

# Case Studies - Forecasting Bitcoin: Data Presentation

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18/04/2023



# Introduction

- Project Context: Forecasting the quarterly growth 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 readable 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 *inflation* 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

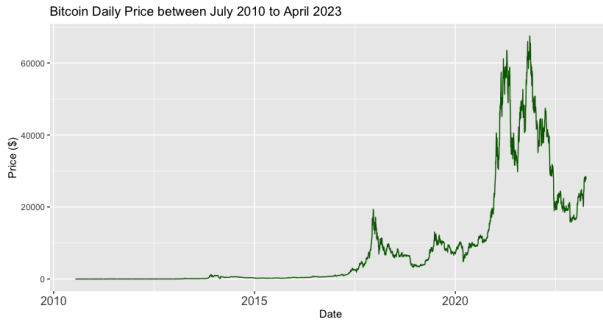


Figure 1: Historical Bitcoin Price Data



## 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

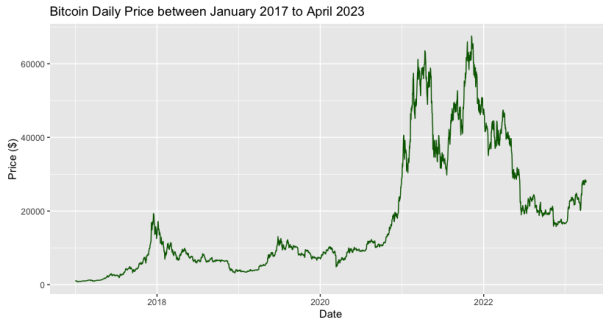


Figure 2: Historical Bitcoin Price Data 2017-2023

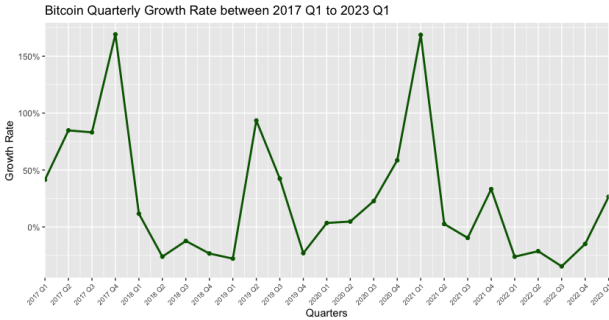


Figure 3: Historical Quarterly Bitcoin Price Growth 2017-2023

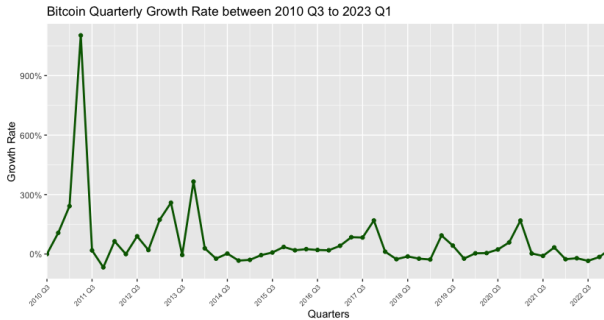
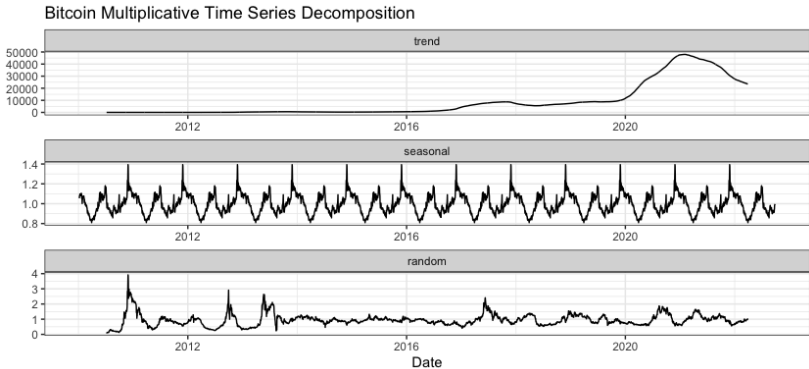


Figure 4: Historical Quarterly Bitcoin Price Growth 2010-2023



### Figure 5: BTC Daily Decomposition

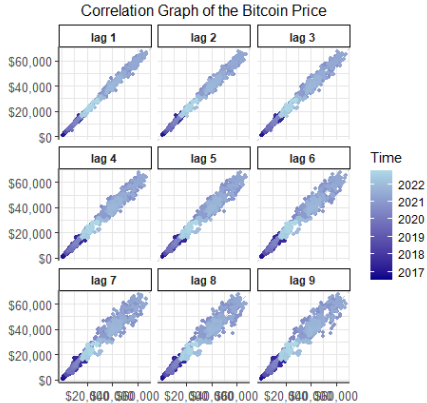
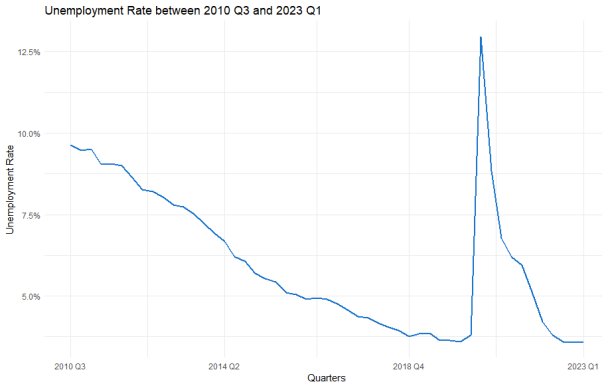


Figure 6: BTC Lagged correlations



### Figure 7: Quarterly Unemployment

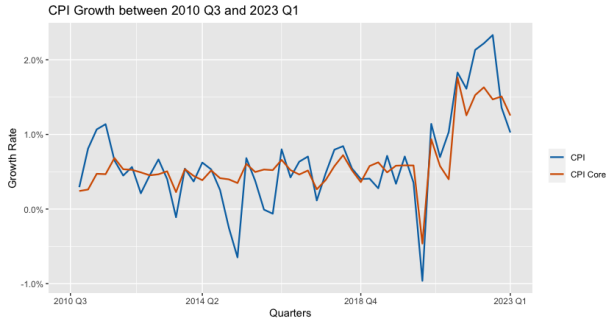
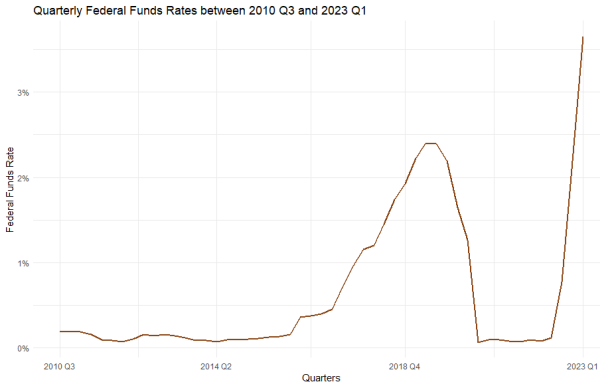


Figure 8: CPI Growth Rate





### Figure 9: Federal Funds Rate

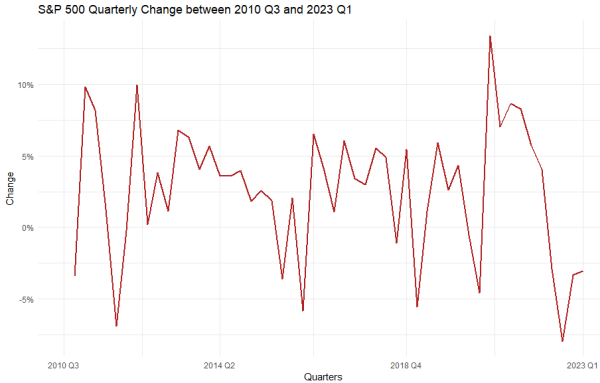


Figure 10: Quarterly S&P

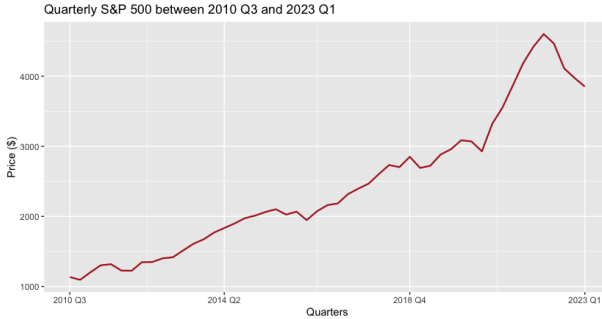


Figure 11: Quarterly S&P Price

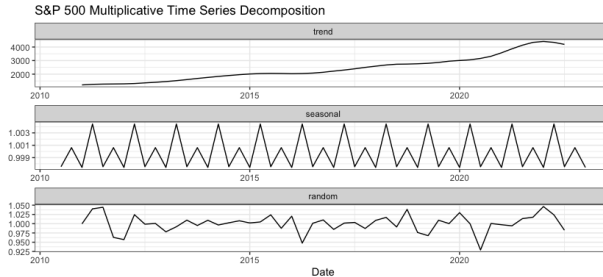


Figure 12: S&P 500 Decomposition

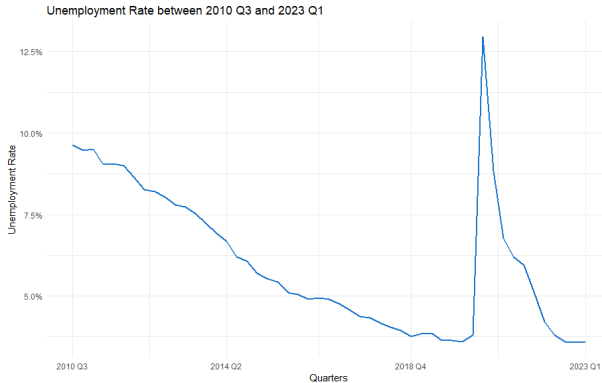


Figure 13: Quarterly Unemployment

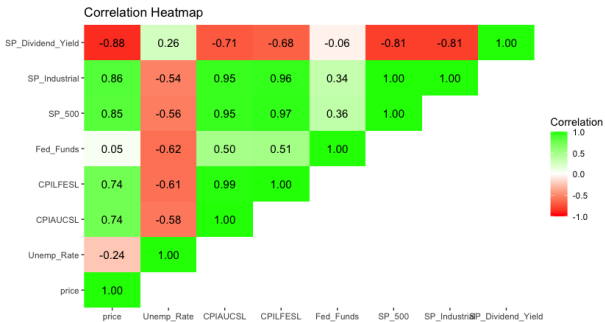


Figure 14: Correlation Heat Map