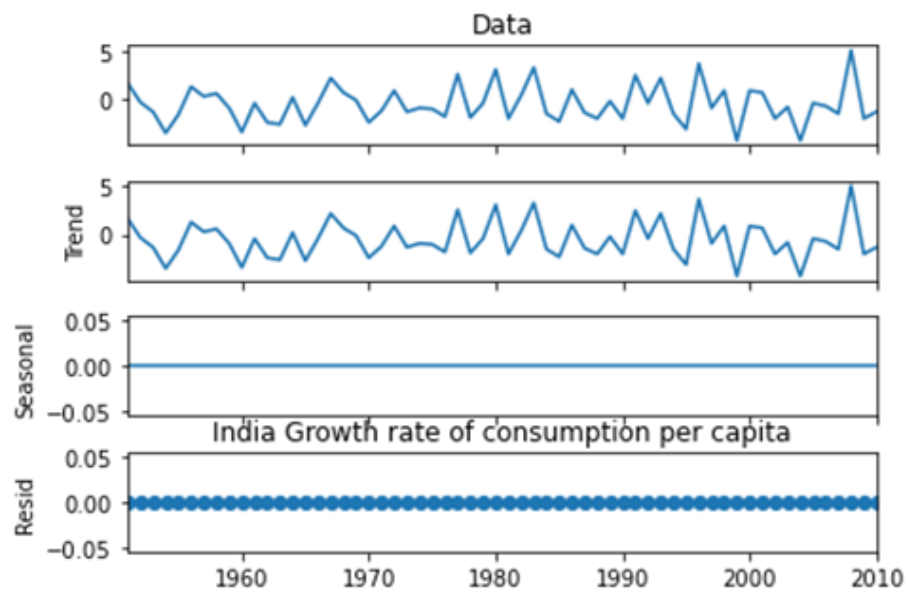
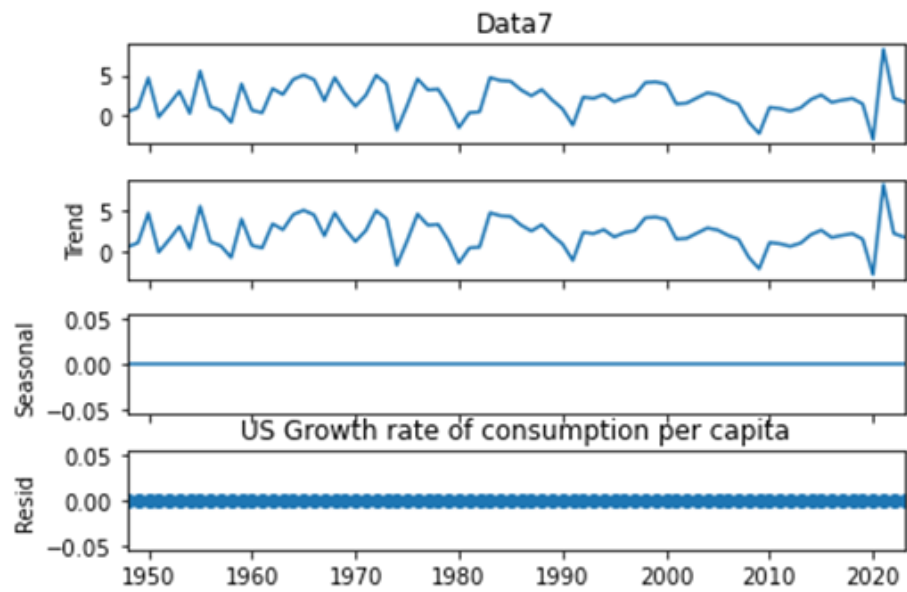
ADF Test Results for India Growth rate of consumption per capita

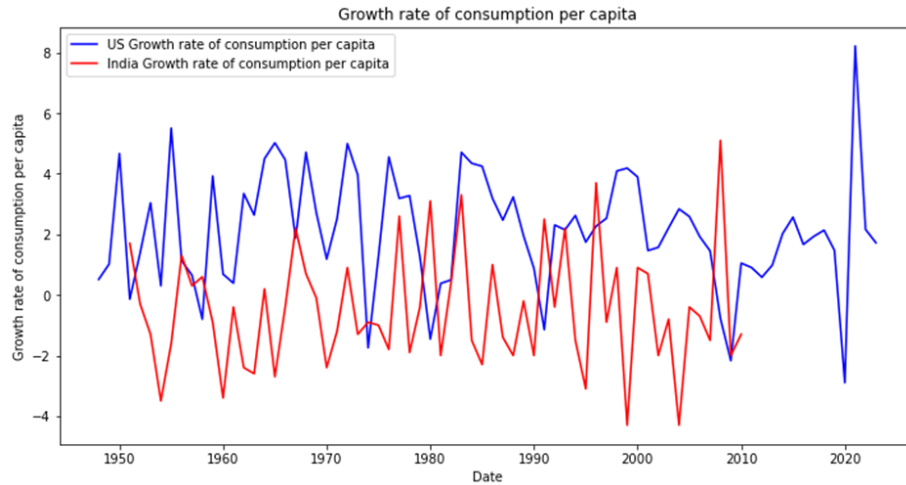
ADF Statistic: -4.108648470274828
p-value: 0.0009446581291609507

Fluctuations/Trends

The US shows a stable growth rate, while India's growth rate has fluctuated, particularly around the 2008 financial crisis and COVID-19 pandemic. **Behaviour During the Great Recession:**

We observe an interesting scenario here as the post 2000s India's Growth rate of consumption per capita declined to negative but post 2008 it spiked up again. However, for the US it started declining since 2005 and regained back in 2009, the next decline period came in COVID -19 during 2020. **Variable analysis:**





The data for the US (Data7) shows a mean growth rate of consumption per capita of approximately 2.11, with a standard deviation of around 1.92. In contrast, for India (Data), the mean growth rate is about -0.51, with a higher standard deviation of approximately 1.97. These figures suggest that consumption per capita in the US has been growing at a moderate pace with relatively low volatility, while India's consumption per capita has shown more variability and a slightly negative average growth rate.

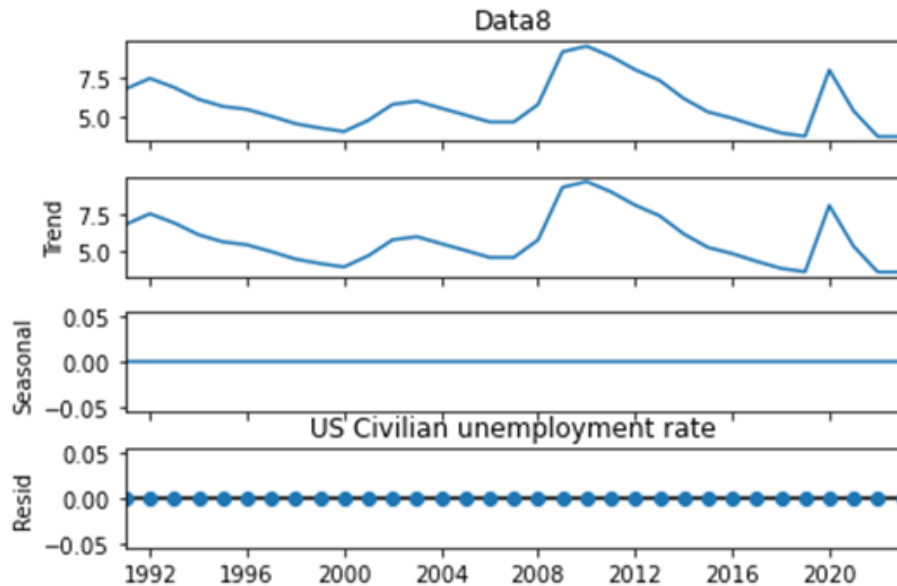
Reasoning for the factors:

US:

The relatively steady line for the US suggests that the growth rate of consumption per capita has been relatively stable over the years. However, minor fluctuations can be attributed to economic cycles, with periods of economic expansion leading to higher employment and thus higher consumption. Changes in government policies, such as tax reforms or changes in labor laws, can also impact the growth rate of consumption per capita.

India:

The increase in India's growth rate of consumption per capita over time can be attributed to the country's economic development and efforts to improve social infrastructure. The sharp decline around the year 2020 could be due to the impact of the COVID-19 pandemic, which led to massive livelihood losses and a decline in income for many households. The dependence of the economy on agriculture does not only cause wide fluctuations in growth rate but also results in slow growth.



9. Civilian unemployment rate

Time Series Properties

ADF Test Results for US Civilian unemployment rate

ADF Statistic: -1.0416638089293158

p-value: 0.7352331018692204

ADF Test Results for India Civilian unemployment rate

ADF Statistic: -3.5714464661139723

p-value: 0.006289862071168105

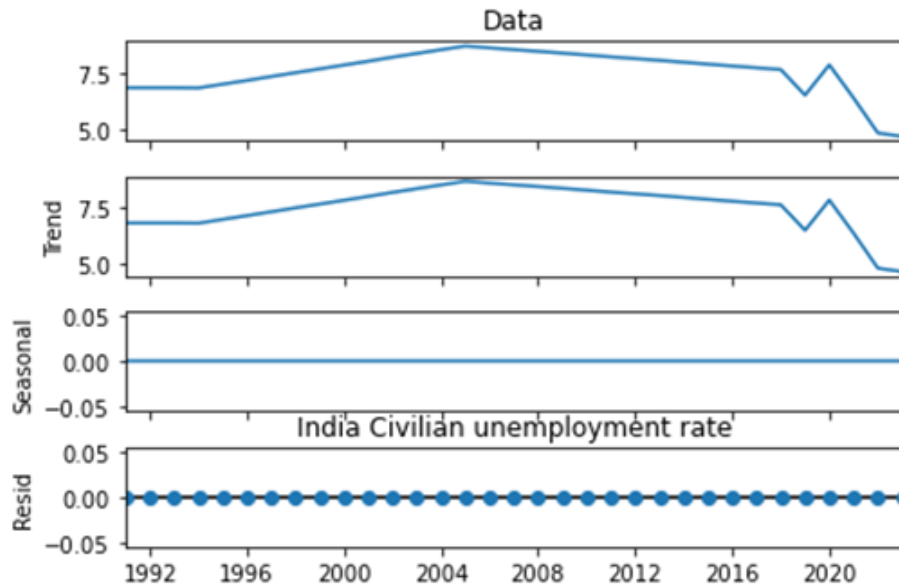
Fluctuations/Trends

Both countries have experienced fluctuations in the unemployment rate, with noticeable spikes around 2000 and post-2016, more pronounced for India.

Behaviour During the Great Recession:

The spike in the US unemployment rate around the year 2000 can be associated with the economic recession during that period¹. This economic downturn led to a rapid decline in employment as companies faced bankruptcy or financial struggles

The recession resulted from a combination of tax cuts, spending increases, and the devastating effects of a banking crisis in the subprime mortgage market. The crisis in subprime mortgage-backed securities spread to mutual funds,



pensions, and the corporations that owned these securities, with widespread national and global impacts. The recession contributed to rising income inequality and prompted a debate about the role of the federal government in regulating private industry. **Variable analysis:**

For civil unemployment data, India shows a mean rate of 7.57% with a standard deviation of approximately 0.97%. In contrast, US reflects a lower mean rate of 5.77% with a higher standard deviation of around 1.66%. This suggests that the level of civil unemployment is higher on average in the former dataset, with slightly less variability compared to the latter.

10. Average duration of unemployment

Time Series Properties

ADF Test Results for US Average duration of unemployment

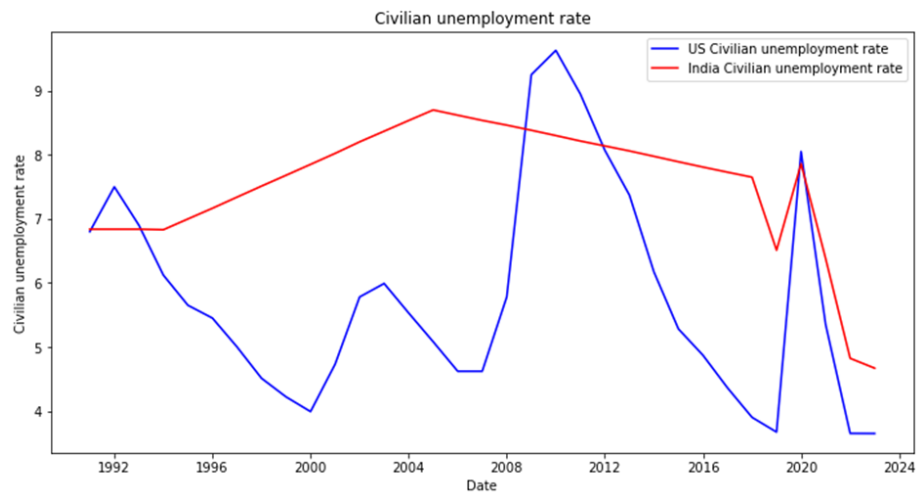
ADF Statistic: -2.207248472220562

p-value: 0.20297238905430815

ADF Test Results for India Average duration of unemployment

ADF Statistic: -2.676314330919273

p-value: 0.07819726906410474



Fluctuations/Trends

The US has seen fluctuations in the average duration of unemployment, with peaks in 1983, early 2000s, and 2010, indicating periods of longer unemployment.

Recession of 2000s Impact: The slight increase in the average duration of unemployment during the early 2000s can be associated with the economic recession during that period¹. This economic downturn led to a rapid decline in employment as companies faced bankruptcy or financial struggles. The recession resulted from a combination of tax cuts, spending increases, and the devastating effects of a banking crisis in the subprime mortgage market². The crisis in subprime mortgage-backed securities spread to mutual funds, pensions, and the corporations that owned these securities, with widespread national and global impacts. The recession contributed to rising income inequality and prompted a debate about the role of the federal government in regulating private industry.

Conclusion

The analysis provides insights into the macroeconomic trends and fluctuations in both countries, highlighting differences and similarities in their economic performance over time.

