ECO702 Macroeconomics
A Comparative Study of Macroeconomic Indicators: India and USA

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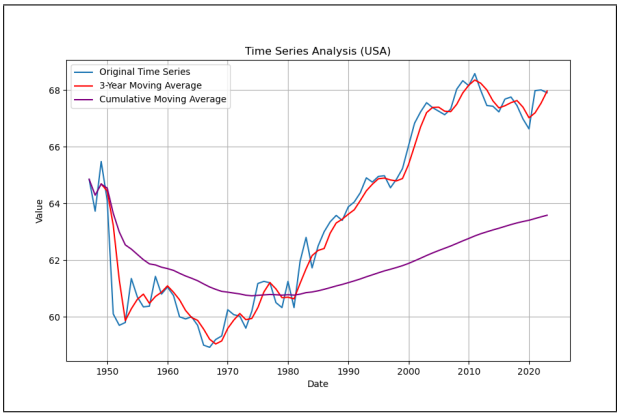
Macroeconomic Indicators

1. Consumption as a fraction of GDP
2. Investment as a fraction of GDP
3. Government spending (all levels) as a fraction of GDP
4. Payments to labor as a share of GDP
5. Payments to capital as a share of GDP
6. Growth rate of output per capita
7. Growth rate of consumption per capita
8. Civilian unemployment rate
9. Average duration of unemployment
10. Inflation

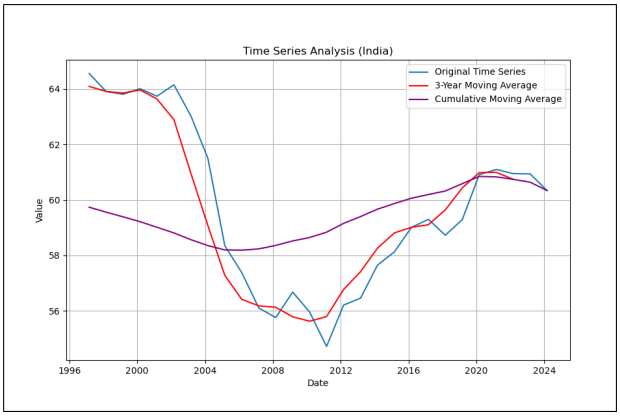
Introduction

In this comparative study, I will analyze 10 different time series of data for India and the USA. I have collected the data from various sources: FRED, World Bank DataBank, RBI, and CEIC. Through the next 10 sections, I will use graphical tools and other statistical methods to explain the various aspects of the time series data I have collected.

1 Consumption as a fraction of GDP



(a) USA



(b) India

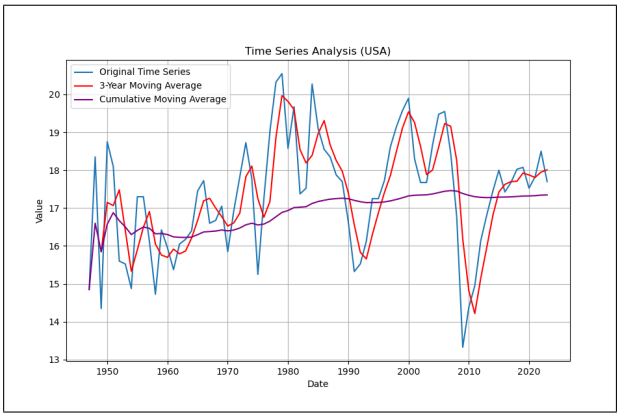
Figure 1: Consumption as a fraction of GDP

For the USA, I could fetch "consumption as a fraction of GDP" as far back as 1948. However, in the case of India, I was able to fetch only since 1997. The US data exhibits non-stationarity, on the contrary, the Indian data exhibits stationarity at 1% level of significance. Thus, the share of consumption as a fraction of GDP varies with time for US. Intuitively, it must vary for India as well. This anomaly may be due to the lack of data.

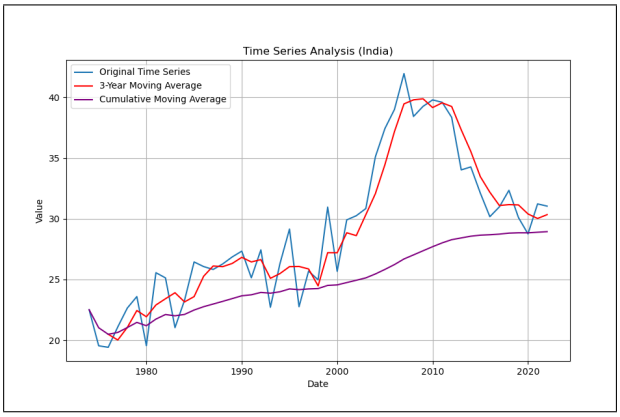
Next, I found the average consumption as a fraction of GDP for India to be 59.73%, whereas for the USA it is 63.58%. In the figures – 1(a) and 1(b), we have plotted the 3-day moving average and cumulative average along with the original time series. It can visually inferred that the cumulative average share of consumption for India dipped during the 2008 recession. It is a little difficult

to see, but there is a slight dip in US counterpart as well. Although, India has a sharper dip, but the consumption share, on an average, is strictly increasing for both countries. It is also clearly noticeable, after 1971, the US consumption share to GDP increased. One reason for 1970s to be a turning point can be because of the termination of the convertibility of the U.S. dollar to gold. In case of India, there is nothing special observed. The economy was recovering, and people were starting to increase their consumption after the 2008 shock.

2 Investment as a fraction of GDP



(a) USA



(b) India

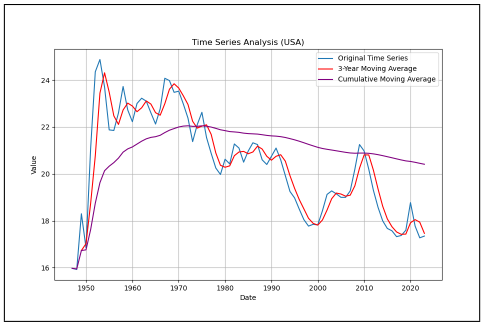
Figure 2: Investment as a fraction of GDP

For "investment as a fraction of GDP", I had to use different data for the countries. In the case of the US, I took "Shares of gross domestic product: Gross private domestic investment" annual data since 1947. However, for India, I have

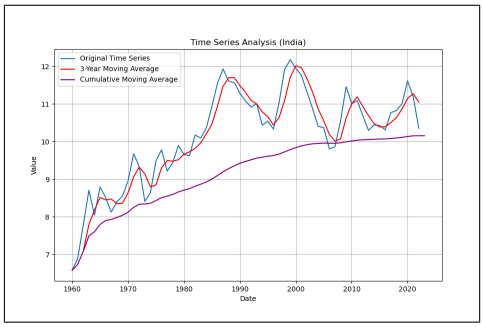
used “Gross capital formation as percentage of GDP” annual data since 1974. Now, the Indian data exhibit non-stationarity at 1% level of significance, but not the US data. This is also evident from the figure 2(a), as the values are moving around an average (here cumulative average) over time. On average, the share of investment in the US economy is 17.34% and in the Indian economy is 28.94% of GDP for our data.

India exhibits a general upward trend and peaks around 2008 as evident from figure 2(b). This may be because of the boom in outsourcing of services from the US to India. The latter had benefitted from that and investments in the country - mainly in the Information Technology sector – and in its linked/associated domains. On the contrary, the US had a major dip in investments in their country during the 2008 recession. Also the share of investment as a percentage of GDP exhibits more fluctuations over time, compared to India.

3 Government spending as a fraction of GDP



(a) USA



(b) India

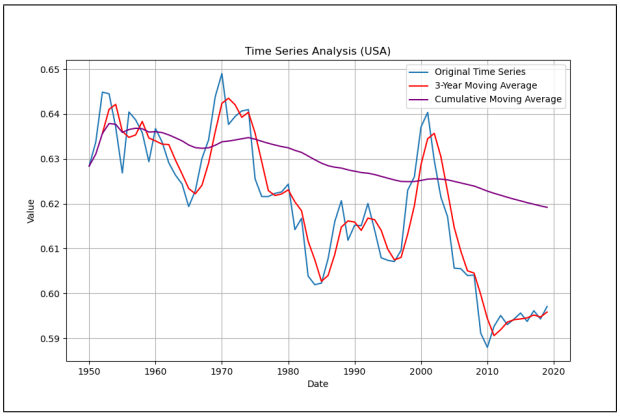
Figure 3: Government spending (all levels) as a fraction of GDP

Again for “Government spending (all levels) as a fraction of GDP”, I had to use

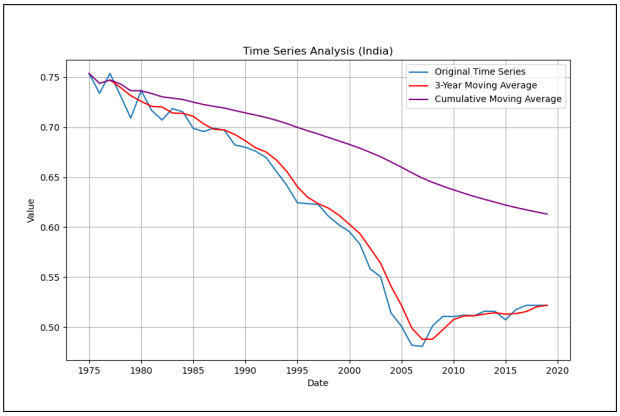
different data for the countries. In the case of the US, I took "Shares of gross domestic product: Government consumption expenditures and gross investment" annual data since 1947. However, for India, I have used "General government final consumption expenditure (% of GDP)" annual data since 1960. The former accounts for the government expenditure on current and capital accounts, whereas the latter only accounts for government expenditure on current account and some parts of the capital account (the exact parts are not mentioned in the source). In this time series analyses, both the countries exhibit non-stationarity in their data. One way of thinking this is, there is no fixed level of government spending. During wars like for India in the mid-1960s and early 1970s, the share was high. In early 2000s the country was making an infrastructure push, which might have increased the share. Similarly for US data, government expenditure depends on the political, global and financial situation the government is in. These are also evident from figures 3(a) and (b).

One interesting observation is that in 2008 crisis, the US government had increased its expenditure (maybe to keep the economy afloat, a similar policy was used during the Covid pandemic), coupled with a shrinking GDP, the share of government expenditure to GDP increased for around that period. In the Indian context, the share of expenditure had decreased. This may be because of the influx of money in the IT sector, and in general booming investment – the government had "crowding out" effect for a brief moment (this is a very vague argument, I did not find good literature to substantiate). On average, the US government spending is 20.41% and the Indian government spending is 10.15%.

4 Payments to labor as a share of GDP



(a) USA

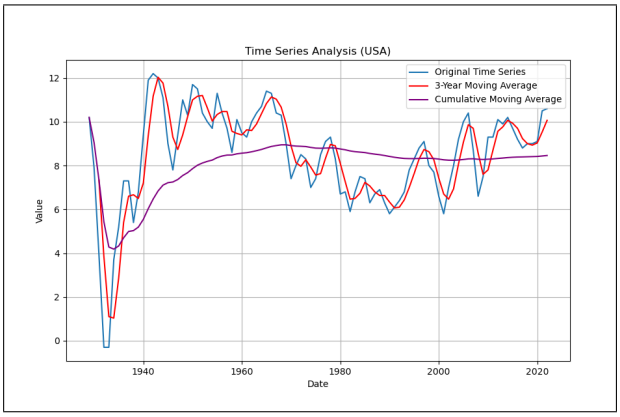


(b) India

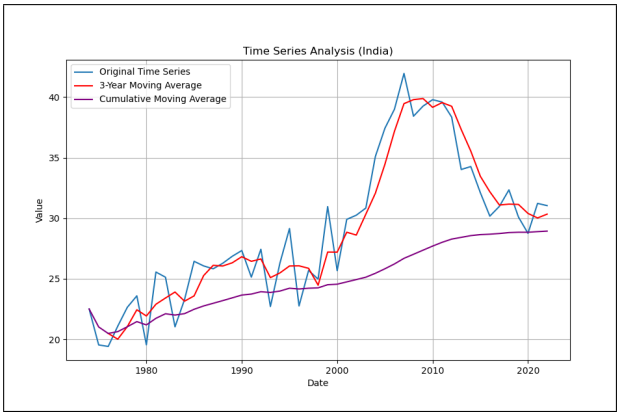
Figure 4: Payments to labor as a share of GDP

I was lucky enough for this time series analysis I was able to get a same type of data from the same source (FRED). I used "Share of Labour Compensation in GDP at Current National Prices" for both countries' analyses. The USA has data since 1950, while India has data from 1975. In this time series analyses, both the countries exhibit non-stationarity in their data. It is also clear from figure 4(a) and 4(b), both the countries' share of payment to its labor is decreasing over time. Around the 2008 crisis, the share of payments dipped for both countries and is recovering very slowly. One noticeable observation in the US data is that the share of payments to labor rose before the crisis. The booming economy can explain this, allowing for more jobs and higher employment. Also, there are more fluctuations in the US data compared to Indian data, which consistently declined still the crisis and showed an upward trend thereafter.

5 Payments to capital as a share of GDP



(a) USA



(b) India

Figure 5: Payments to capital as a share of GDP

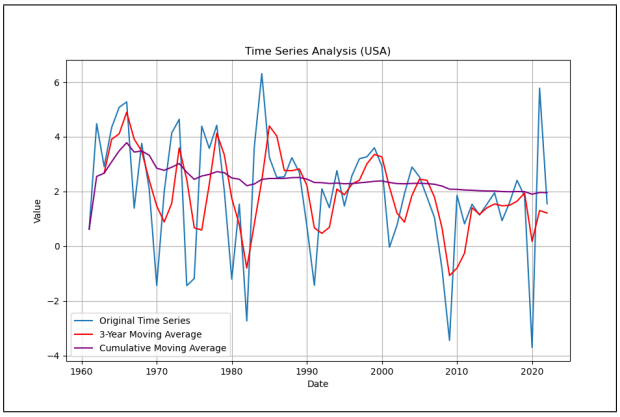
For this analysis, I used "Shares of gross domestic income: Corporate profits with inventory valuation and capital consumption" for USA from 1929, and for India, I used "Gross capital formation as a percentage of GDP" from 1974. For the US data, it was very appropriate to use this time series, as it accounts for corporate profits (which are payments to shareholders), inventory accumulations, and capital consumption in the economy. But for India, we were not able to get corporate profits and inventory accumulation. However, these two can be a very good proxy for payments to capital as a share of GDP. This is because the rise in investments means a rise in capital payments (unless there is a default).

Both the countries' data exhibit non-stationarity, for their given periods. This is also evident from figures 5(a) and 5(b). The average share for US is 8.46%,

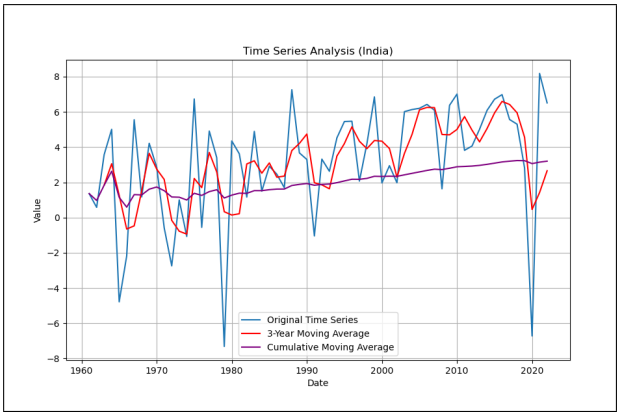
whereas the average share for India is 28.93%. From the figures, we see that the US share of payments to capital was fairly low during the 1930s. This maybe because of "The Great Depression" (1929-39). However, during the WW2 period, i.e., after 1940s, the share of payments rose. This can be attributed the loans taken during wartime by US were being repaid over the years. India being a developing country, the government always took the risk of huge loans for development purposes. This can be a plausible reason why the cumulative moving average line is upward-sloping.

Now during the 2008 crisis, we see a major dip in the US share of payments to capital. Simply because people and organizations defaulted. When you default, you do not pay the interests, which means the payments to capital falls. Now, in case of US, the fall in payments were faster/more than the fall in US GDP. Thus, we ultimately see a dip in the crisis period. For India, we do not have any such observations. However, we see that the share of payments increased. One way to think about it can be – the GDP of the country did not fall by much because of the investment influx, but the increase in GDP was attributed to capital investments (this can also be verified by our consumption analysis, where Indian consumption share to GDP had fallen for the same period). This implies more and more loans were taken and interests had to be paid.

6 Growth rate of output per capita



(a) USA



(b) India

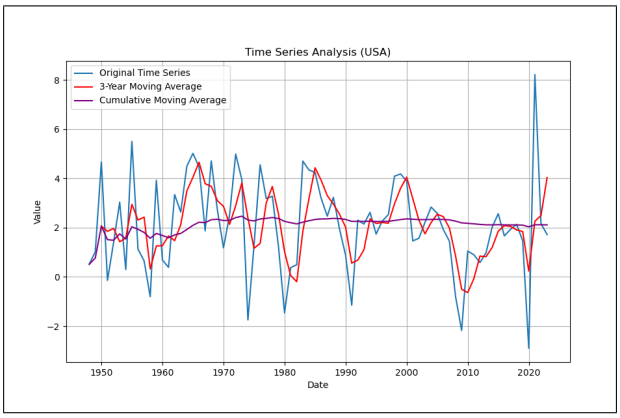
Figure 6: Growth rate of output per capita

In this analysis, I have used "GDP per capita growth (annual %)" from 1960 for both countries, obtained from WDI. The US data exhibits stationarity, whereas the Indian data does not. It is also visually evident from Figure 6 (a) and (b). The US data hovers around the cumulative average (please note, the scale of the graphs are different, hence the US data may not seem stationary, but it is). On the other hand, Indian data shows an upward trend, with a lot of fluctuations. The average per capita growth for the US is 1.96% and for India, it is 3.20%. Thus, it is a good sign for India as it is expanding its output share at an increasing rate (increasing rate since the trend is upward).

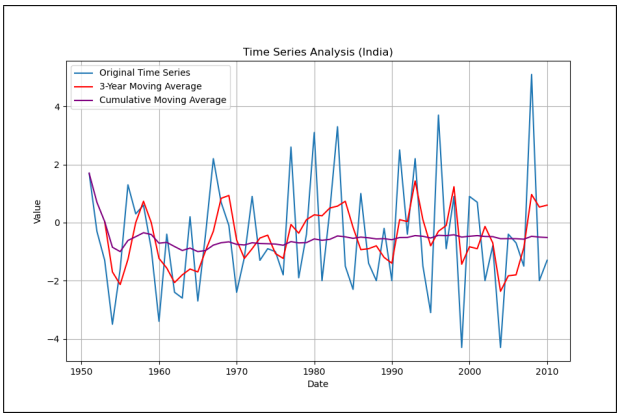
Both countries showed a massive dip during the 2008 crisis, however, it is notable that Indian per capita output growth did not go negative. Thus, during

the Great Recession, the Indian economic output per capita slowed but did not shrink (this maybe due to the sound monetary and economic policies). Whereas, the US took a hit and was quick to recover. It is also worth mentioning, that the per capita ouput growth shrunk (i.e., turned negative) in 2020 due to the Covid-19 pandemic.

7 Growth rate of consumption per capita



(a) USA



(b) India

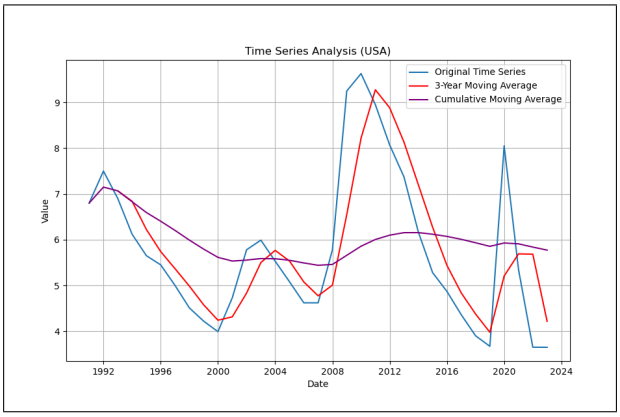
Figure 7: Growth rate of consumption per capita

For this section, I have used "Real personal consumption expenditures per capita, Percent Change from Year Ago" from 1948 to 2023 for the US, and for India, I have used "Consumption Share of Purchasing Power Parity Converted GDP Per Capita at constant prices for India, Percent Change from Year Ago" from 1951 till 2010. Both these data are obtained from FRED, and both

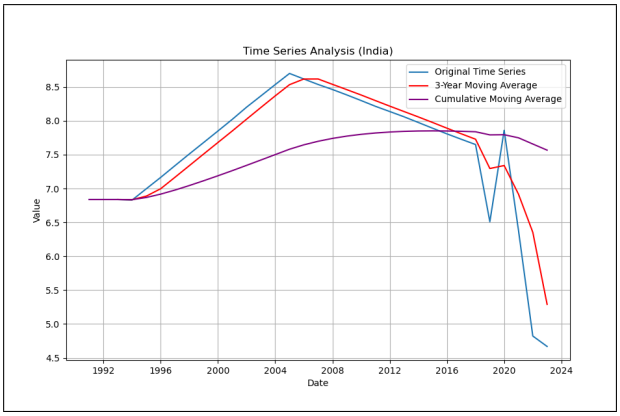
of them exhibit stationarity (at 1% level of significance). We can verify it visually as well, both the graphs in Figure 7 (a) and (b), are hovering around the cumulative moving average line (purple).

The average rate of growth of consumption for US is 2.11%, whereas for India it is -0.51%. This means, over the years, the per capita consumption in the US kept expanding, whereas for India it was consistently shrinking. The latter can be associated with a decreased standard of living, increased income inequality, and poor policy considerations. High fluctuations for both data may indicate that this variable is highly sensitive to shocks and booms. Interestingly in 2008, there was a significant growth in per capita consumption in India, whereas it was pretty low for the US (as expected).

8 Civilian unemployment rate



(a) USA



(b) India

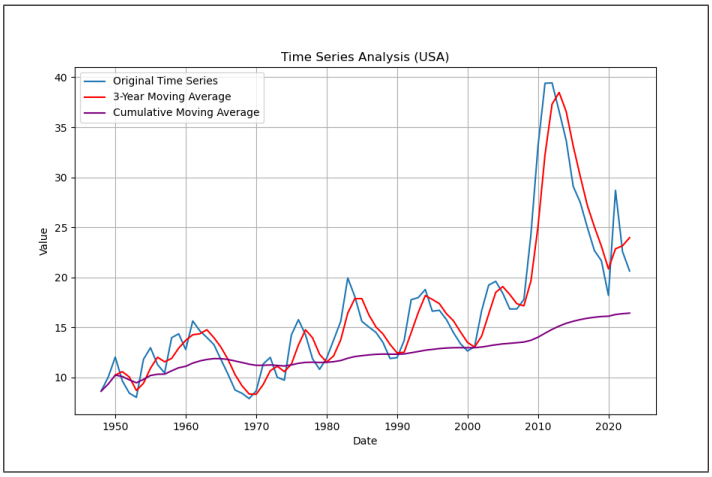
Figure 8: Civilian unemployment rate

In this section I have used the data – "Unemployment, total (% of total labor force)" from WDI, for both US and India analysis. I have only used the data from 1991, beyond which the data for India was not available. Unlike my analysis in other sections, a small time period will enable us to better focus on the 2008 crisis. Here, civilian unemployment refers to the share of the labor force that is without work but available for and seeking employment. Both the countries' data exhibit non-stationarity. Although from Figure 8, the US graph looks somewhat stationary, but it isn't.

Over the periods, the US average did not fluctuate much as somewhat evident from the 3-year moving average line in Figure 8 (a). The mean unemployment for the US is 5.77% and for India is 7.57%.

For the US, the trend seems to fluctuate more compared to India. However, on an average, the US unemployment fell since 1991. On the contrary, India showed rising unemployment – even before the 2008 crisis. As evident from figure 8, the US civilian unemployment rate shot up in 2008 and was well above the cumulative average for until 2014. It took US about 8 years to get back to the pre-crisis unemployment rate (i.e., in 2016). This indicates that the US employment (labor market) took almost a decade to overcome the 2008 shocks. Interestingly in India, there is no unemployment spike during the 2008 crisis. However, the data shows (as evident from figure 8) the unemployment rate gradually fell for the coming decade and the Indian labor market performed well after the 2008 shock.

9 Average duration of unemployment



(a) USA

Figure 9: Average duration of unemployment

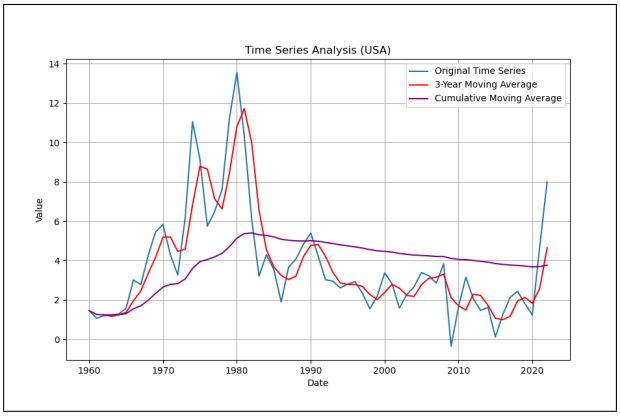
Before we dive into this analysis, a brief context of what is the average duration of unemployment, and how it is similar and different from the unemployment rate is worth stating. The unemployment rate indicates the proportion of labor force that is unemployed, which can signify economic downturns or insufficient job opportunities. Whereas, average duration of unemployment suggests that unemployed individuals are facing challenges in finding new employment, which could indicate structural issues in the labor market or difficulties in matching job seekers with available positions. The unemployment rate act as an indicator of the effectiveness of economic policies (fiscal or monetary measures to stimulate job creation). On the other hand, the average duration of unemployment may indicate the need for targeted policies to address specific barriers to reem-

ployment, such as job training programs.

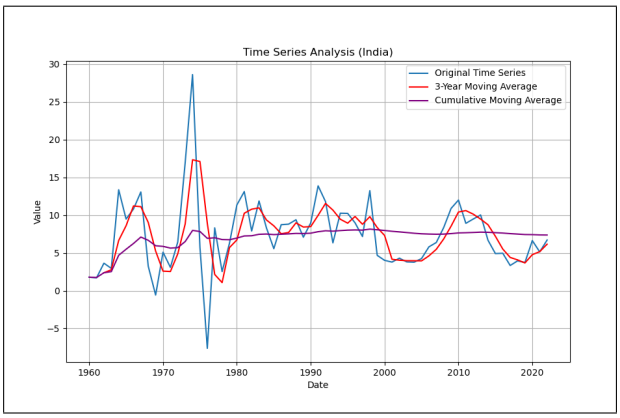
Although the average duration of unemployment and the unemployment rate suggest a similar state of the economy, they are fundamentally very different. For this analysis, I was able to get only the US data from FRED – "Average Weeks Unemployed", as far back as 1948. I was unable to compensate (find a proxy) for the Indian data. Primarily because in the last section I have penned down a detailed analysis of the unemployment rate for both countries (which could have been a good proxy, more on that in a while), and at the beginning of this section, I briefly mentioned how unemployment rate is different than average duration. The data here exhibits non-stationarity, which is evident from Figure 9 (a), and the mean of the time series data was 16.43 weeks.

We see the data fluctuates with an upward trend, i.e., over the years the average duration of unemployment in the US was increasing. This implies people were finding it increasingly difficult to find jobs – may be due to advancements in technology, which rendered many jobs to be useless. Specially in the mid-90s and mid-2000s (before recession), the advancements in computers which aided automation, pushed many laborers out of the job market. It was difficult for them to upskill in a short span of time and participate in the technologically driven industries. This in turn resulted in increased unemployment. Thus, there is a direct relationship between the average duration and unemployment rate – we can also see it on the graphs (in Figure 9 (a) and Figure 8 (a)). Therefore, we can say or estimate the Indian average duration of unemployment exhibits a similar structure, but we do not have exact numbers to provide a better analysis. Finally, during the 2008 recession, there were fewer jobs in the economy. This made it all the more difficult for the people to be employed, which is why, the we see the graph shooting up (reaching about 39.4 weeks in 2011 and 2012).

10 Inflation



(a) USA



(b) India

Figure 10: Inflation

For our final time series comparison, I have used the data – "Inflation, consumer prices (annual %)" obtained from WDI, from 1960. Here, inflation is measured by the consumer price index which reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals. The Indian inflation data is stationary (at 1% level of significance) but the US data is not. It is evident from Figure 10 (b) where the cumulative average is almost a straight line (hovering around 7%). The average inflation rate for India is 7.36%, whereas for US it is 3.76%.

Let us focus on US data first. In the 1970s and 80s, US economy saw very high inflation rates (as high as 13.55% in 1980) due to many reasons such as –

Fed policy, implementation of Keynesian economic policy, higher oil prices by OPEC countries, continued spending for the Vietnam war and expansion in Social Security benefits. All of these combined caused what is called – "The Great Inflation" of the 70s and early 80s. We have not included the 70s data for unemployment, but it is worth mentioning that the country was facing 'stagflation' (a situation where inflation is high, economic growth is slow, and unemployment is high and steady) during the 70s.
However, after that, the US saw moderate levels of inflation (until the Covid-19 pandemic), on average showing a constant level of inflation about 3%. On the contrary, the Indian data shows massive fluctuations. Similar to US, India too faced the oil price shocks (it was more brutal for India because the country was, and still is, a net importer of oil). Back then India was a closed economy, which made it difficult for trade and earn dollars for oil imports.
Additionally, the country faced droughts in 1971, 72 and 74, which further escalated inflation rate. After the 1980s, the inflation rate hovered around the mean inflation, due to Indian Reserve Bank's (RBI) strong and effective monetary policy. In 2008, the US graph shows a dip which is justified because of high levels of unemployment in the economy. High unemployment implies lower aggregate income, which implies lower levels of demand for consumption and finally lower inflation. However, the US economy was able to stay afloat and recover. In the Indian context, one of the main reasons for inflation during the Great Recession, was rising international oil prices (its always the oil!). Over the years, however, inflation was not very high, rather it averaged out (again indicating strong monetary policy decisions). Even during the pandemic, inflation was not high in India (6.69% in 2022), compared to US which thouched 8% in 2022. We have also summarized the minimum, maximum and the average inflation for both the countries in Table 1.

Table 1: Inflation Highlights

Summary Stat	IND	USA
Min	-7.63	-0.36
Max	28.6	13.55
Avg	7.37	3.76

Concluding Remarks

Let us sum up a bit! We have successfully analysed the 10 different time series data and tried to answer the questions as precisely as possible. From this analysis, one of the key take away was that Indian data is scarce. This is a major issue, especially for policy markers. When there is a lack of data, you fail to study various parts of the economy, which will result in poor policy decisions and ultimately harm the economy in the long run. As in the case of average duration of unemployment, there are proxies available – which can very nearly characterize that data. However, such proxies are not sufficient substitutes. There maybe bias if such proxy data is used to formulate policies. This can be an area of policy recoomendation to the government.

Next, we were able to visualize that many of the data had a strong positive and negative correlation. For the 2008 crisis, we saw that US was more severely affected compared to India. Many of the indicators, had a sharper turn for the US. Furthermore, I had tried to explain some of the fluctuations (specially in 70s and 80s, wherever applicable), which acts as additional examples to strengthen our 2008 crisis behavior of that variable. Lastly, the comparison made it clearer, how differently both economies react to the same shocks and have a different trajectory altogether.

Thank you for reading!

APPENDIX

All the data and codes to generate the graphs and statistics are available in the *APPENDIX folder*.