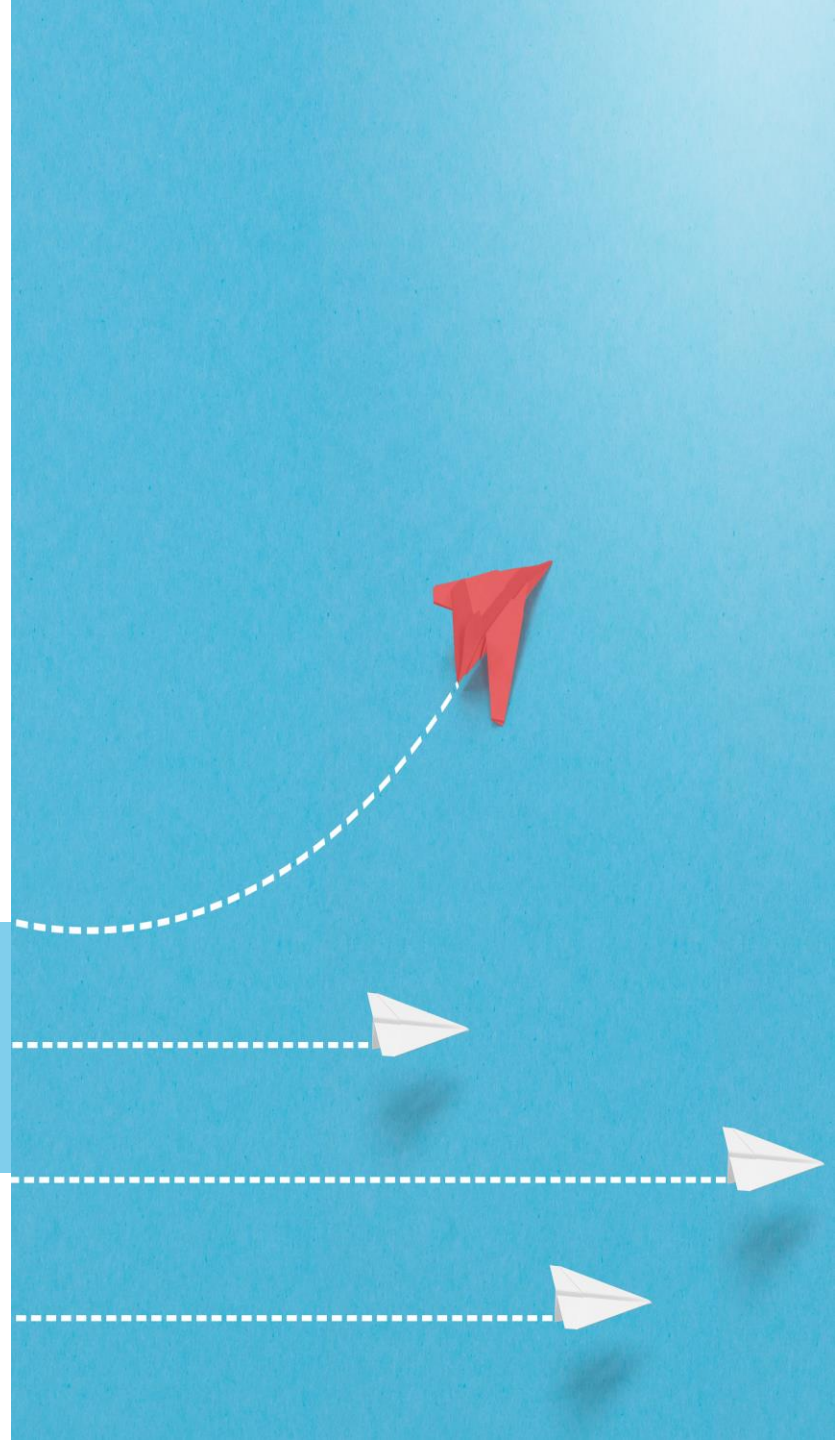
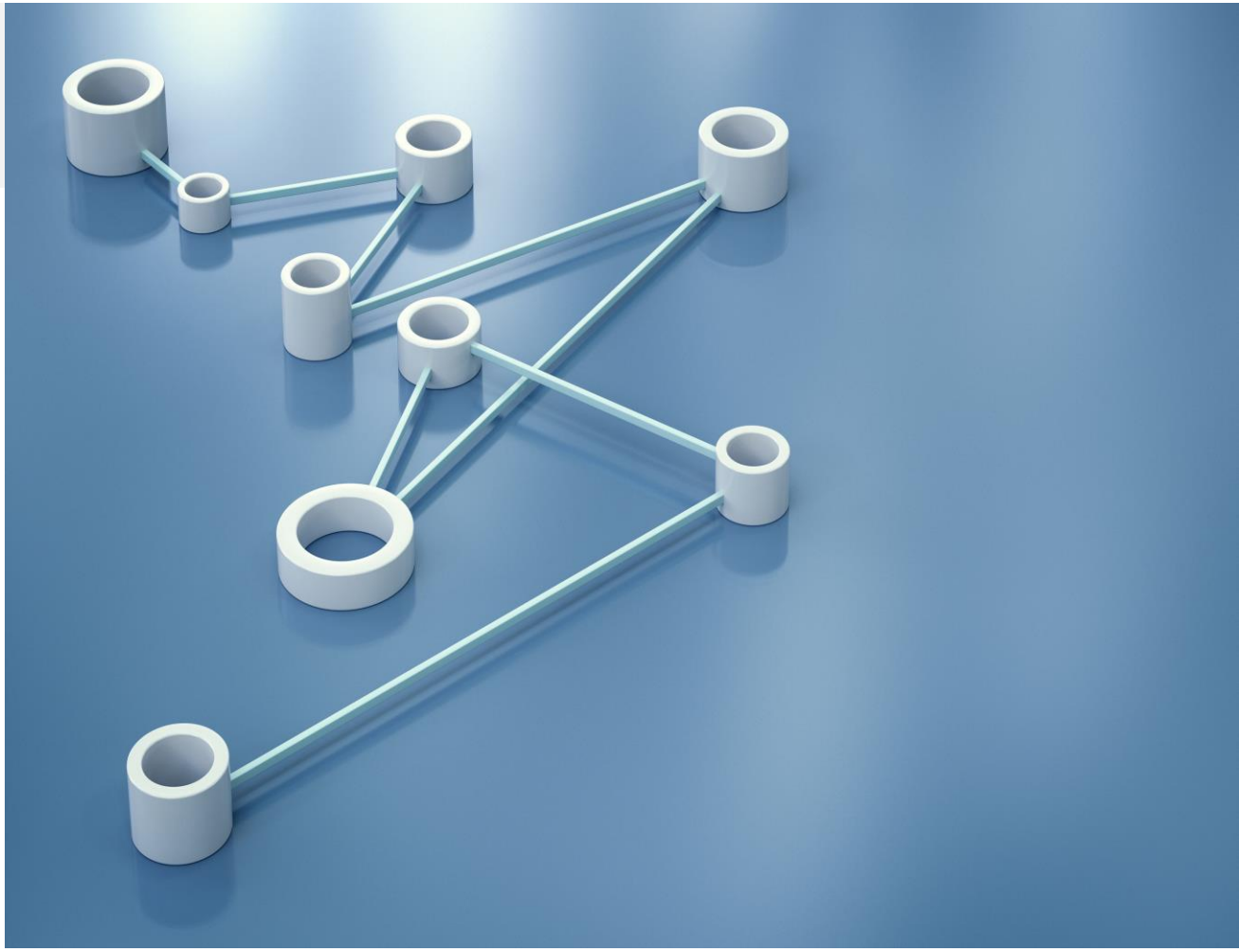
NAVIGATING THE UK ECONOMY:

A Brief Analysis of Key Economic Indicators



Introduction:

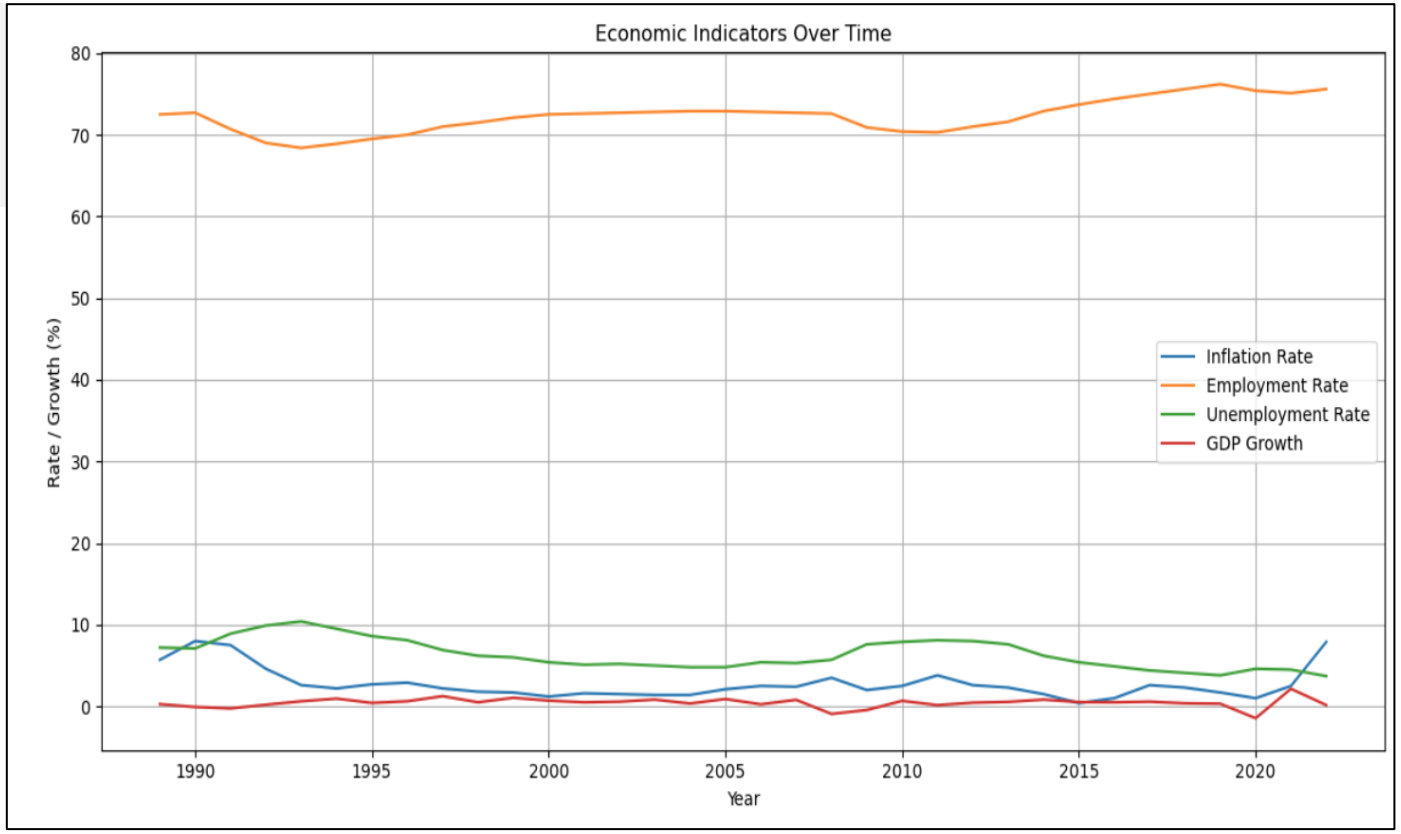
- Using UK National Statistics CSV data
- Focus on key UK economic indicators: inflation, unemployment, employment, GDP growth
- A brief analysis on three-decade UK economic performance overview
- Analysis of historical trends, turning points, and relationships.
- Identifying economic recessions (difficult periods) in the past 30 years



Research Questions:

We've made three key questions of public interest.

1. What do the historical trends in economic indicators tell us?
2. Are there interconnections between the Indicators?
3. What do economic indicators reveal about the quality of life for people in the UK?



Q1: What Do the Historical Trends in Economic Indicators Tell Us?

Approach: Plot line graphs for each indicator, the inflation rate, employment rate, unemployment rate, and GDP growth rate. Then find trends

Q1: What Do the Historical Trends in Economic Indicators Tell Us?

Unemployment Rate is the percentage of people who are actively looking for a job but not at the moment.

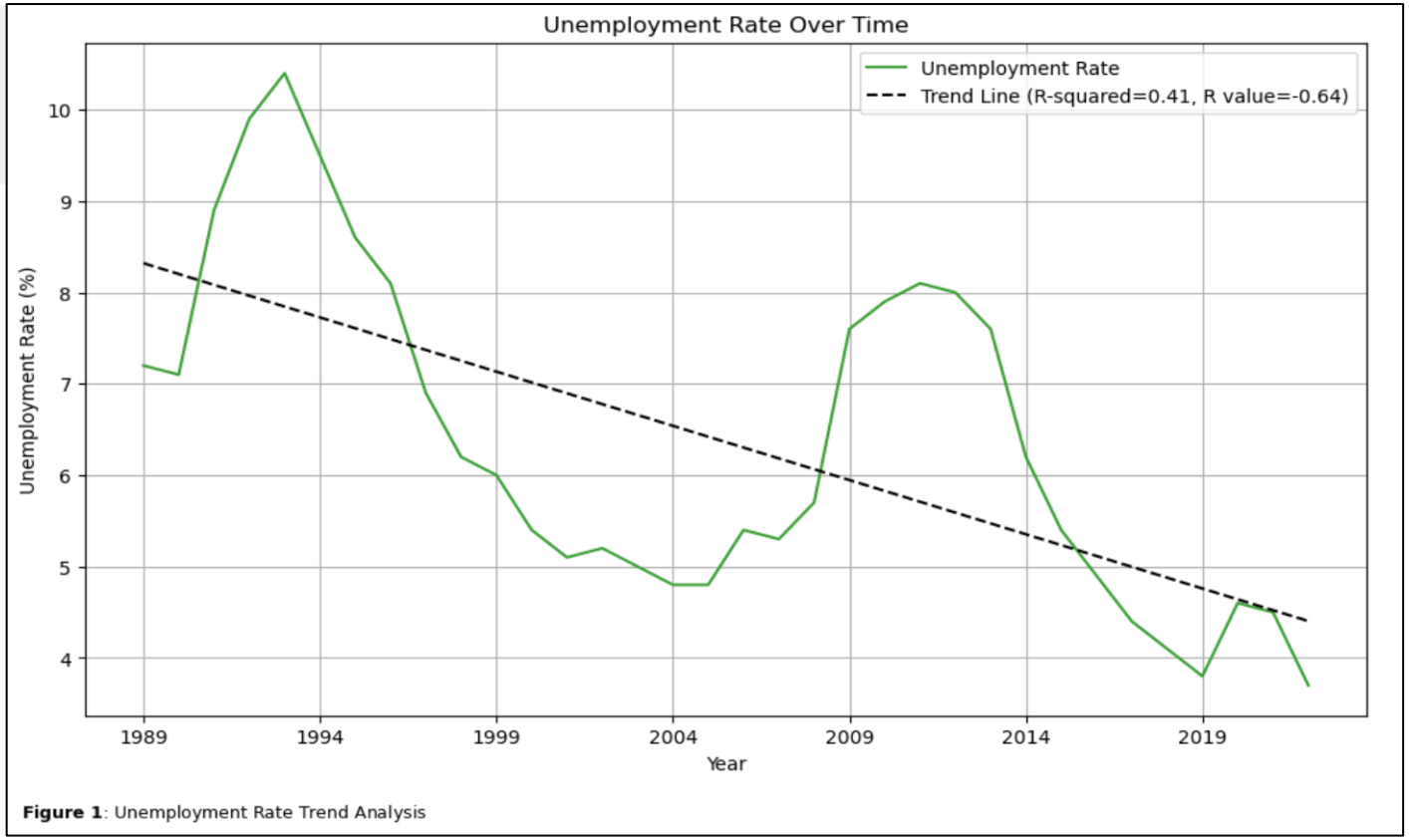


Figure 1: Unemployment Rate Trend Analysis

What does this tell us?

- Trend of decreasing unemployment implying higher percentage of population have jobs than before

```
# Plot a line graph for the Unemployment Rate
plt.figure(figsize=(10, 6))
plt.plot(unemployment_df['Year'], unemployment_df['Unemployment Rate'], label='Unemployment Rate', color='#2ca02c')

# Calculate the trend line
x = unemployment_df['Year']
y = unemployment_df['Unemployment Rate']
slope, intercept, r_value, p_value, std_err = stats.linregress(x, y)

# Trend line
trend_line = slope * x + intercept
print(f'Gradient (Slope) = {slope:.2f}')
```

Q1: What Do the Historical Trends in Economic Indicators Tell Us?

Employment Rate is the percentage of people in a population who have no jobs at the moment.

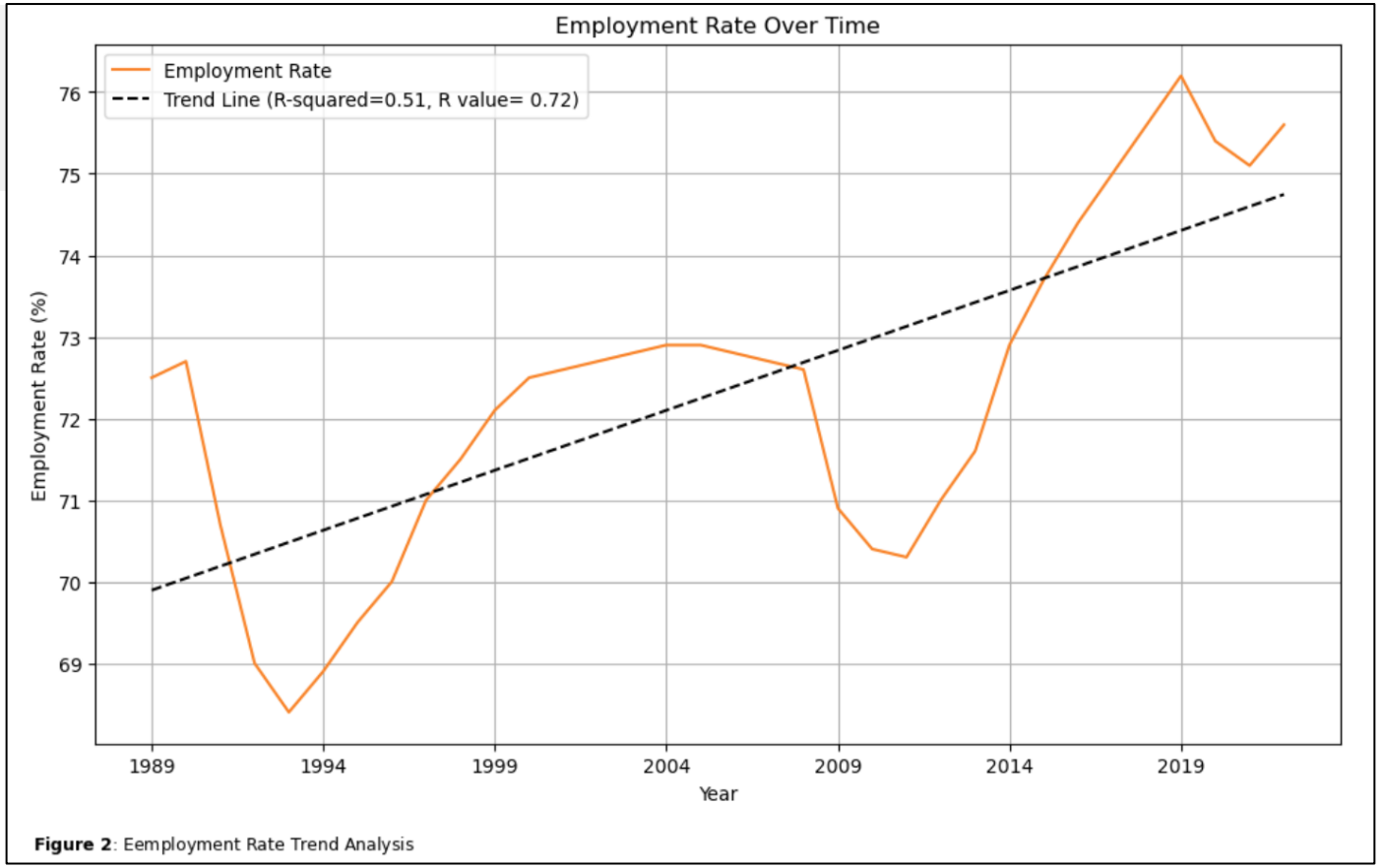


Figure 2: Eemployment Rate Trend Analysis

What does this tell us?

- This confirms the growing job security trend.

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```
# Plot the trend line, displayed in dotted, calculate R(correlation coefficient), and R squared
plt.plot(employment_df['Year'], trend_line, label=f'Trend Line (R-squared={r_value**2:.2f}, R value={r_value: .2f})'
 , linestyle='--', color='black')
plt.title('Employment Rate Over Time')
plt.xlabel('Year')
plt.ylabel('Employment Rate (%)')
plt.grid(True)
plt.legend()
plt.tight_layout()
```

Q1: What Do the Historical Trends in Economic Indicators Tell Us?

Inflation Rate is the percentage at which prices for goods and services in an economy are increasing over a specific period of time

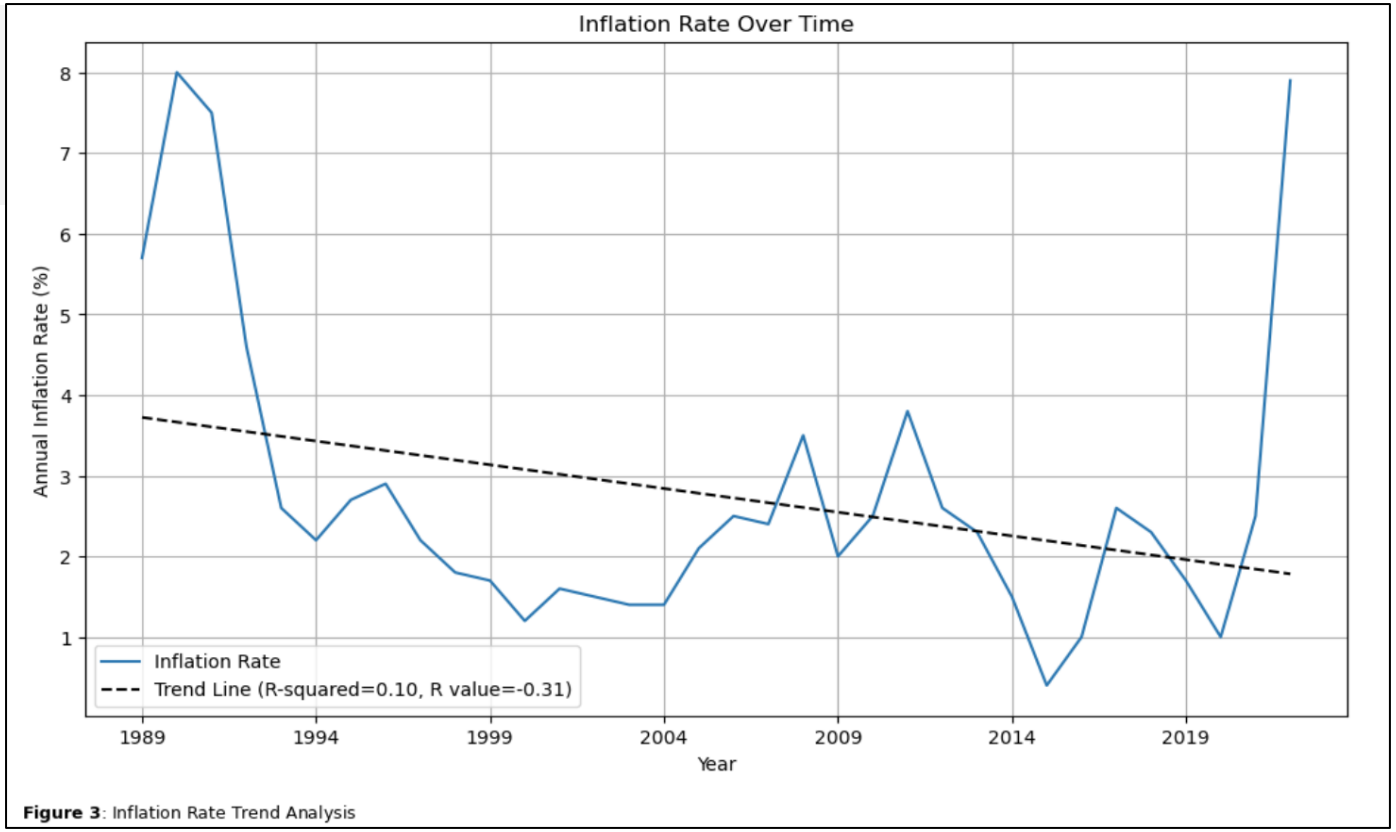

Figure 3: Inflation Rate Trend Analysis

What does this tell us?

- A trend of prices increasing at a slower rate, which is beneficial for the economy's stability.

```
# Figure position adjusted as requred  ,transform=plt.gca().transAxes is used
years_with_5_gap = inflation_df['Year'].iloc[::5]
plt.xticks(years_with_5_gap)
plt.text(-0.05, -0.15, r'$\bf{Figure\ 3}$: Inflation Rate Trend Analysis', transform=plt.gca().transAxes, fontsize=9
plt.show()
```

Q1: What Do the Historical Trends in Economic Indicators Tell Us?

GDP (Gross Domestic Product) Growth Rate measures how fast a country's economy is growing over a specific period.

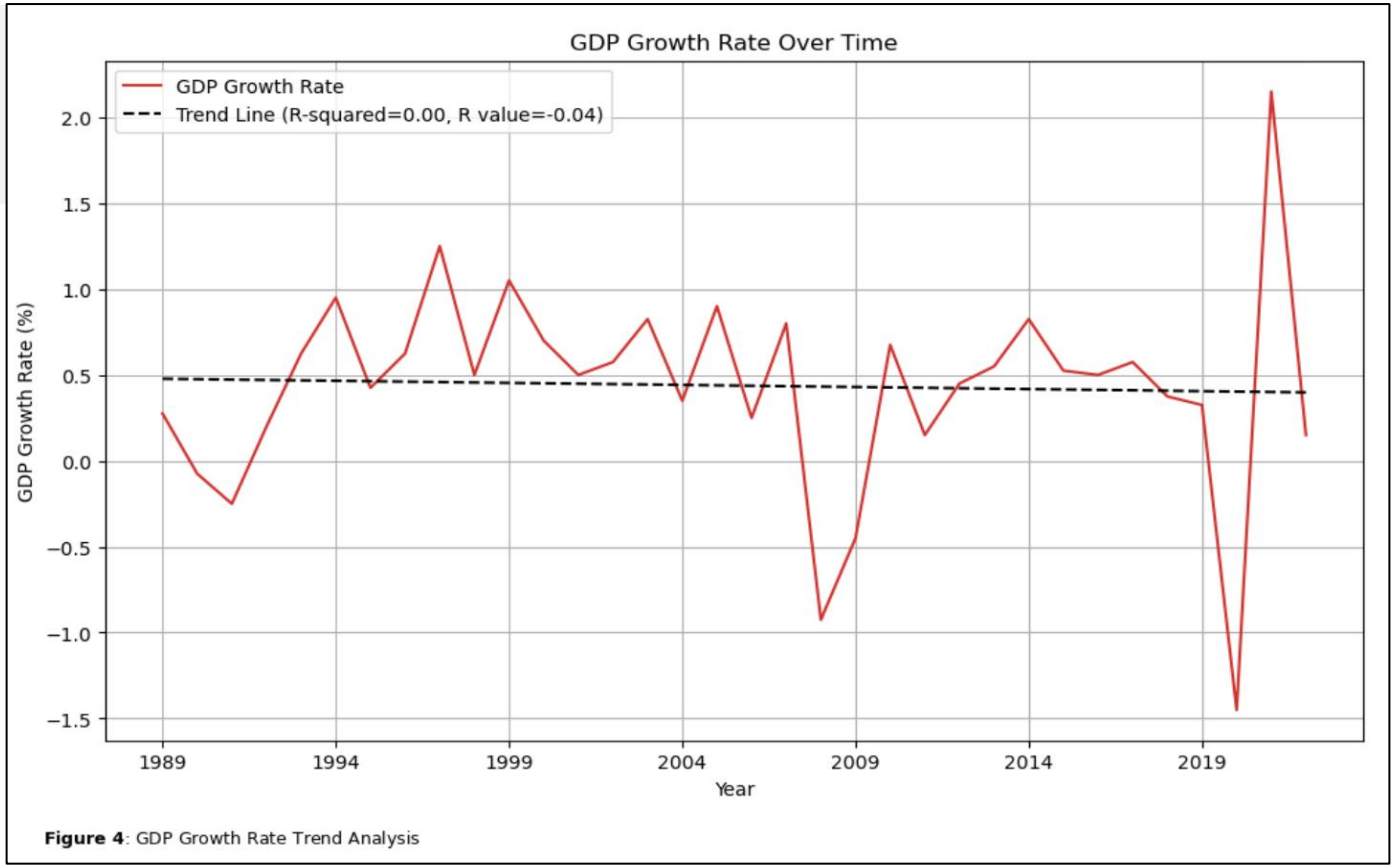

Figure 4: GDP Growth Rate Trend Analysis

What does this tell us?

- GDP growth trending flat or slow suggests limited economic expansion

```
# Create a line graph for the GDP Growth Rate
plt.figure(figsize=(10, 6))
plt.plot(gdp_df['Year'], gdp_df['GDP'], label='GDP Growth Rate', color='#d62728')

# Calculate the trend line
x = np.arange(len(gdp_df))
y = gdp_df['GDP']
slope, intercept, r_value, p_value, std_err = stats.linregress(x, y)

# Generate y values for the trend line
trend_line = slope * x + intercept

# Trend line
plt.plot(gdp_df['Year'], trend_line, label=f'Trend Line (R-squared={r_value**2:.2f}, R value={r_value: .2f})'
 , linestyle='--', color='black')
plt.title('GDP Growth Rate Over Time')
plt.xlabel('Year')
plt.ylabel('GDP Growth Rate (%)')
plt.grid(True)
plt.legend()
plt.tight_layout()

# Set x-axis ticks to show every 5 years
x_ticks = gdp_df['Year'][::5]
plt.xticks(x_ticks)
```

Q1: What Do the Historical Trends in Economic Indicators Tell Us?

Assumption 1: All indicators are equally important to estimate country's economic success

Assumption 2: R value (correlation coefficient) can be used reasonably measure the strength of trend of economic indicators

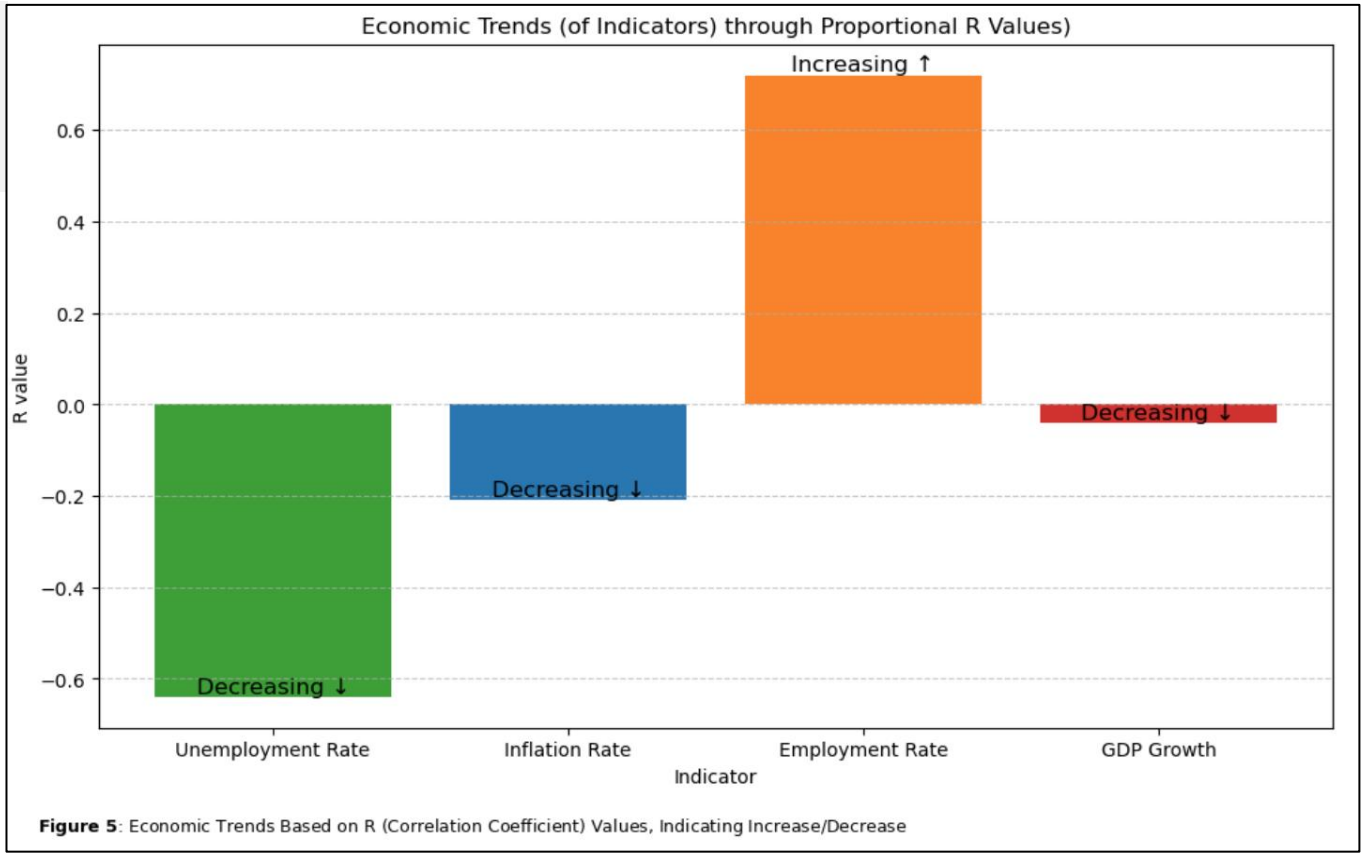

Figure 5: Economic Trends Based on R (Correlation Coefficient) Values, Indicating Increase/Decrease

What does this tell us?

- This chart summarises economic trends based on R values, signifying whether factors have improved or declined.

Q1: What Do the Historical Trends in Economic Indicators Tell Us?

What this tells us?

- Visually summarizes the proportion of favourable and adverse economic trends based on R values

- Simply tells 95.5 % trends would be favourable in long run.

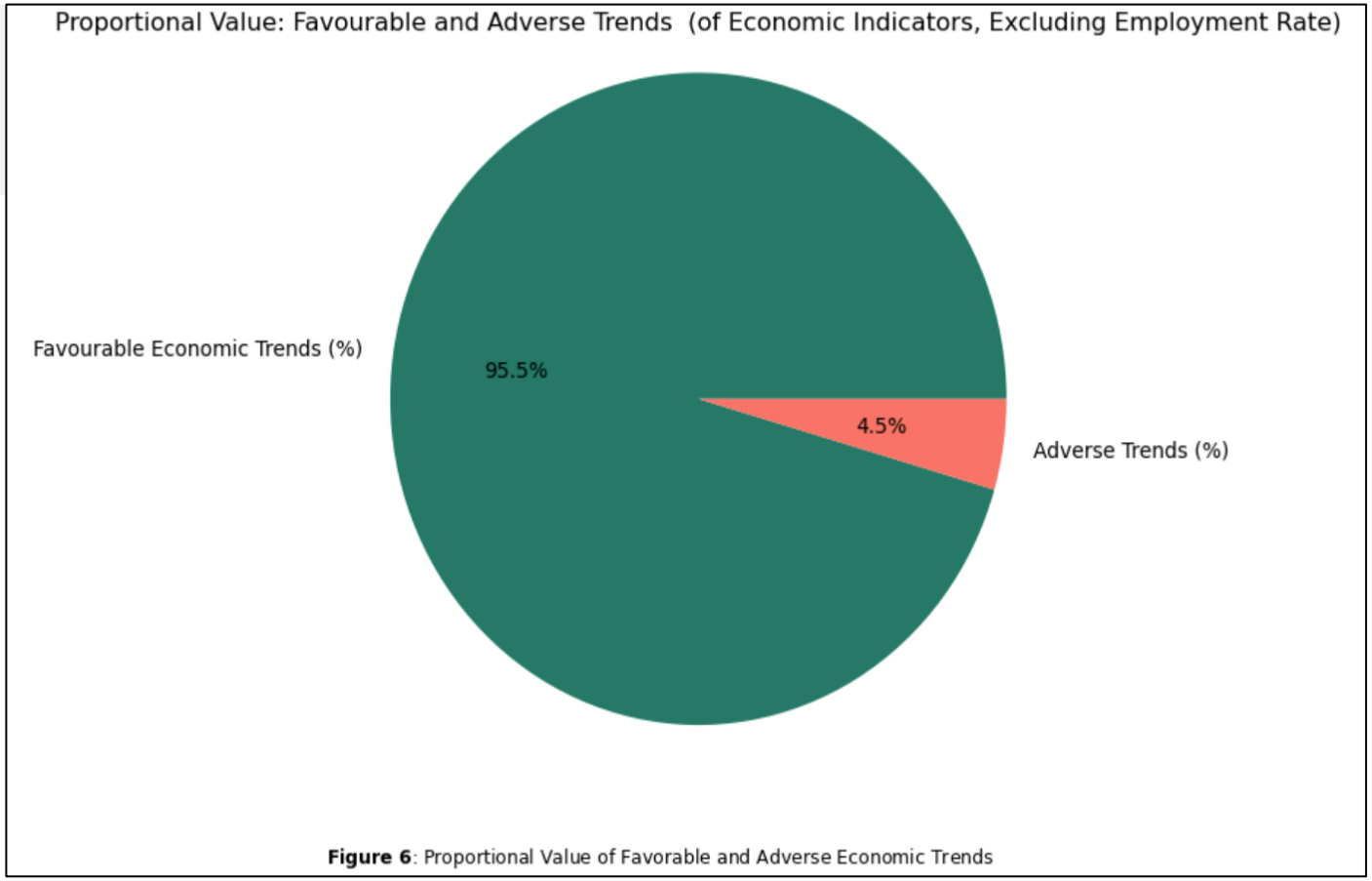

Figure 6: Proportional Value of Favorable and Adverse Economic Trends

Q2: Are There Interconnections Between Economic Indicators?

Approach: Observe the patterns shown in the plots. Identify correlations from heatmap

Q2: Are There Interconnections Between Economic Indicators?

What relationships are observable?

- Inflation and unemployment display direct relationship
- Inflation and GDP growth rate display Inverse relationship
- GDP growth rate and unemployment display weak inverse relationship
- Employment rate and unemployment display weak inverse relationship

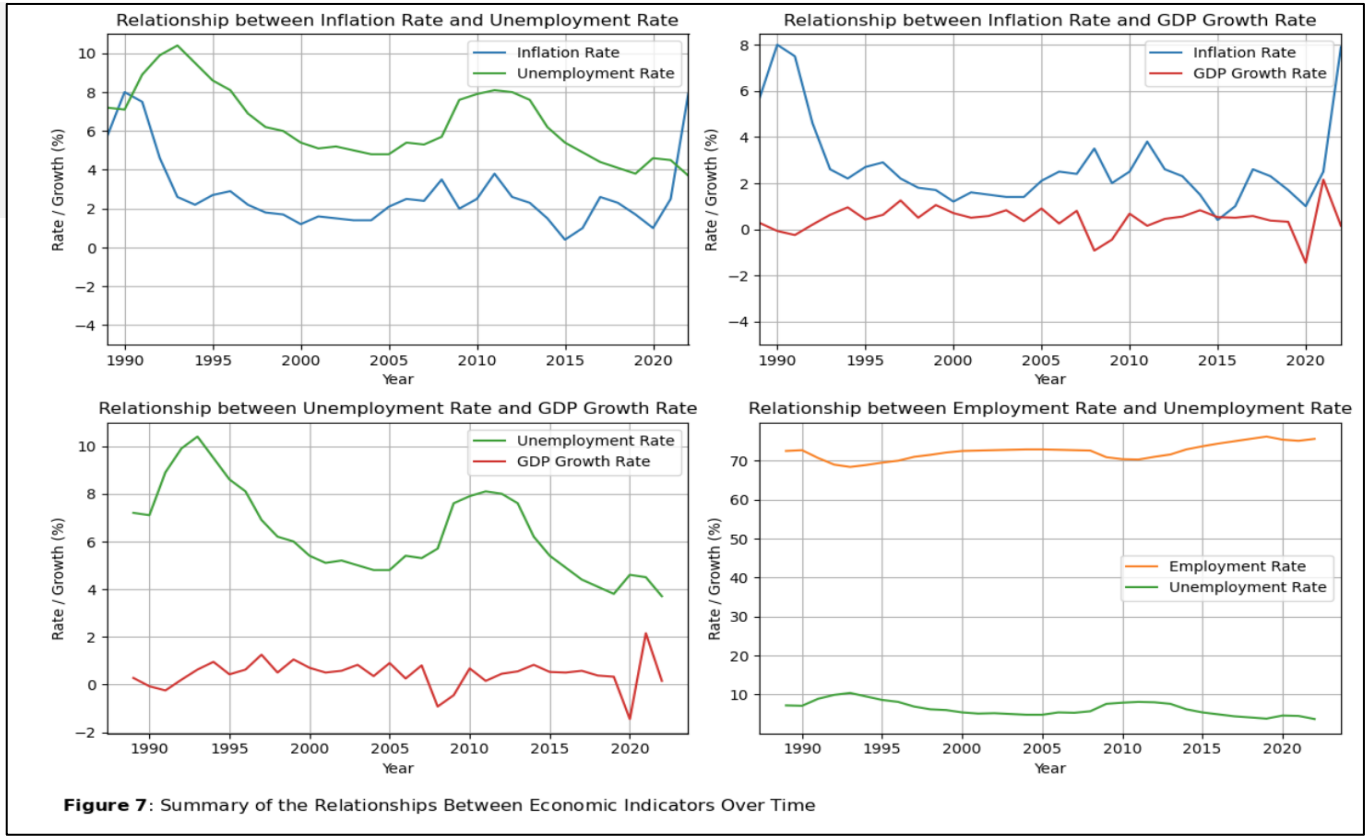

Figure 7: Summary of the Relationships Between Economic Indicators Over Time

```
axs[1, 1].plot(combined_df['Year'], combined_df['Employment Rate'], label='Employment Rate', color='#ff7f0e')
axs[1, 1].plot(combined_df['Year'], combined_df['Unemployment Rate'], label='Unemployment Rate', color='#2ca02c')
axs[1, 1].set_xlabel('Year')
axs[1, 1].set_ylabel('Rate / Growth (%)')
axs[1, 1].set_title('Relationship between Employment Rate and Unemployment Rate')
axs[1, 1].legend()
axs[1, 1].grid(True)

# Adjust spacing between subplots
plt.tight_layout()
plt.text(-1.3, -0.25, r'$\bf{Figure\ 13}$: Summary of the Relationships Between Economic Indicators Over Time', transform

plt.show()
```

Q2: Are There Interconnections Between Economic Indicators?

How are the relationships measured?

- Moderate (0.27) positive correlation is between unemployment rate and inflation rate
- Strong negative correlation (-0.93) between employment and unemployment
- Very weak negative correlation (-0.04) between unemployment and GDP growth rate
- Very weak negative correlation (-0.07) between employment and GDP growth rate

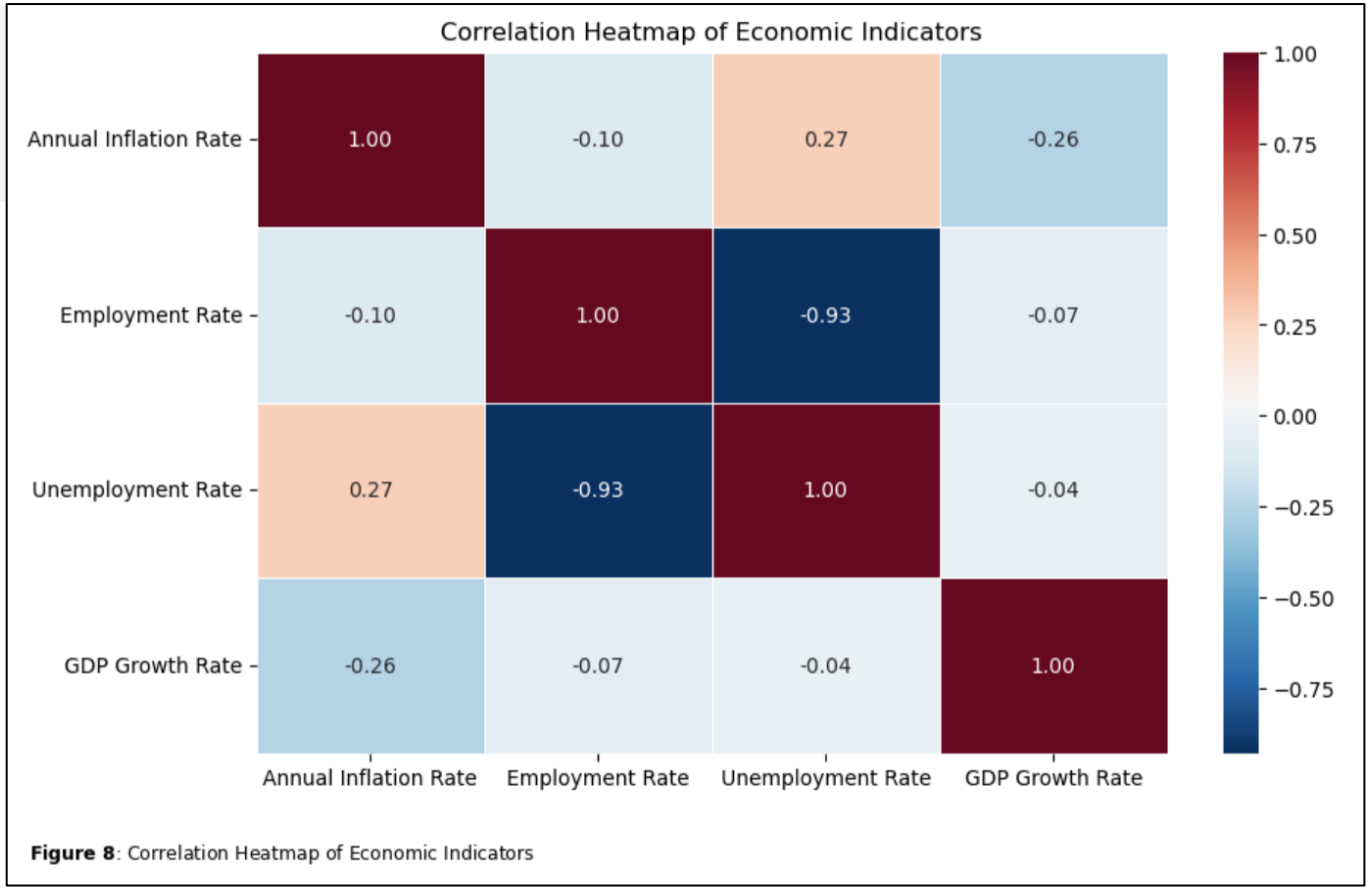

Figure 8: Correlation Heatmap of Economic Indicators

```
# Select the columns for correlation analysis
correlation_data = combined_df[['Annual Inflation Rate', 'Employment Rate', 'Unemployment Rate', 'GDP Growth Rate']]

# Calculate the correlation matrix
correlation_matrix = correlation_data.corr()

# Create a heatmap
plt.figure(figsize=(10, 6))
sns.heatmap(correlation_matrix, annot=True, cmap='RdBu_r', fmt=".2f", linewidths=0.5)
plt.title("Correlation Heatmap of Economic Indicators")
plt.text(-0.25, -0.15, r'$\bf{Figure\ 14}$: Correlation Heatmap of Economic Indicators', transform=plt.gca().transAxes,
plt.show()
```

Q3: What Do Economic Indicators Reveal About the Quality of Life for People in the UK?

Approach: Draw bar chart of GDP growth rate. Identify negative growths
Draw line graph of unemployment rate and inflation rate. Identify peak rates.
Draw bar chart to see stable time in economy

Q3: What do economic indicators reveal about the quality of life for people in the UK?

A recession is a period when a country's economy is struggling

Assumption 3: All negative GDP growth rates lead to recession, and normal otherwise

What does GDP growth rate tell us ?

- **Recession Periods** (Orange Bars): indicate years in which the GDP growth rate was negative, signifying economic recession

- **Normal Periods** (Dark Green Bars): represent years when the GDP growth rate was positive, indicating normal economic conditions

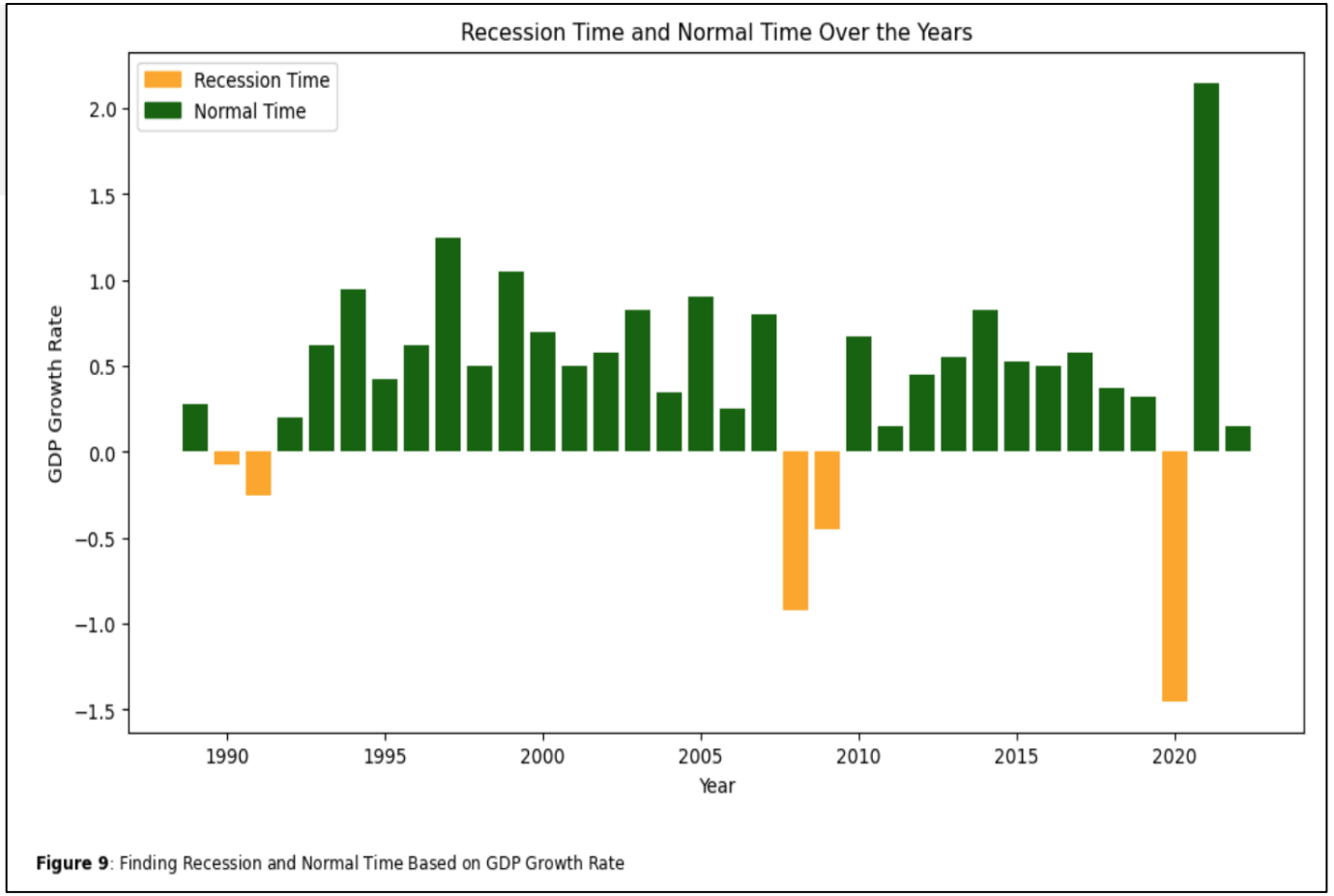

Figure 9: Finding Recession and Normal Time Based on GDP Growth Rate

Q3: What do economic indicators reveal about the quality of life for people in the UK?

What do the inflation rate and unemployment rate jointly reveal?

- Both graphs jointly suggest three short recession periods surrounded by dashed lines

- These periods align with the recessions identified through previous GDP growth rate observations.

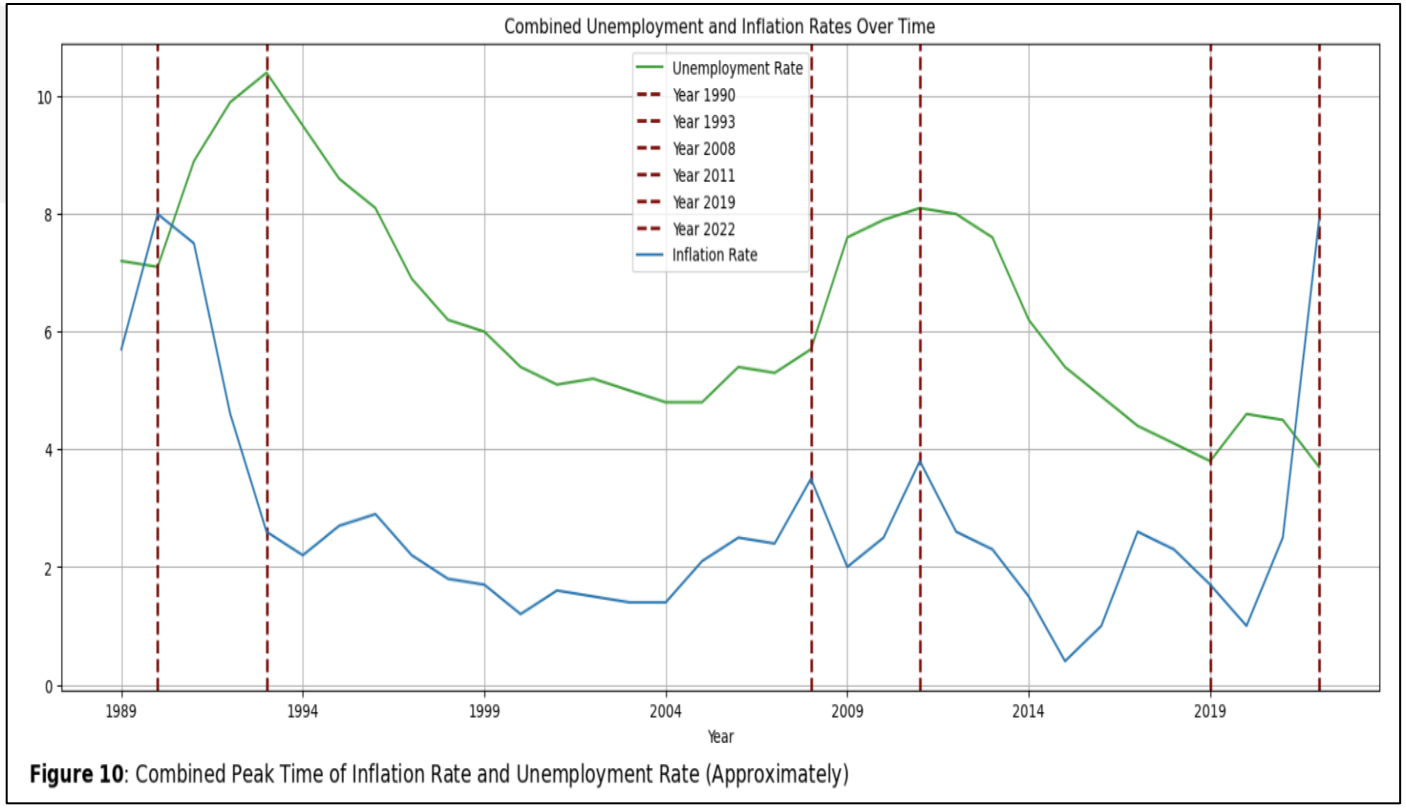

Figure 10: Combined Peak Time of Inflation Rate and Unemployment Rate (Approximately)

Q3: What do economic indicators reveal about the quality of life for people in the UK?

What was the UK's toughest economic period, considering all indicators?

- **Observed Recessions**:

  Period 1: 1990 -1991

  Period 2: 2008 -2009

  Period 3 : 2020

- **Technical Recessions**:

  Period 1: Second quarter of 1990 to first quarter of 1992 (imf.org)

  Period 2: Third quarter of 2008 to fourth quarter of 2009 (parliament.uk)

  Period 3: Second quarter of 2020 (ons.gov.uk)

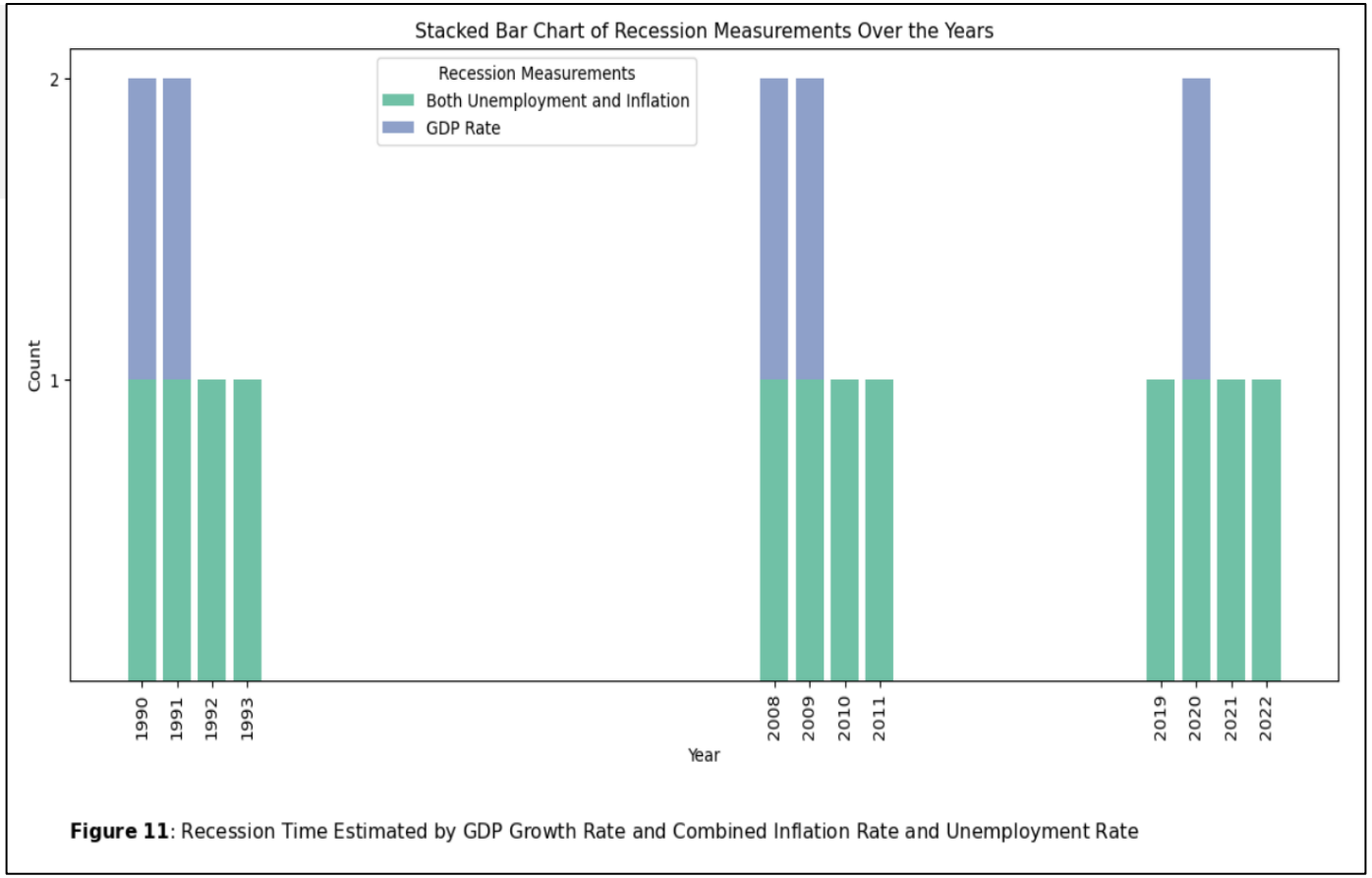

Figure 11: Recession Time Estimated by GDP Growth Rate and Combined Inflation Rate and Unemployment Rate

Q3: What do economic indicators reveal about the quality of life for people in the UK?

How would these recessions have impacted the quality of life in the UK?

- **Unemployment**: (Loss jobs)

  Period 1: 3.5 % increase in job losses (1990- 93)

  Period 2: 2.5 % increase in jobs losses (2008 -10)

  Period 3: < 1 % job losses increase (2019 - 20)

- **Inflation rate:** (Increase food and living cost)

  Period 1: and Period 3: Annual inflation rate is 8%

  Period 2: Annual inflation rate is 3.9%

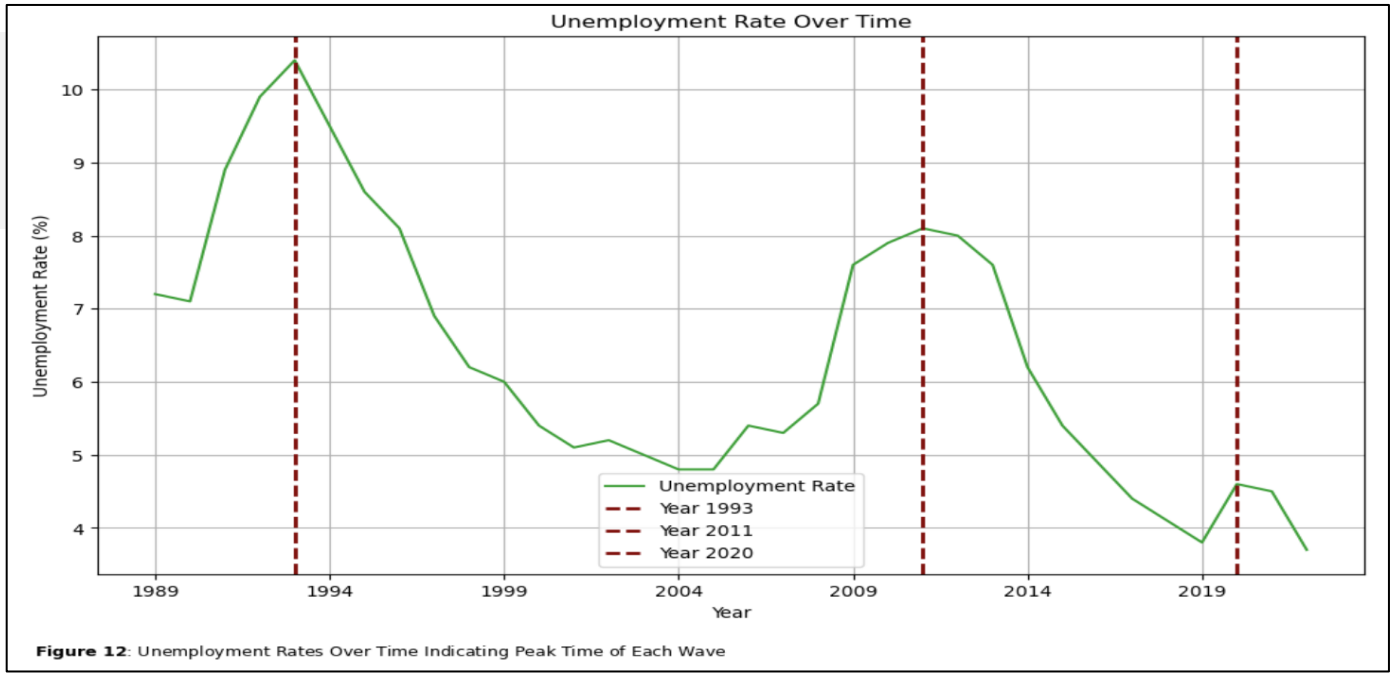

Figure 12: Unemployment Rates Over Time Indicating Peak Time of Each Wave

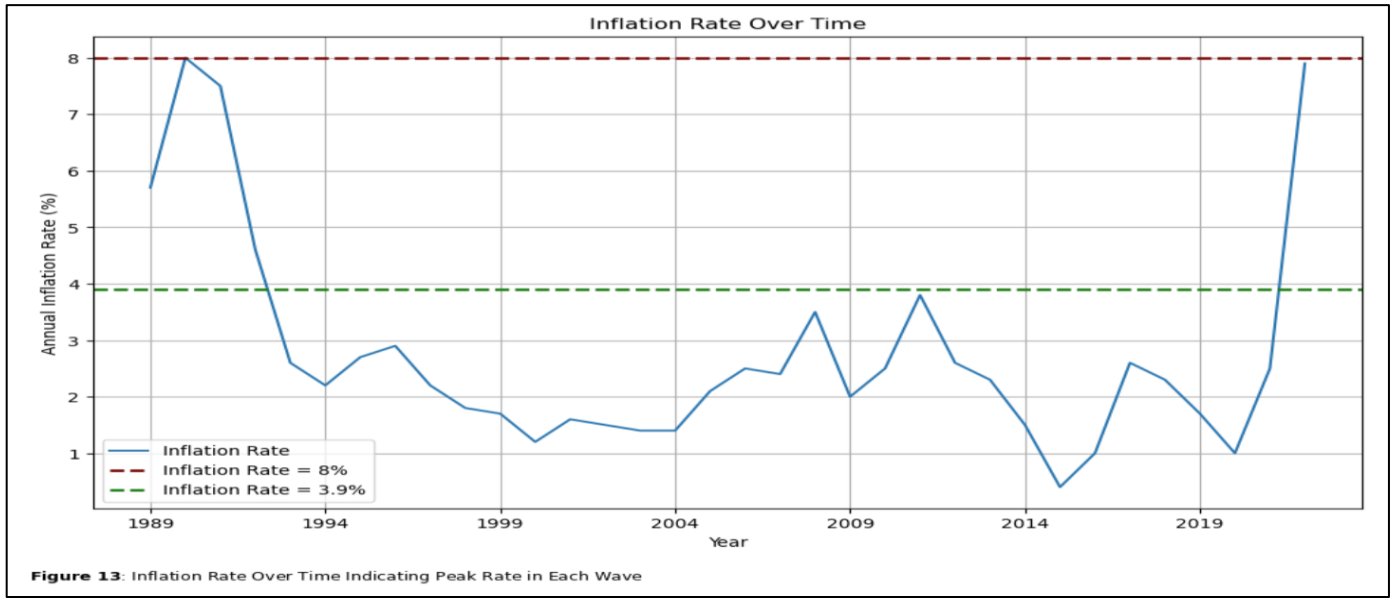

Figure 13: Inflation Rate Over Time Indicating Peak Rate in Each Wave

Q3: What do economic indicators reveal about the quality of life for people in the UK?

When was the period of stable, high-quality life in the UK?

Most Stable Time in Economy periods

1999 – 2006

2014 - 2018

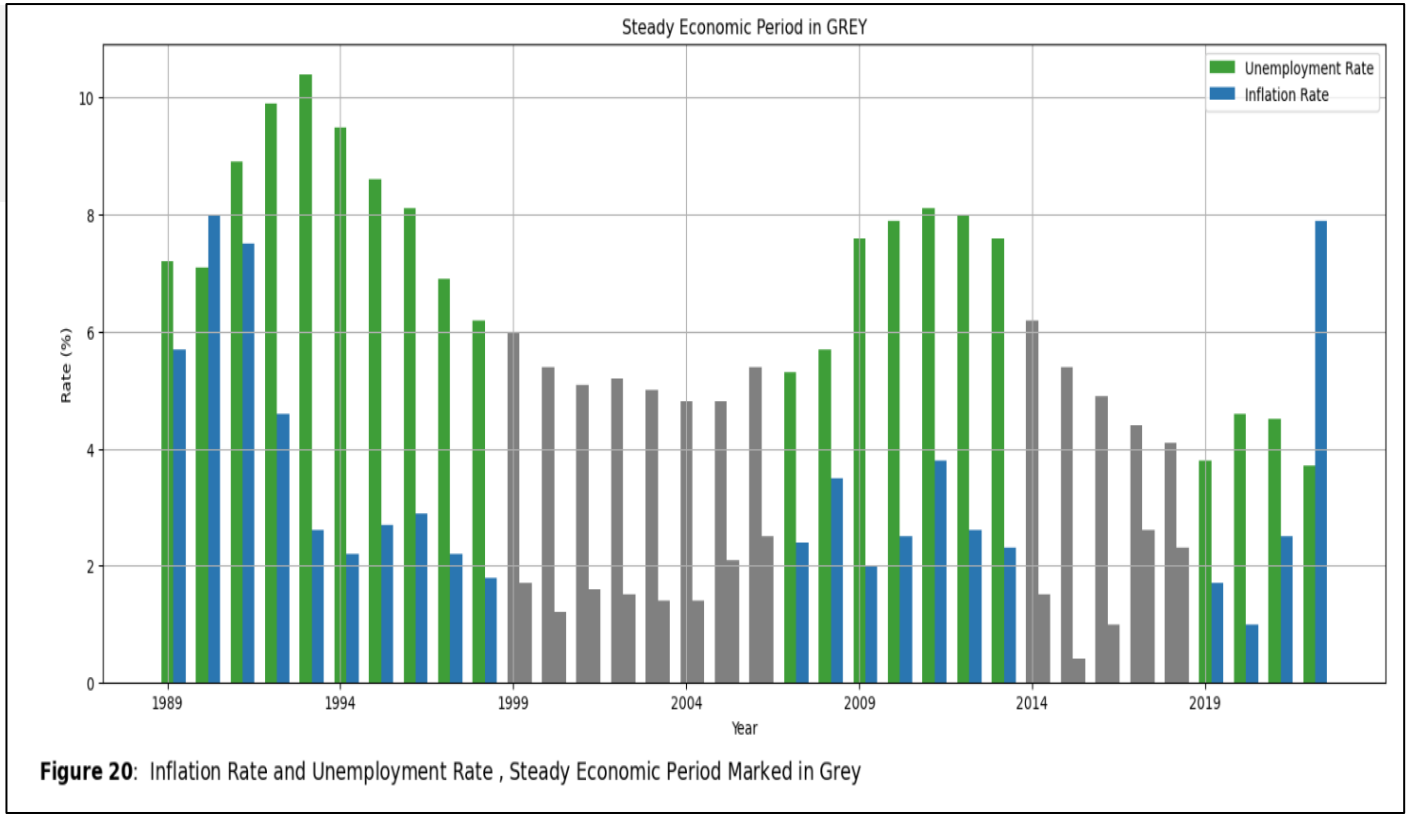

Figure 20: Inflation Rate and Unemployment Rate , Steady Economic Period Marked in Grey

Limitations

- Economic estimations are usually **multifactorial**, but this analysis considered only four indicators.
- **Assumptions** made in the analysis may not be perfect.
- To observe more comprehensive trend patterns, a **longer timeframe** is necessary.
- Quality of life depends on various factors **beyond job losses and price** increases.
- The analysis is limited to historical data and does **not provide future predictions**.

Conclusion

- Favourable overall trend
- Economic challenges in the 1990, 2008 crisis and 2020.
- Stable and prosperous periods in 1999-2006 and 2014-2018.

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