5 Year Historical Data Analysis for FTSE100 & Bitcoin-GBP

Data analysis, forecast and Visualisation

David Anumah // AXA interview

The Questions

Question 1

Extract and clean data obtained form public accessible sources for Bitcoin GBP and FTSE 100

Get data, clean the data,

Perform feature engineering

Question 2

From the data, extract insights using python and visualizations

Question 3

Conduct a hypothesis test at 5% significance level to determine whether there is a difference between price movement for FTSE100 and Bitcoin in the analysis period.

Solution

Data Source

This was the most accessible option as yahoo finance can be accessed via yfinance in python API and has a trustworthy data consistency across timeframes

Data analysis and Feature engineering

Data ▶ Moving Averages ▶ Returns

Both Data from FTSE 100 and Bitcoin had similar column of Date, High, Low and Closing prices

Simple moving Average

- Formula: $\text{SMA} = \frac{\sum \text{Price}_i}{n}$, where n is the number of periods.

**Exponential Moving Average (EMA):**

- The EMA gives more weight to recent prices, making it more responsive to new information. It uses a smoothing factor, which is typically $\frac{2}{n+1}$ for n periods.

- Formula: $\text{EMA}_{\text{today}} = (\text{Price}_{\text{today}} \times \alpha) + (\text{EMA}_{\text{yesterday}} \times (1 - \alpha))$, where α is the smoothing factor.

Distribution Analysis

Distribution of Daily Returns
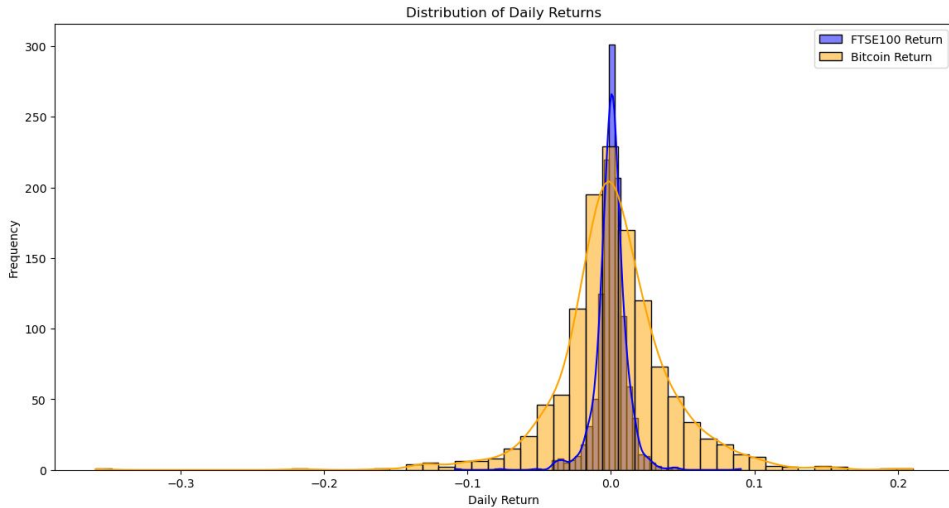
The distribution of daily returns bar graph provides several key insights into the behavior of an asset's price movements over time.

# Volatility of FTSE 100 and Bitcoin GBP

FTSE100 and Bitcoin Volatility (30-Day Rolling)
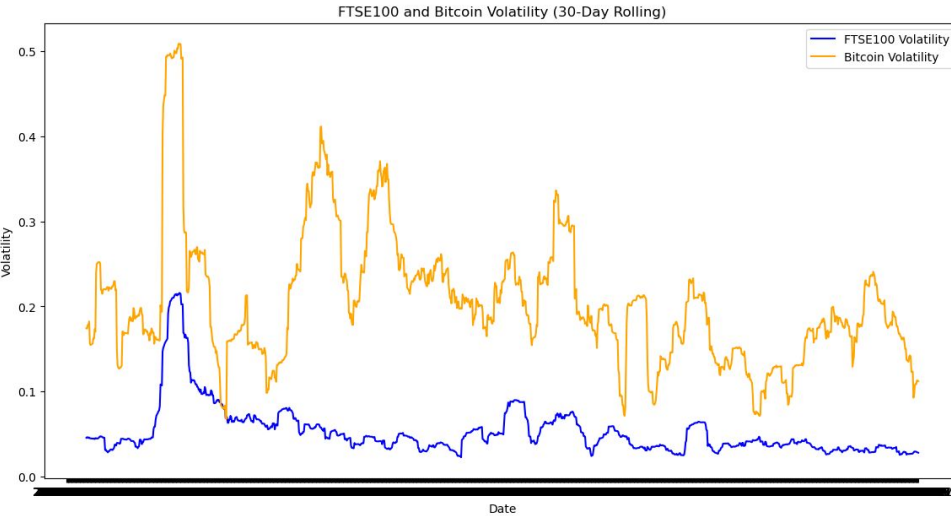
Risk Assessment:

- Bitcoin's higher volatility suggests that it is a riskier investment compared to FTSE 100. Investors in Bitcoin can expect larger price swings, which can lead to higher potential gains but also higher potential losses.

- FTSE 100's lower volatility indicates more stable and predictable price movements, making it a relatively safer investment.

Price Trends Comparison

Date
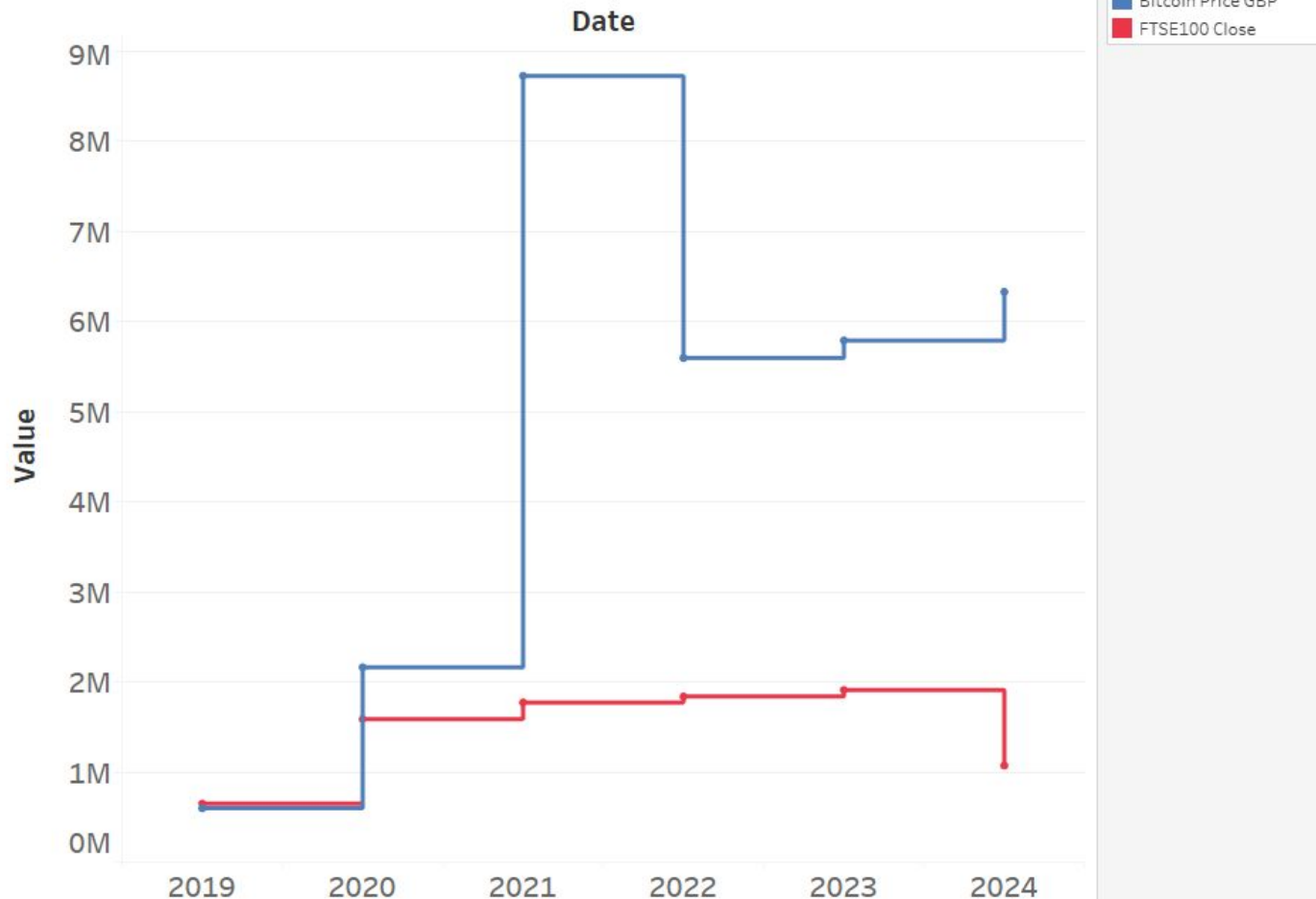
Bitcoin trends can be more volatile, with sharper peaks and troughs.

Typically, the FTSE 100 may exhibit a gradual upward or downward trend influenced by macroeconomic factors, corporate earnings, and geopolitical events.
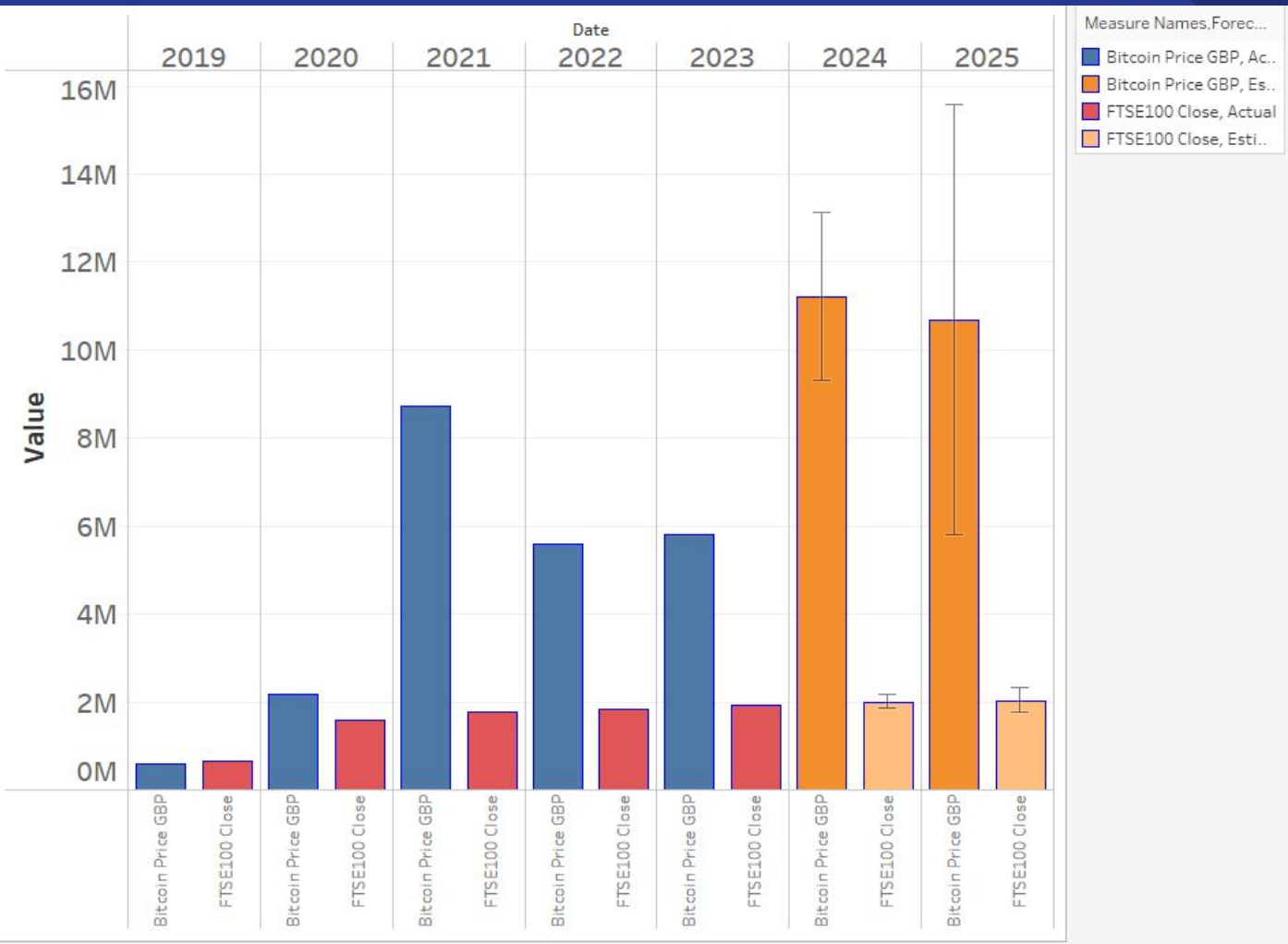
Forecast

Forecast for both Bitcoin GBP and FTSE 100

Null Hypothesis (H0): There is no significant difference between the mean returns of FTSE 100 and Bitcoin. ($\mu_1 = \mu_2$)

Alternative Hypothesis (H1): There is a significant difference between the mean returns of FTSE 100 and Bitcoin. ($\mu_1 \neq \mu_2$)

The test assumes that the samples are independent and come from normally distributed data

These findings suggest that, over the analysis period, the daily returns of FTSE100 and Bitcoin are statistically similar

Null Hypothesis	Data collection	Conducting the test	Results	Implications
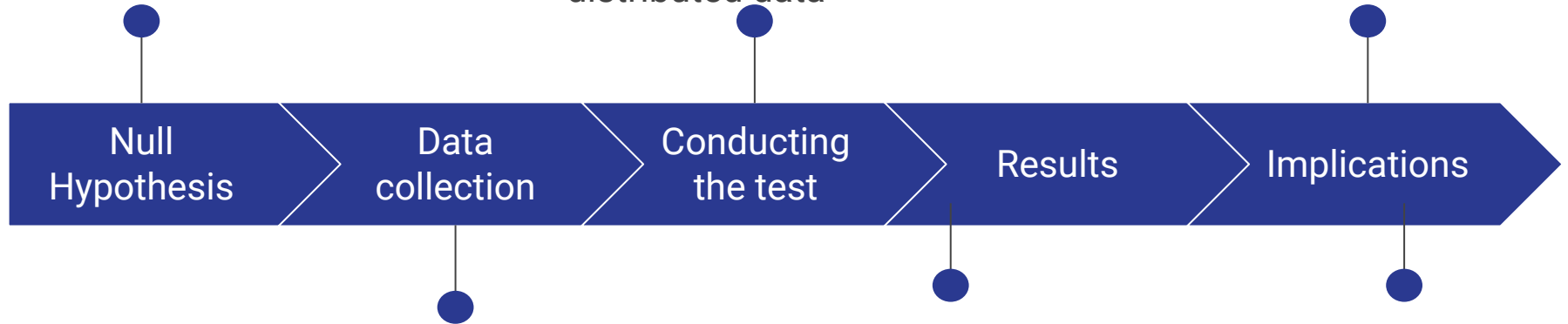
Data was from the same source, yahoo finance

T-statistic: -1.670

P-value: 0.094

Fail to reject the null hypothesis

The results suggest that, based on the sample data and at the 5% significance level, the mean daily returns of FTSE 100 and Bitcoin are not significantly different.

Conclusions

In conclusion, while FTSE100 and Bitcoin have similar mean daily returns, their risk profiles differ significantly due to Bitcoin's higher volatility. This emphasises the importance of considering both return potential and risk when seeking new investments. The low correlation between FTSE 100 and Bitcoin-GBP highlights the potential for diversification of investments, which can be used to optimize portfolio and profits. Investors should tailor their asset allocation to align with their individual risk tolerance and long term investment objectives.