

Cryptocurrency Price and Risk Analysis

A Study of the Top 10 by Market Cap (excl. stablecoins) 2022-2024

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Table of Contents

- Project Overview
- Data Source
- Insights Deep-Dive
- Recommendations
- Appendix

Overview

Context

The goal of this project is to perform a comprehensive analysis of the **price performance, volatility, and risk characteristics** of the top 10 cryptocurrencies by market cap (excl. stablecoins) — Bitcoin (BTC), Ethereum (ETH), Binance Coin (BNB), Solana (SOL), Ripple (XRP), and Dogecoin (DOGE) — from January 1st, 2022 to August 31st, 2024.

This analysis aims to provide insights and offer recommendations for constructing a well-balanced cryptocurrency portfolio.

Data Source

Data Source

- Historical price data for Bitcoin (BTC), Ethereum (ETH), Binance Coin (BNB), Solana (SOL), Ripple (XRP), and Dogecoin (DOGE) was sourced using the **yfinance** library in Python. yfinance is a widely-used library that enables users to access historical market data from Yahoo Finance.

```
cryptocurrencies = ['BTC-USD', 'ETH-USD', 'BNB-USD', 'SOL-USD', 'XRP-USD', 'DOGE-USD']
data = yf.download(cryptocurrencies, start='2022-01-01', end='2024-08-31')
data.head()
```

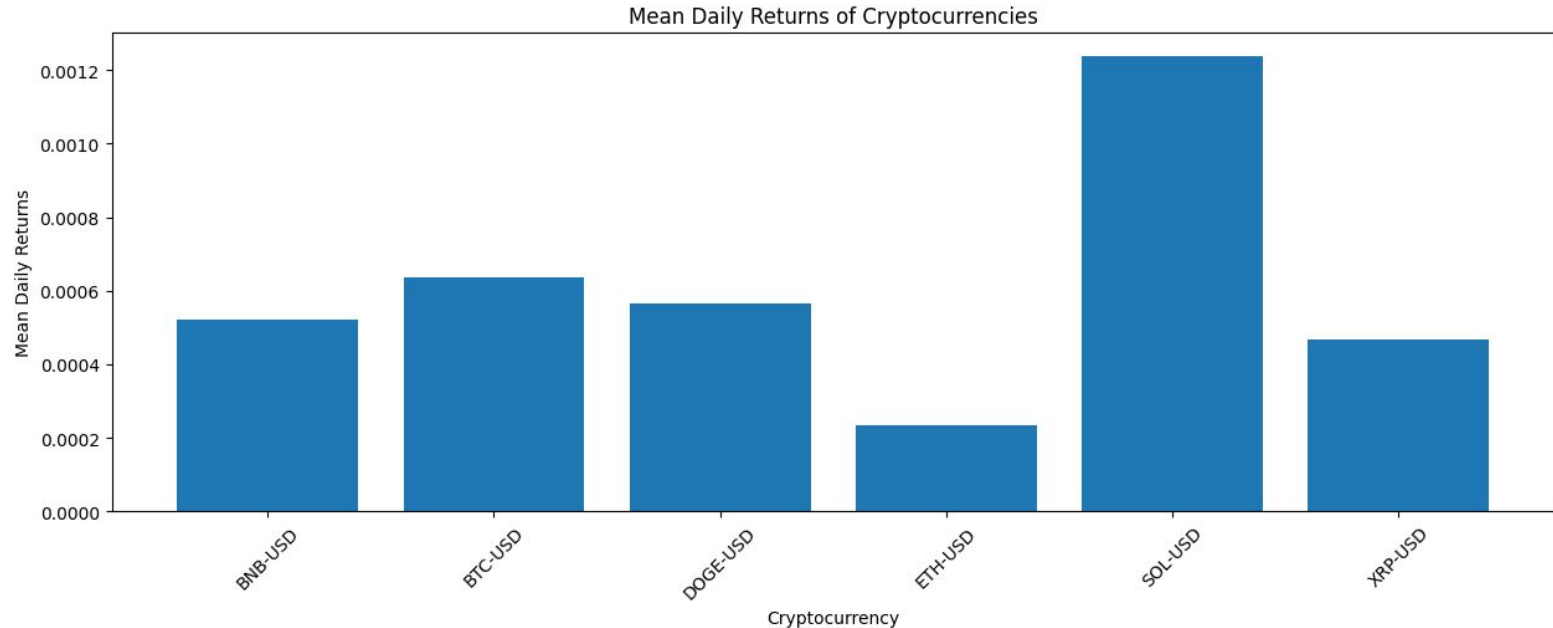
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Price	Adj Close					Close					
Ticker	BNB-USD	BTC-USD	DOGE-USD	ETH-USD	SOL-USD	XRP-USD	BNB-USD	BTC-USD	DOGE-USD	ETH-USD	
Date											
2022-01-01 00:00:00+00:00	527.352722	47686.812500	0.173035	3769.697021	178.517944	0.849472	527.352722	47686.812500	0.173035	3769.697021	
2022-01-02 00:00:00+00:00	531.396667	47345.218750	0.174403	3829.564941	176.382843	0.859118	531.396667	47345.218750	0.174403	3829.564941	
2022-01-03 00:00:00+00:00	512.135986	46458.117188	0.170088	3761.380371	170.297745	0.832885	512.135986	46458.117188	0.170088	3761.380371	
2022-01-04 00:00:00+00:00	507.506104	45897.574219	0.168803	3794.056641	167.938904	0.824673	507.506104	45897.574219	0.168803	3794.056641	
2022-01-05 00:00:00+00:00	475.056946	43569.003906	0.159420	3550.386963	155.099731	0.774358	475.056946	43569.003906	0.159420	3550.386963	

Insights Deep-Dive

Returns

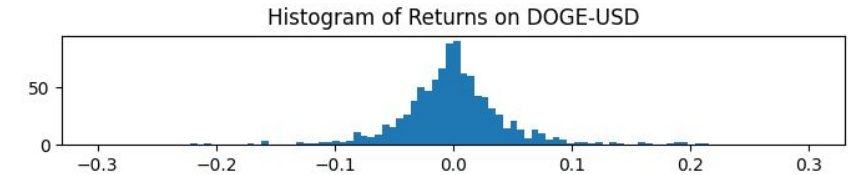
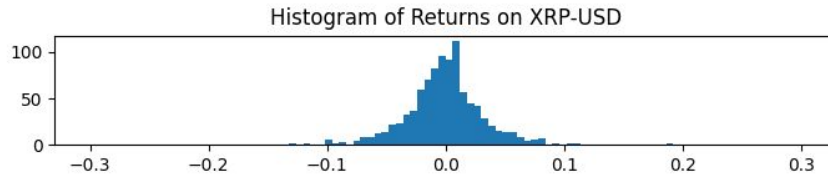
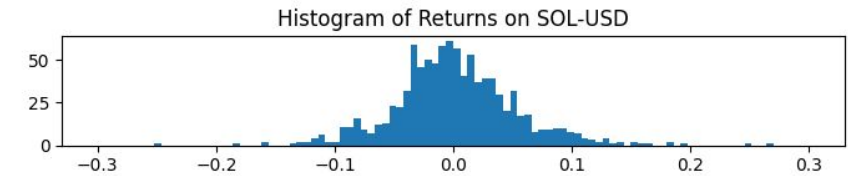
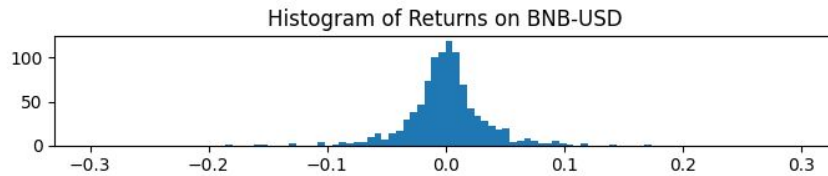
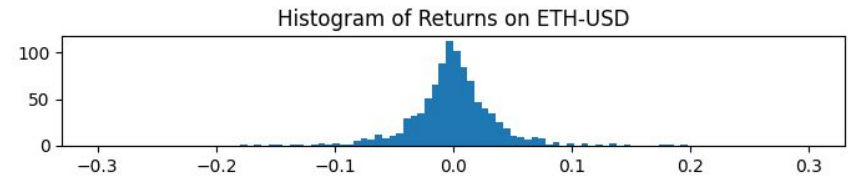
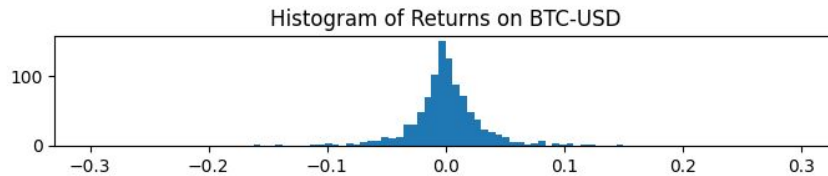
- SOL experienced the most significant mean daily returns.
- BTC exhibited substantial growth, trailed by DOGE, BNB, and XRP.
- ETH had the least significant mean daily returns.



Volatility

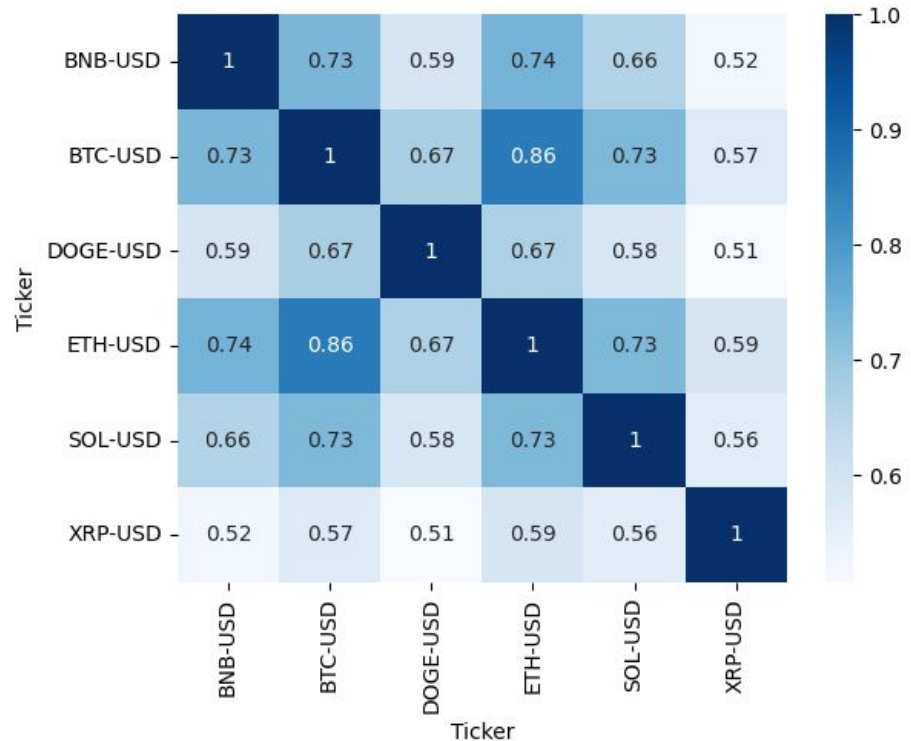
- SOL exhibited the **highest volatility** (0.28) followed closely by DOGE (0.24), potentially indicating higher risk
- BTC displayed the **lowest volatility**, suggesting lower risk.
- ETH, BNB, and XRP demonstrated varying levels of volatility.

```
SOL Average Volatility: 0.28106325265515986  
DOGE Average Volatility: 0.23898065020644232  
XRP Average Volatility: 0.21099418899188907  
ETH Average Volatility: 0.1832994284806239  
BNB Average Volatility: 0.16197750432982475  
BTC Average Volatility: 0.15019137000495625
```



Correlations

- The correlation heatmap shows BTC and ETH have the **highest positive correlation**, indicating their price movements tend to follow **similar trends**.
- SOL, BNB, XRP, and DOGE exhibit the **strongest correlation with ETH**, indicating that ETH may be a **leading indicator** for these altcoins.



Risk-Adjusted Returns

- SOL has the highest Sharpe Ratio at 0.360890, indicating the most favorable risk-adjusted returns among the cryptocurrencies analyzed, suggesting it offers the best trade-off between risk and reward in this dataset.
- BTC follows with a Sharpe Ratio of 0.350683, reflecting relatively high risk-adjusted returns, which reinforces its reputation as a stable and potentially rewarding investment.
- BNB and DOGE have moderate Sharpe Ratios of 0.261249 and 0.188223, respectively, suggesting they offer lower risk-adjusted returns compared to BTC and SOL.
- XRP and ETH have lower Sharpe Ratios of 0.167882 and 0.103561, indicating that their risk-adjusted returns are less favorable, with ETH showing the least favorable profile.

```
sharpe_ratio = returns.mean() / returns.std() * np.sqrt(252)
print(sharpe_ratio)
```

Ticker	
BNB-USD	0.261249
BTC-USD	0.350683
DOGE-USD	0.188223
ETH-USD	0.103561
SOL-USD	0.360890
XRP-USD	0.167882

Recommendations

Key Recommendations

Prioritize Stability

- Allocating a significant portion of the portfolio to an established blue-chip cryptocurrency in Bitcoin (BTC) can be beneficial. Its higher market capitalization and lower volatility, coupled with favorable risk-adjusted returns, can help mitigate the high risk associated with the volatile cryptocurrency market.

Balance with Growth Opportunities

- While focusing Bitcoin (BTC) for stability, it's also valuable to balance the portfolio with emerging assets among the top 10 that have higher potential for returns such as SOL or DOGE. This approach allows you to capture growth potential while maintaining overall portfolio stability, achieving a blend of stability and growth.

Monitor Correlations

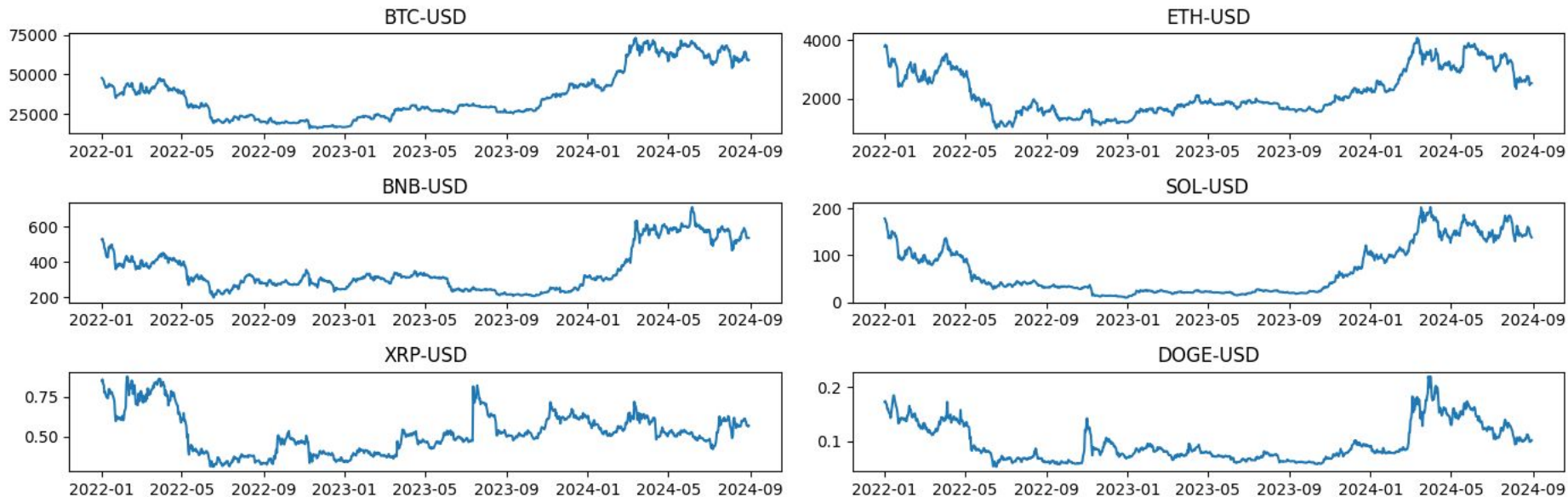
- Regularly assess correlations between cryptocurrencies to identify potential diversification opportunities and avoid excessive concentration.

Conclusion: A balanced approach that emphasizes BTC for stability, supplemented by strategic positions in emerging cryptocurrencies with high growth potential such as SOL and DOGE can optimize risk-adjusted returns. Continuous monitoring of volatility, returns, and correlations is crucial for making timely portfolio adjustments. In the highly volatile and speculative cryptocurrency market.

Appendix

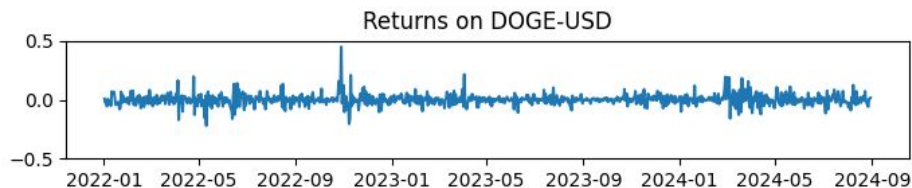
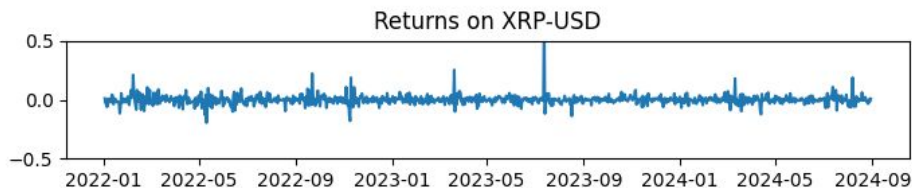
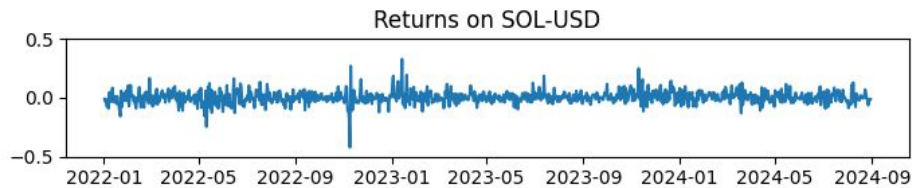
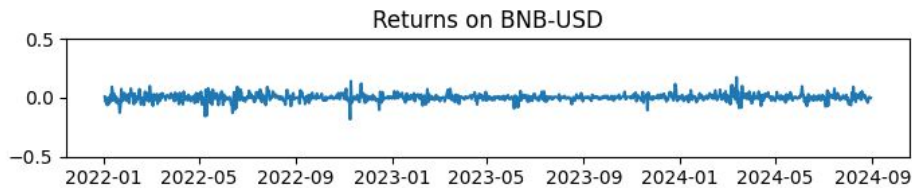
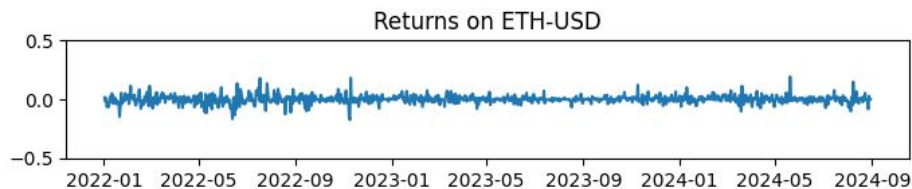
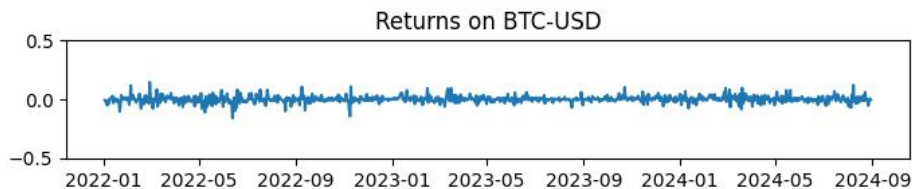
Appendix A

Time series line chart illustrating the historical performance of the six cryptocurrencies from 2022-01-01 to 2024-08-31. These charts allow for easy comparison of price movements over time, highlighting trends and patterns in the performance of each cryptocurrency



Appendix B

These line charts represent the daily returns from 2022-01-01 to 2024-08-31. These charts illustrate the volatility of daily returns, indicating that Solana (SOL) and Dogecoin (DOGE) are the most volatile among the cryptocurrencies analyzed.



Thank you!