Case Studies - Forecasting Bitcoin: Data Presentation

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Introduction

- Project Context: Forecasting the quarterly growh rate of the Bitcoin.
- Potential Drivers: US unemployment rate, the US inflation rate, the federal funds rate and the growth rate of the S&P 500

Data

Data Recruitment

Historical Bitcoin Data

- *Investing.com*
- One of the top three global financial websites in the world.

Other Drivers

- *FRED-QD*
- It is a large macroeconomic database designed for the empirical analysis of "big data."

Data

Dataset Properties

Historical Bitcoin Data

- *.csv* format
- Starts from Q3 2010
- Runs daily, over 4650 data points and counting
- 7 columns in total namely: *Date, Price, Open, High, Low, Volume, Change %*

Other Drivers

- *.csv* format
- Starts from Q1 1959
- Runs *quarterly*, over 200 individual columns

Data

Data Operations

Historical Bitcoin Data

- Added a column called *change*, according to the growth rate formula
- Fixed the *volume* column which had *K*, *M*, *B* corresponding to thousand, million and billion.
- Changed the time index to be readible by R.
- Daily data has been aggregated to be quarterly data using averages over the given period.

Other Drivers

- In total of 8 columns have been used, namely *UNRATE','CPIAUCSL', 'CPILFESL', 'FEDFUNDS', 'S.P.500', 'S.P..indust', 'S.P.div.yield'*

Column	Description
UNRATE	Civilian Unemployment Rate (Percent)
CPIAUCSL	CPI for All Urban Consumers: All Items
CPILFESL	CPI for All Urban Consumers: All Items Less Food Energy
FEDFUNDS	Effective Federal Funds Rate
S.P.500	S&P's Common Stock Price Index: Composite
S.P..indust	S&P's Common Stock Price Index: Industrials
S.P.div.yield	S&P's Composite Common Stock: Dividend Yield

Other Drivers

- Created data for *infilation* from the CPI
- Derived the growth rate for S&P indexes

All of the variables have been combined in a dataframe called *combined_df*

Data

Data Visualisations

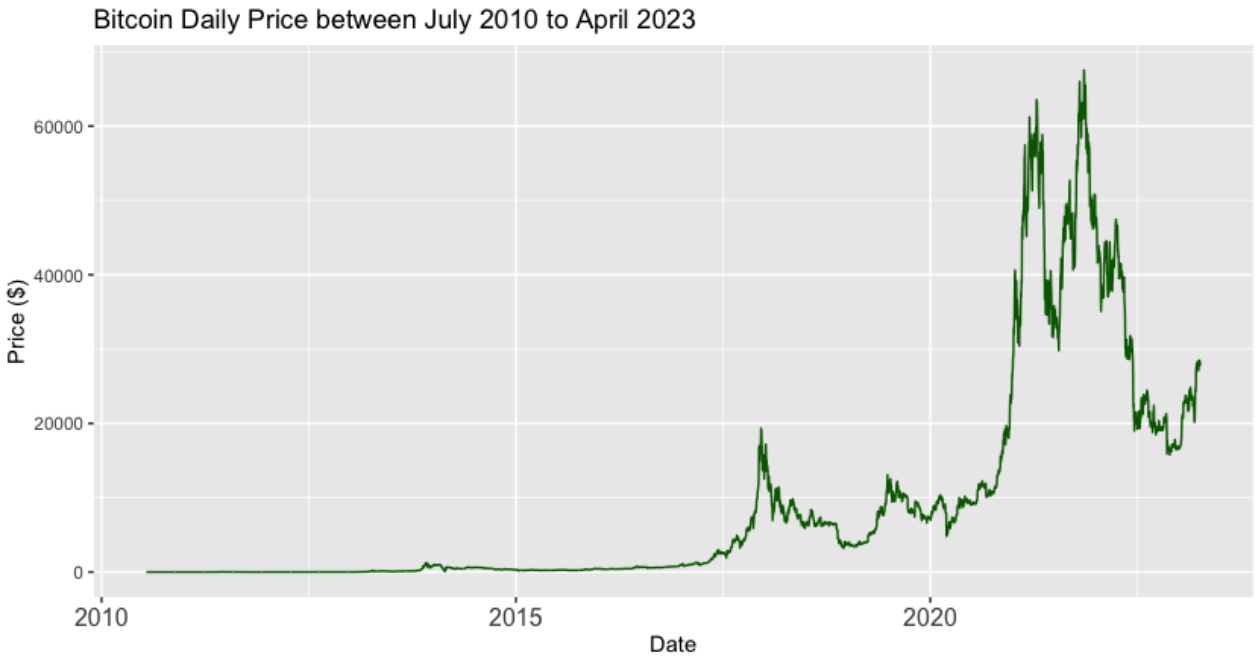

Figure 1: Historical Bitcoin Price Data

Descriptive Statistics for Historical Daily Bitcoin Price

Metric	Value
Data Points	4644
Mean	8,894.42
Standard Deviation	14,497.53
Median	902.65
Minimum	0.1
Maximum	67,527.9

- Since the price of the Bitcoin has seen a lot of volatility over the years, variance value surpases the mean.

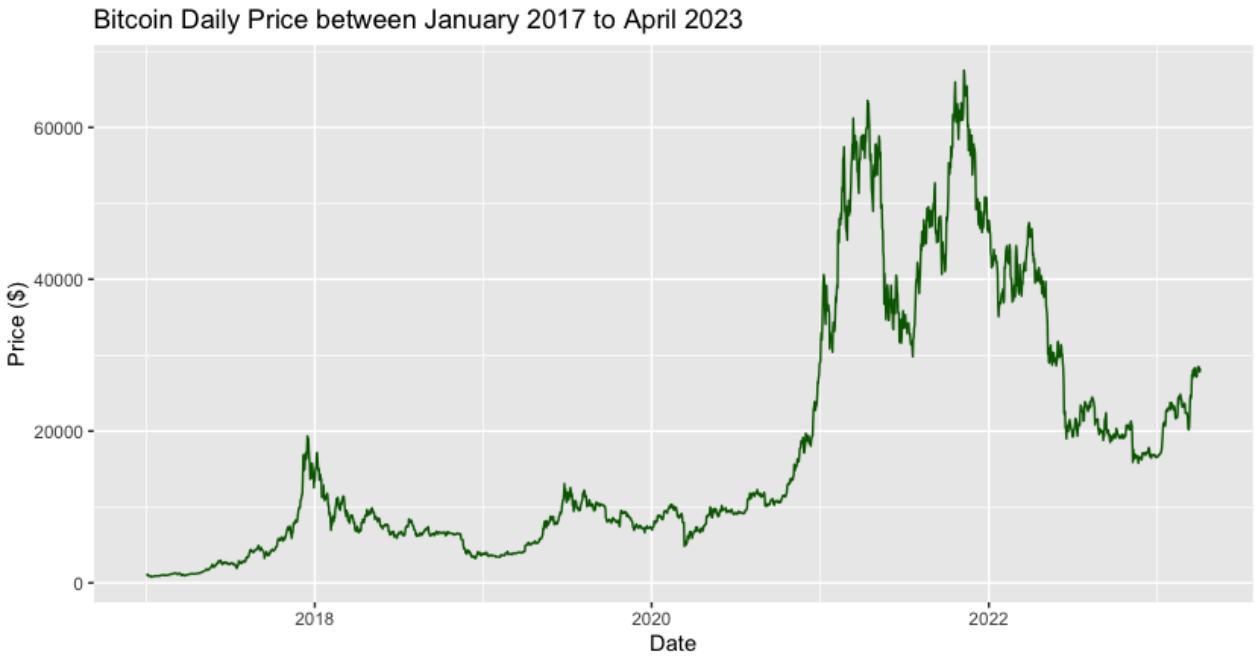

Figure 2: Historical Bitcoin Price Data 2017-2023

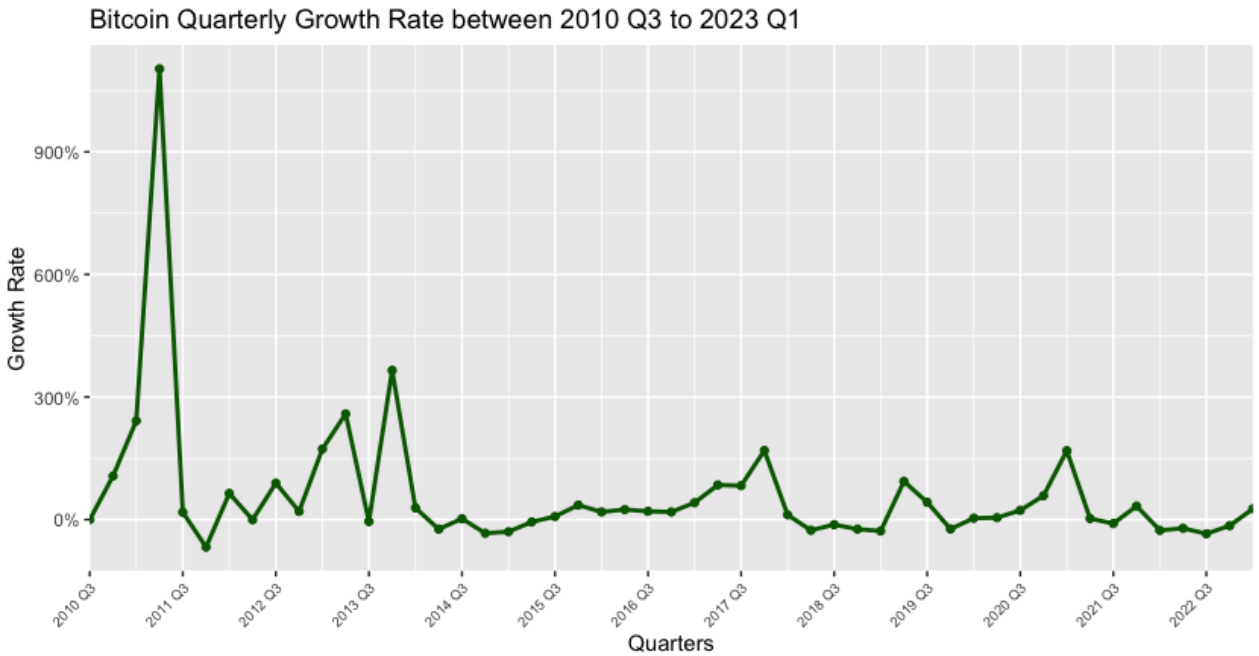

Figure 3: Historical Quarterly Bitcoin Price Growth 2010-2023

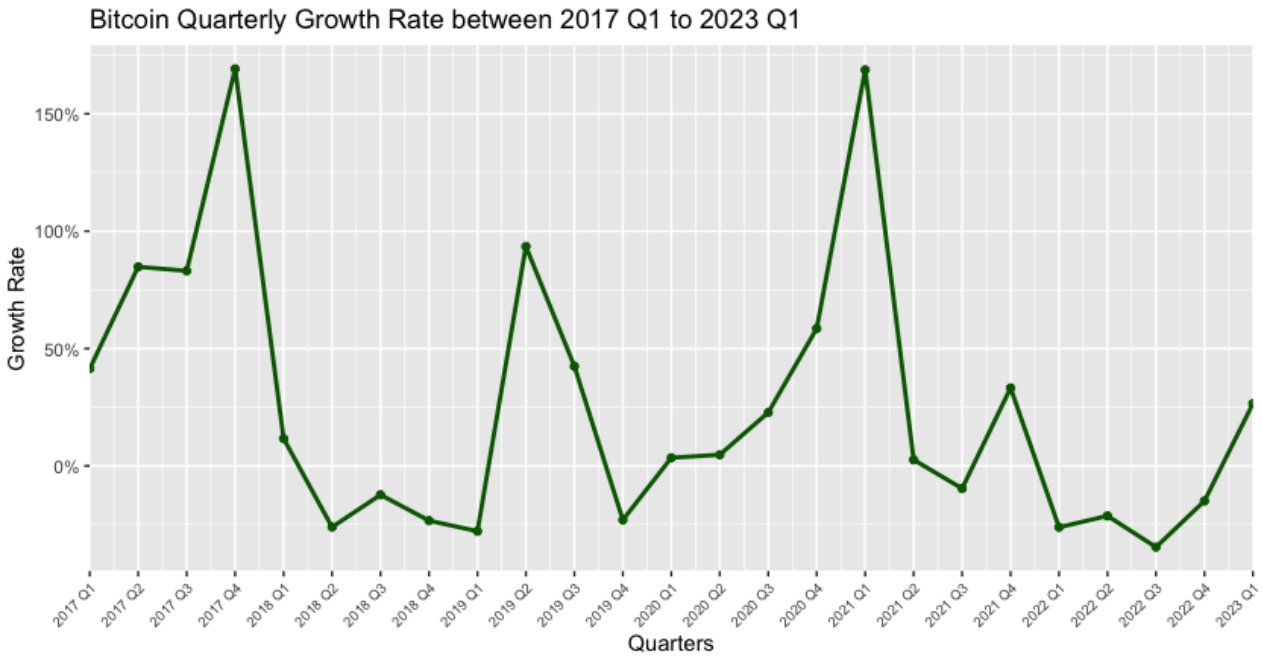

Figure 4: Historical Quarterly Bitcoin Price Growth 2017-2023

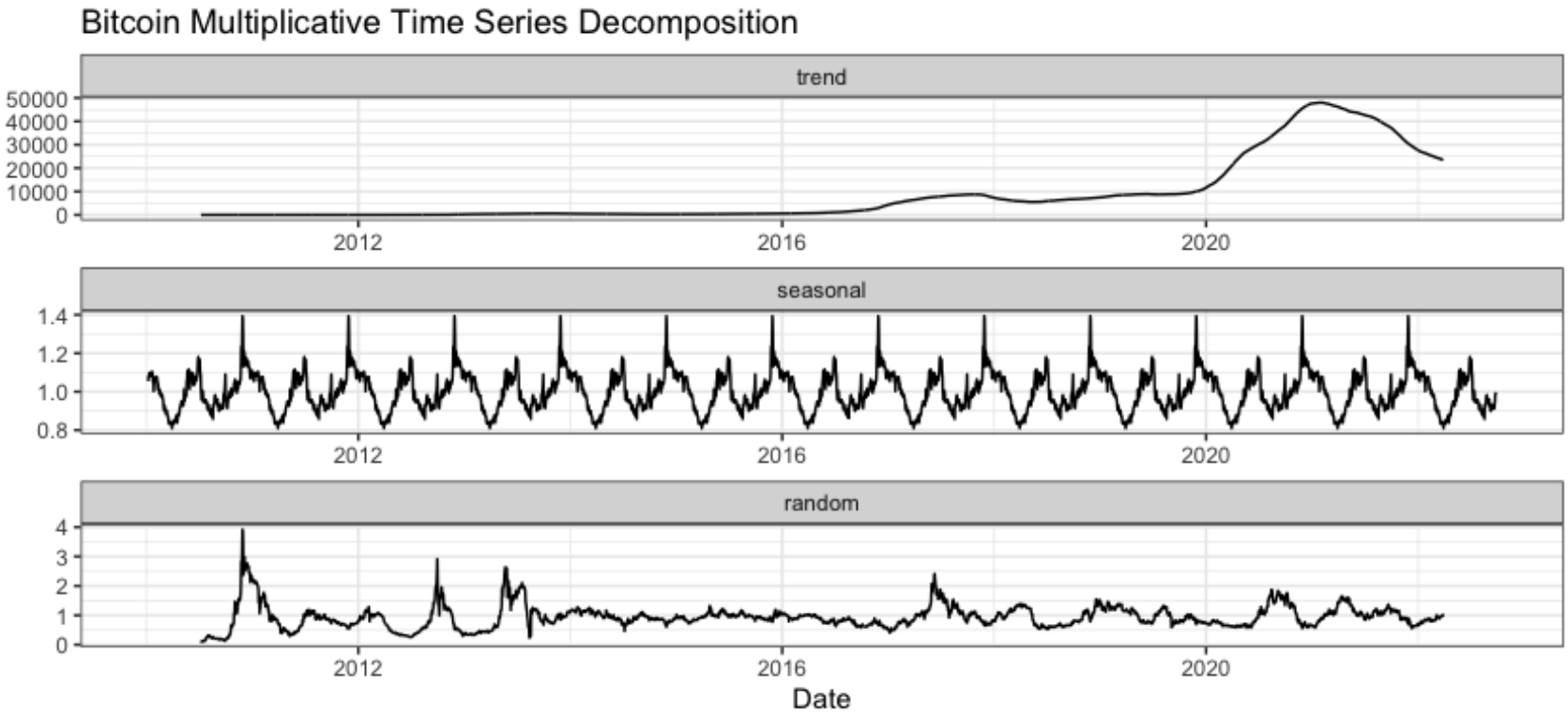

Figure 5: BTC Daily Decomposition

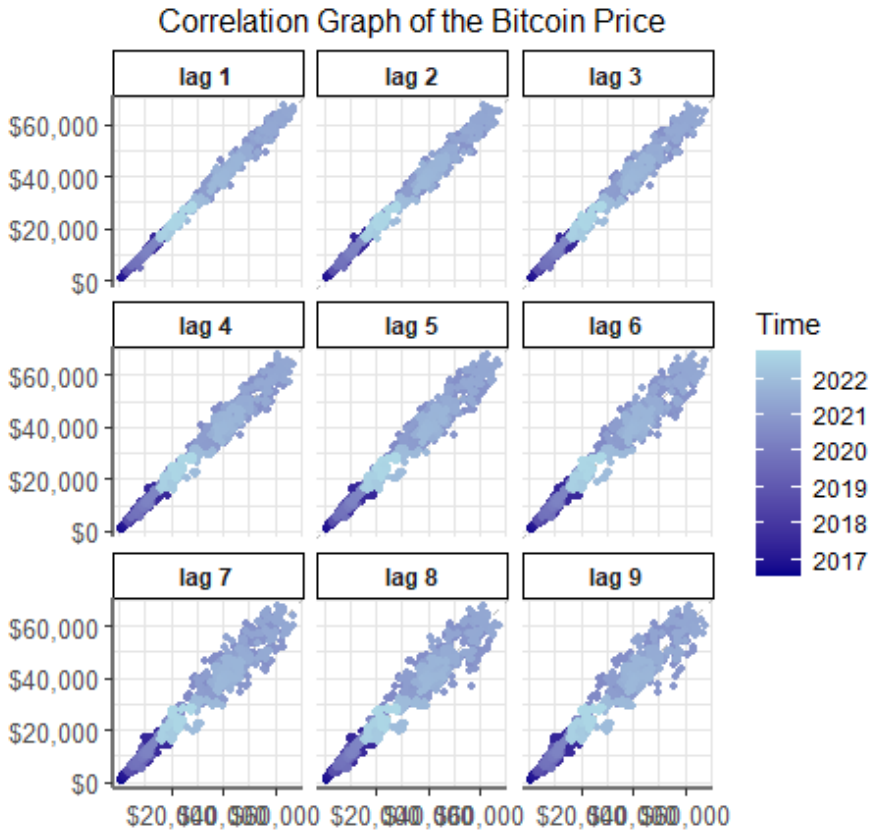

Figure 6: BTC Lagged correlations

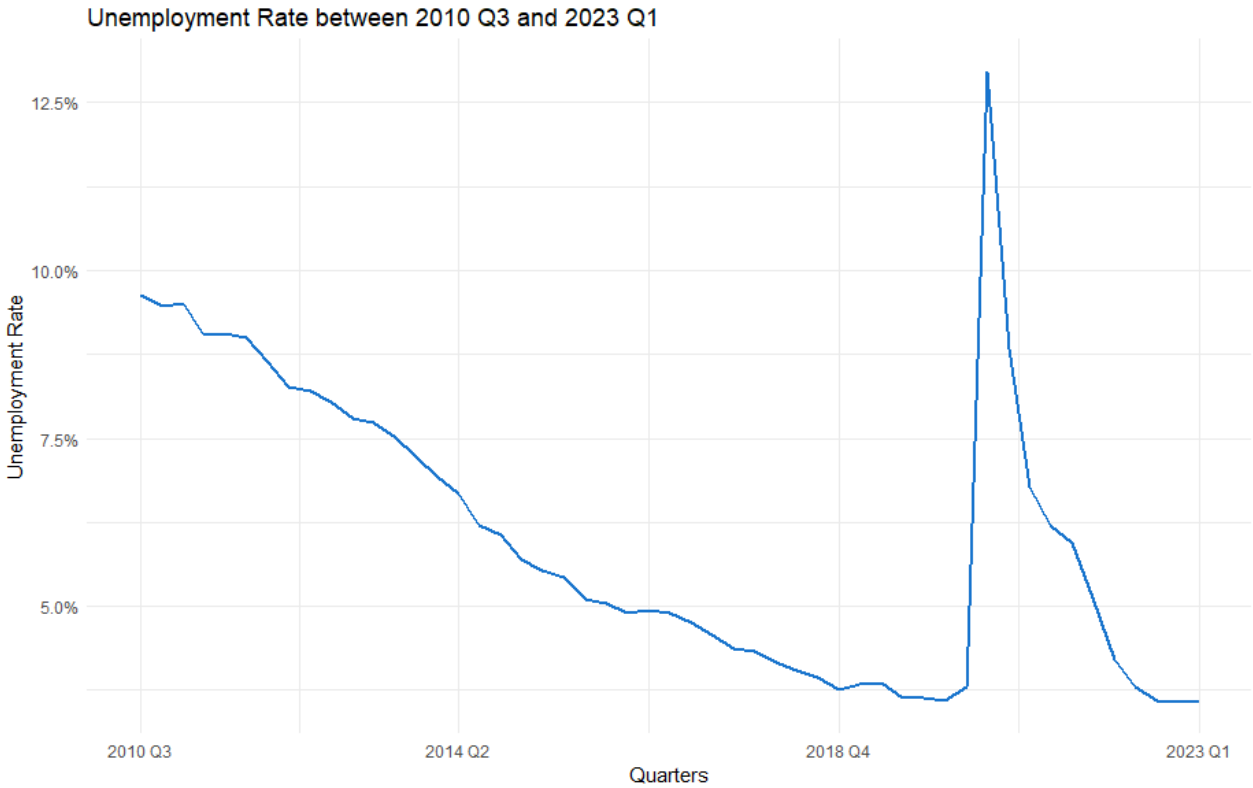

Figure 7: Quarterly Unemployment

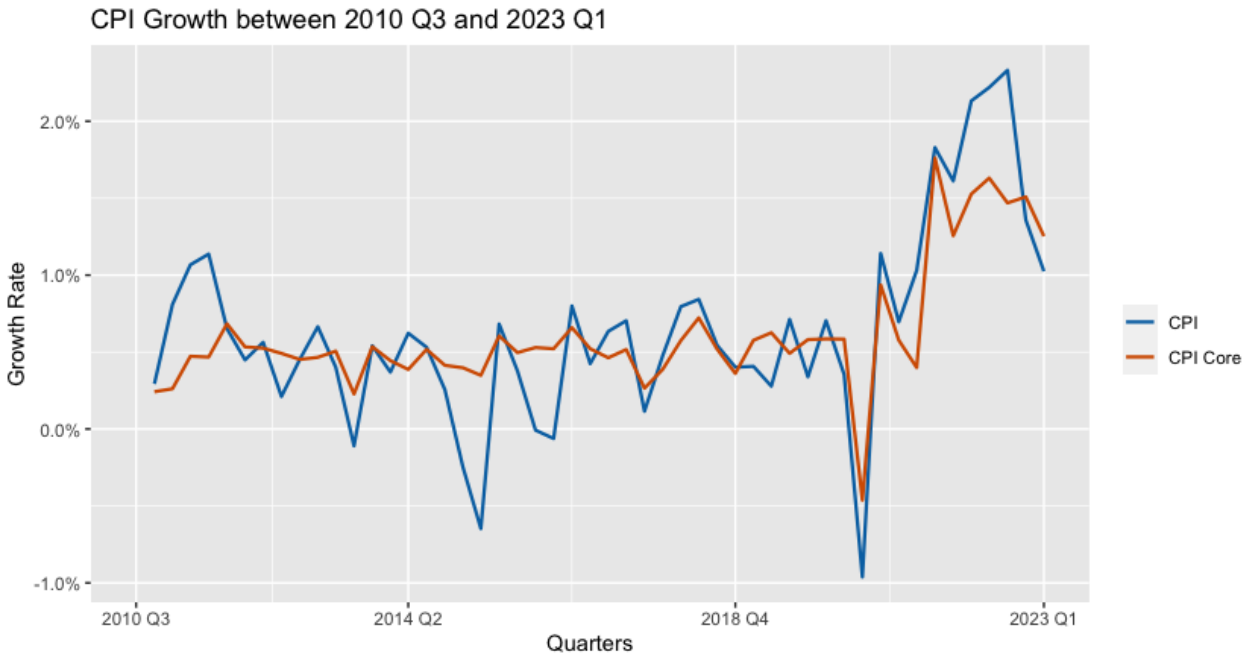

Figure 8: CPI Growth Rate

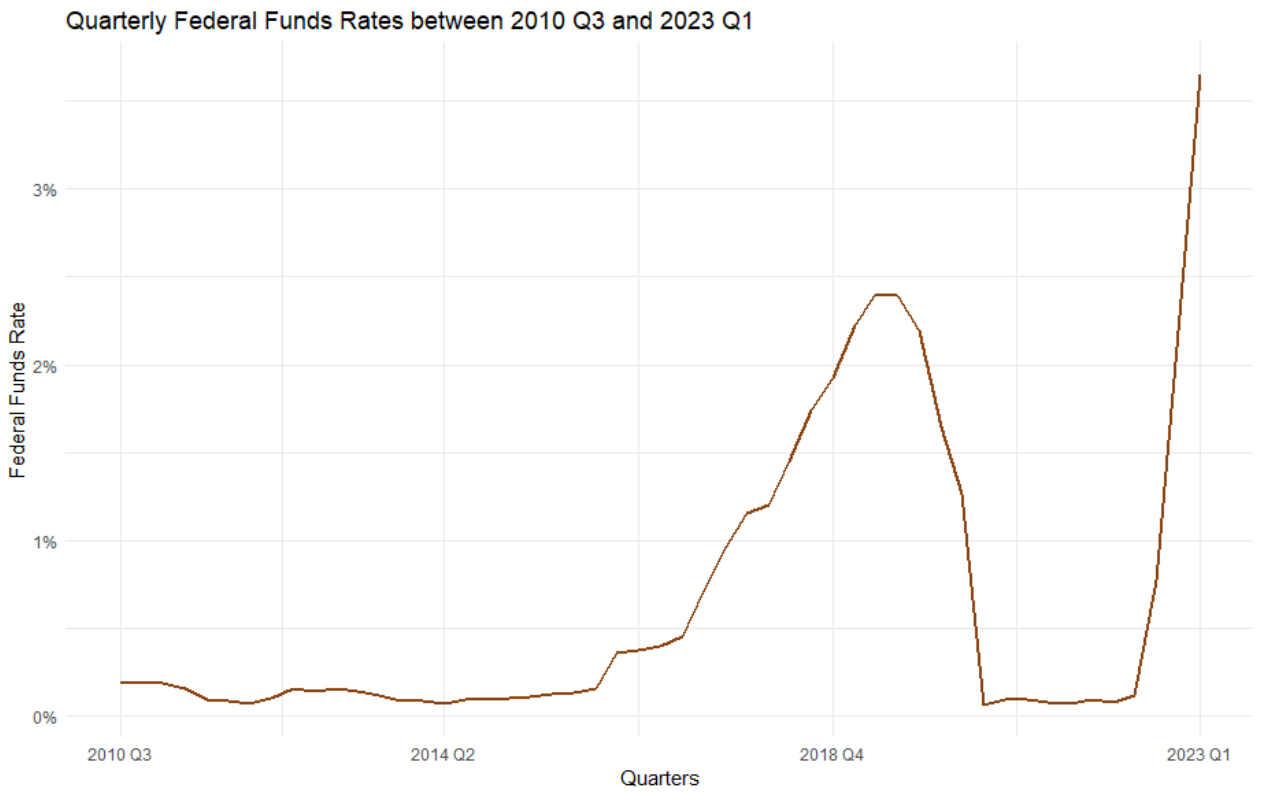

Figure 9: Federal Funds Rate

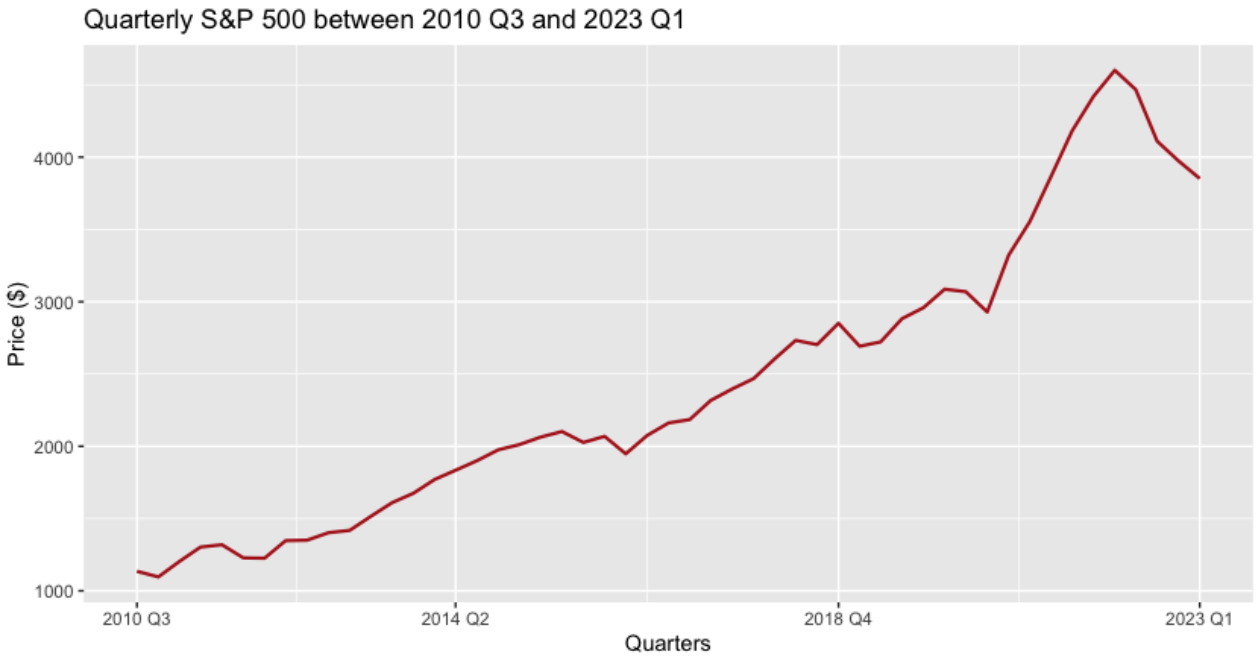

Figure 10: Quarterly S&P Price

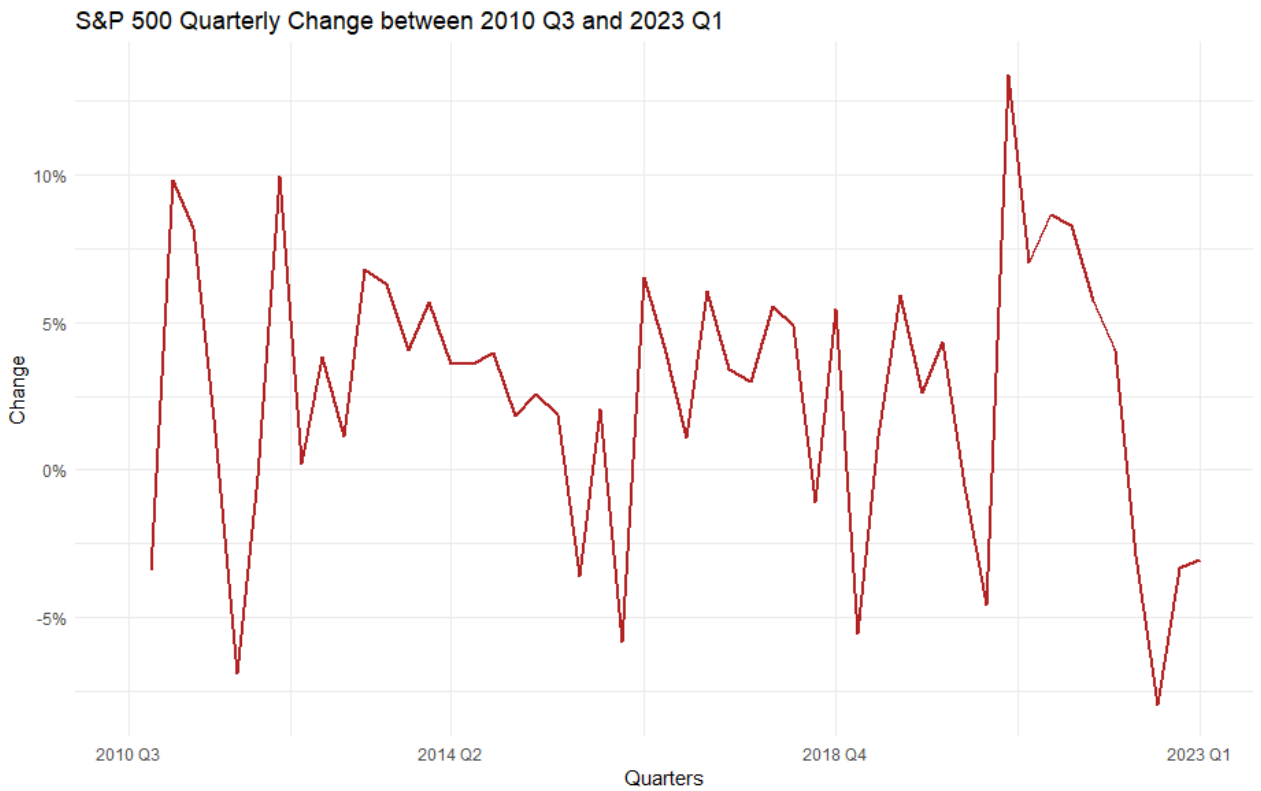

Figure 11: Quarterly S&P Growth Rate

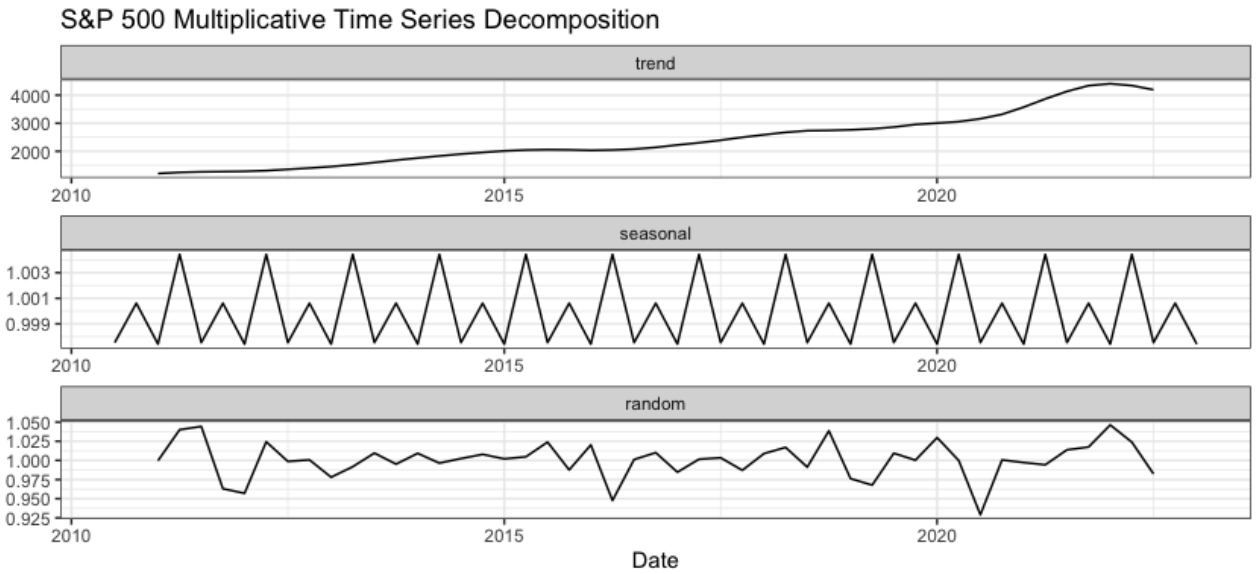

Figure 12: S&P 500 Decomposition

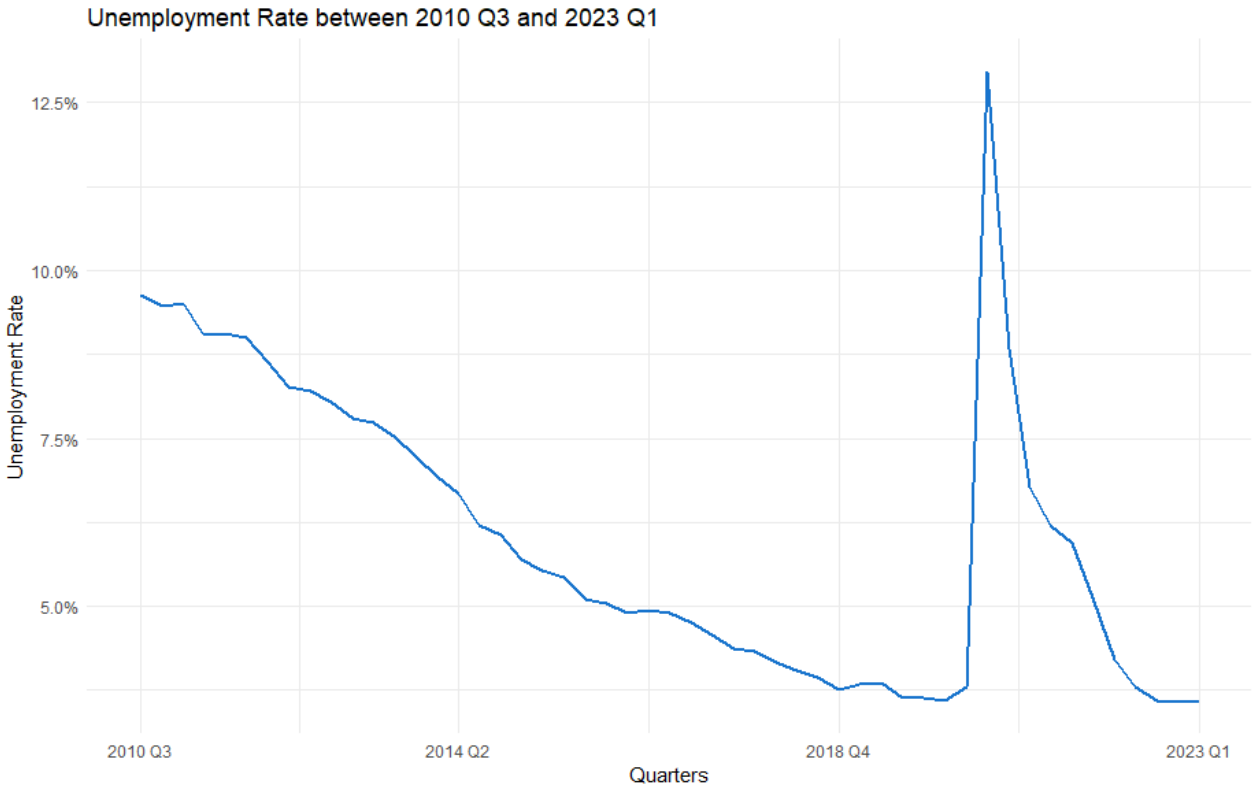

Figure 13: Quarterly Unemployment

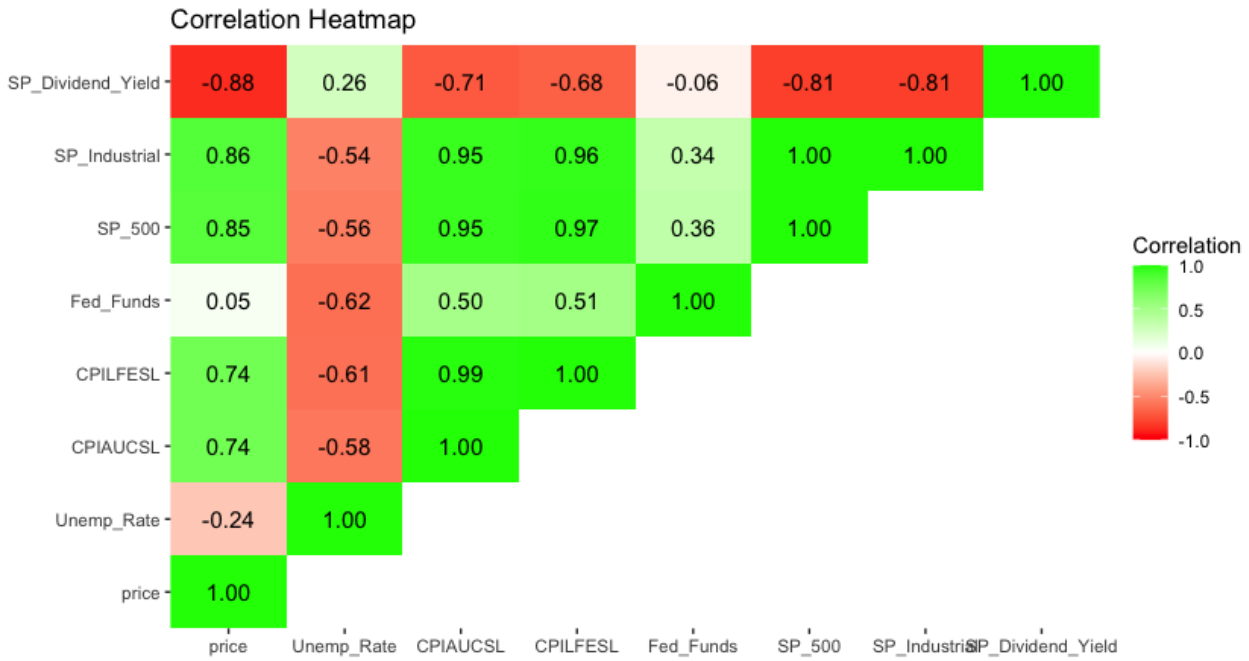

Figure 14: Correlation Heat Map