PROJECT 1

OCT 4, 2021

Portfolio Optimizer

Simon Zhang | Aelrid Crasta | Marj Dela Cruz | Eli Muse

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What this report covers

Project Description

Description

The portfolio optimizer project aims to utilize the efficient frontier theory to model weights for assets in a portfolio for optimized returns at minimal risk for new and existing portfolios

Hypothesis

- On the efficient frontier model, a diversified portfolio consisting of shares and crypto assets at optimal weights will outperform single asset portfolios.

Objectives

- Model a portfolio across asset classes that achieve the optimal Sharpe ratio.
- Achieve the lowest possible risk for optimal return across asset classes.
- Compare performance across all asset classes over four years

Key Questions

Q1

Crypto Only Portfolio

Performance in the last four years on efficient frontier theory

Q2

Stock Only Portfolio

Performance in the last four years on efficient frontier theory

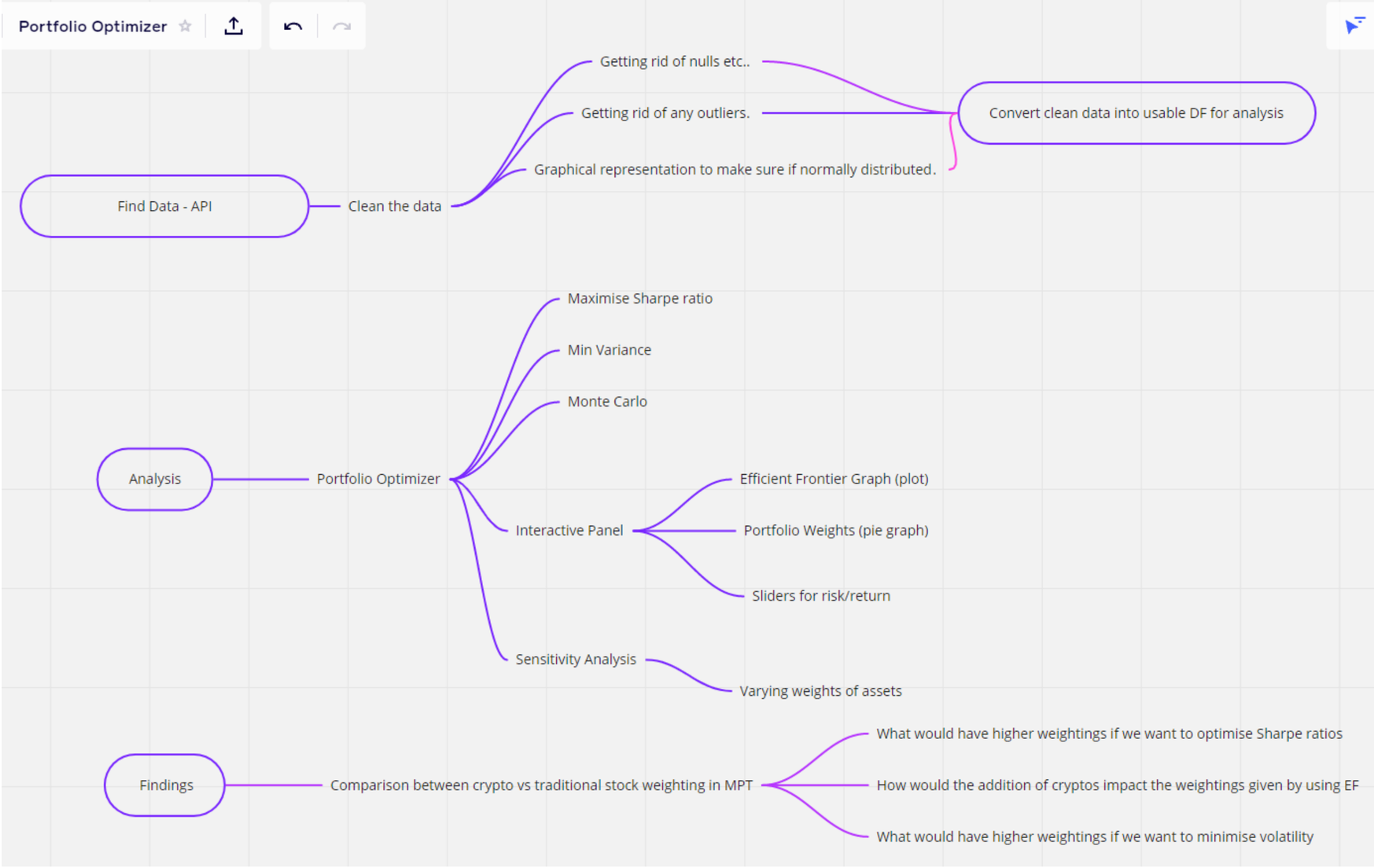
Q3

Mixed Portfolio

Performance in the last four years on efficient frontier theory

Code Diagram

Graphical breakdown of questions and solutions to aid analysis



Data Sources

Alpaca API

Four years historical data for stock assets

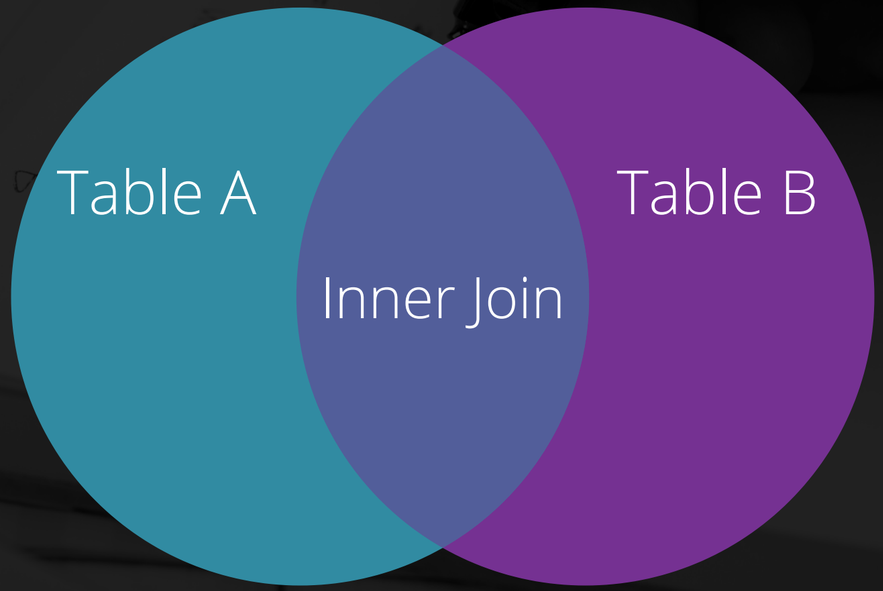
CryptoWatch API

Four years historical data set for crypto assets

Data Clean Up & Preparation

252 trading days used

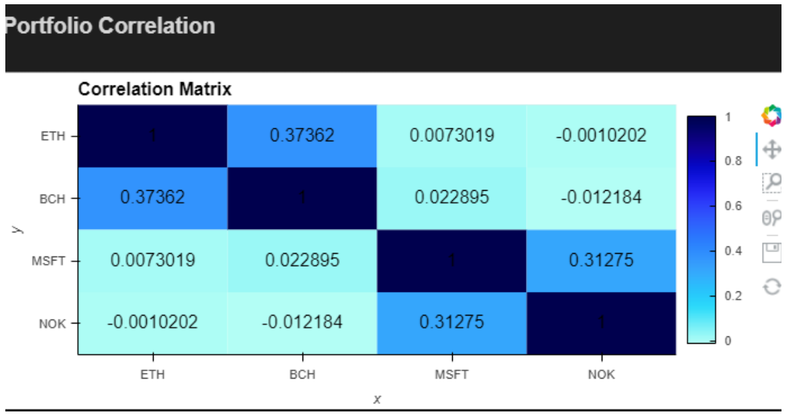
For shares & Crypto



Inner join: Combines rows that share the same index - rows with missing data will not be included

Limitations

Application challenges and assumptions made in analysis



- For larger portfolios, a large portion of rows would be missing as the date of outliers could vary
- Cryptos have a 24 hours trading period
- Data cleaning method may have had impacted correlation coefficents so our results may vary from the actual correlation.

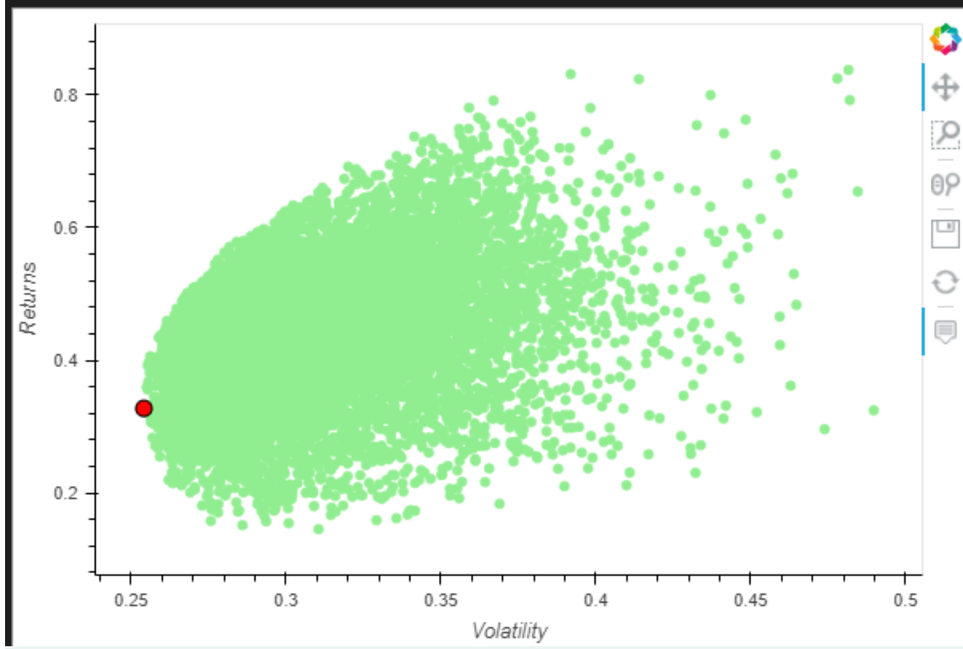
Crypto Portfolio Analysis

Key Insights and Findings

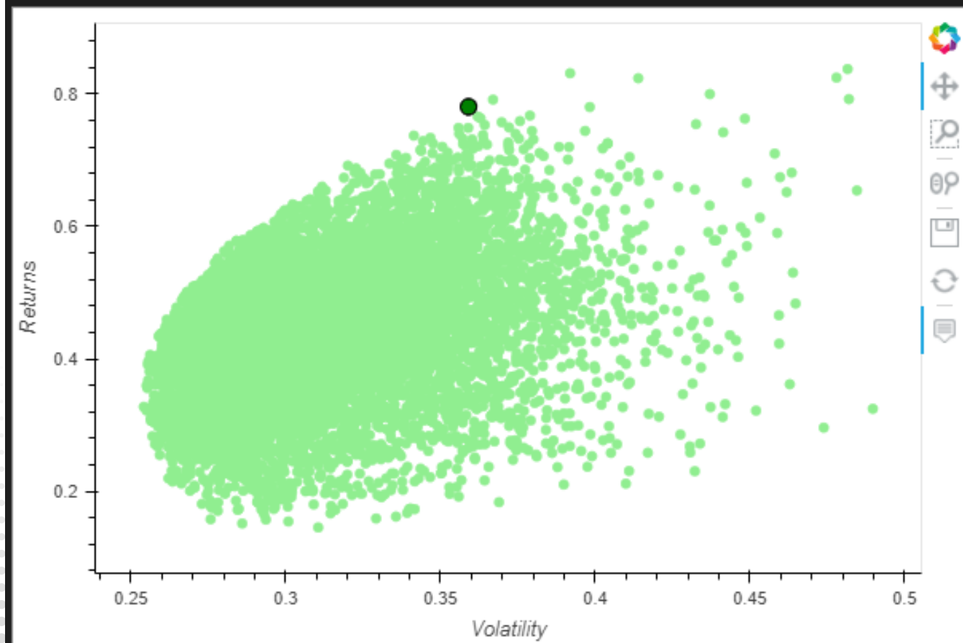
An Optimal portfolio investing strategy taking risk free rate into consideration would yield a 78.5% return while taking on a 35.9% risk.

Conservative strategy would yield a 32.5% return and at worse could see a 32.8% loss on portfolio value.

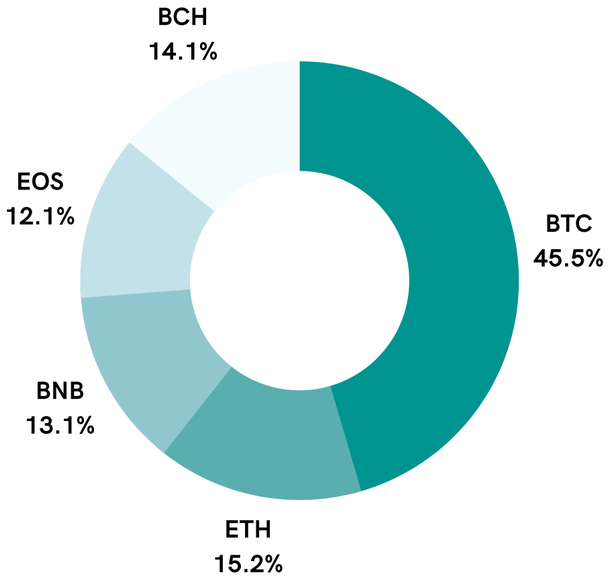
Minimum Volatility Portfolio



Optimal Risky Portfolio



Minimum Volatility Portfolio

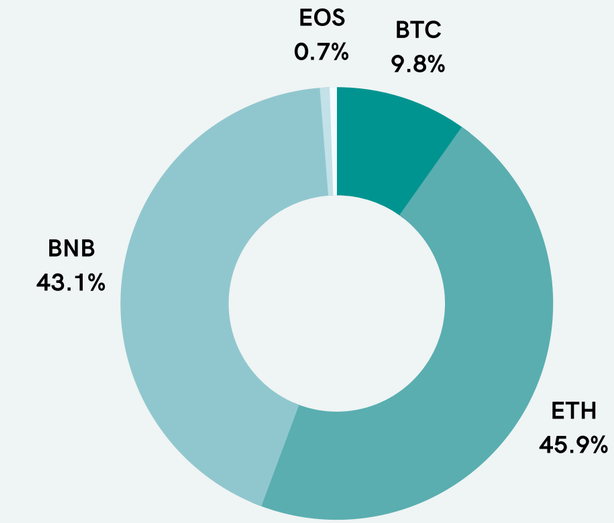


32.5%

Returns

32.8% Volatility

Optimal Risky Portfolio



78.5%

Returns

35.9% Volatility

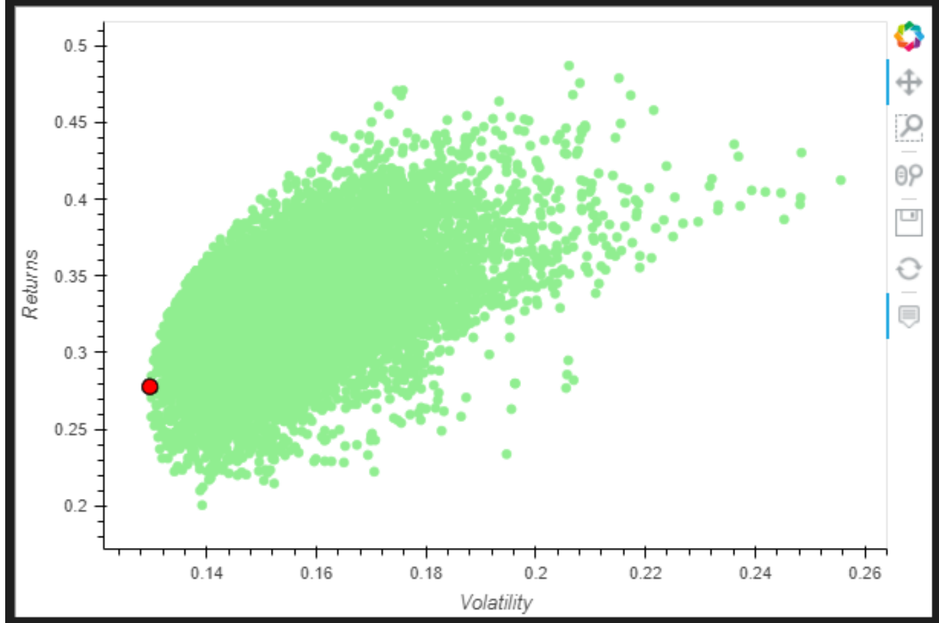
Stock Portfolio Analysis

Key Insights and Findings

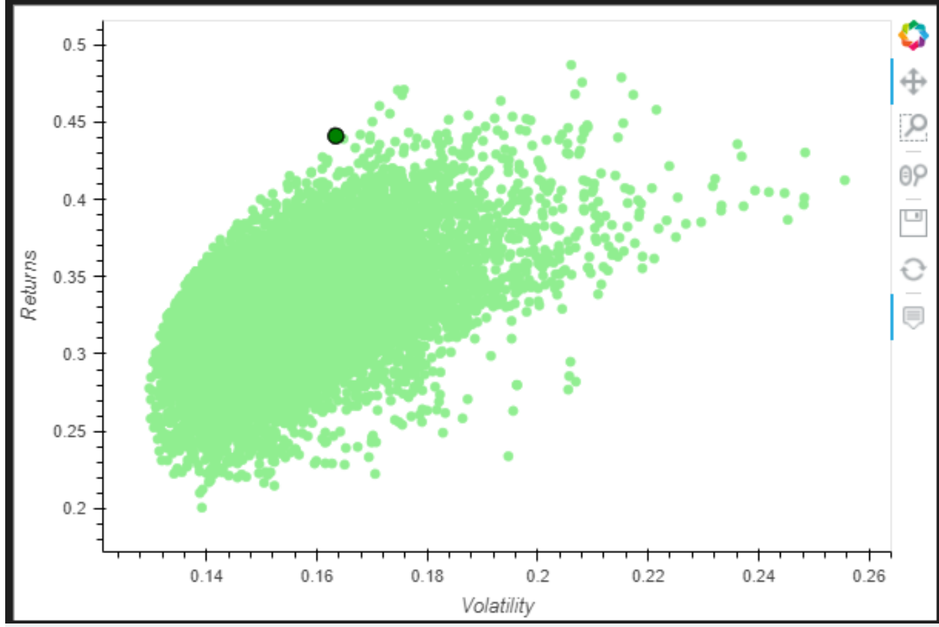
An Optimal portfolio investing strategy taking risk free rate into consideration would yield a 44.1% return while taking on a 16.3% risk.

Conservative strategy would yield a 27.7% return and at worse could see a 13% loss on portfolio value.

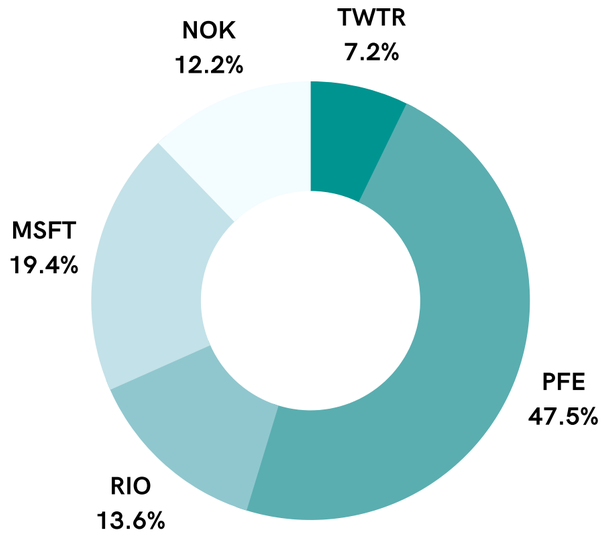
Minimum Volatility Portfolio



Optimal Risky Portfolio



Minimum Volatility Portfolio

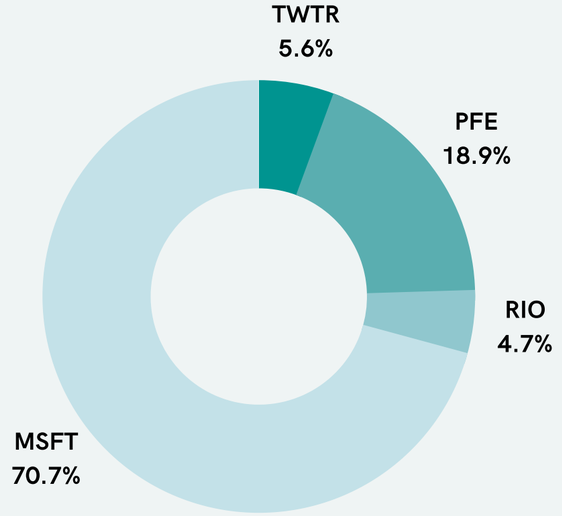


27.7%

Returns

13.0% Volatility

Optimal Risky Portfolio



44.1%

Returns

16.3% Volatility

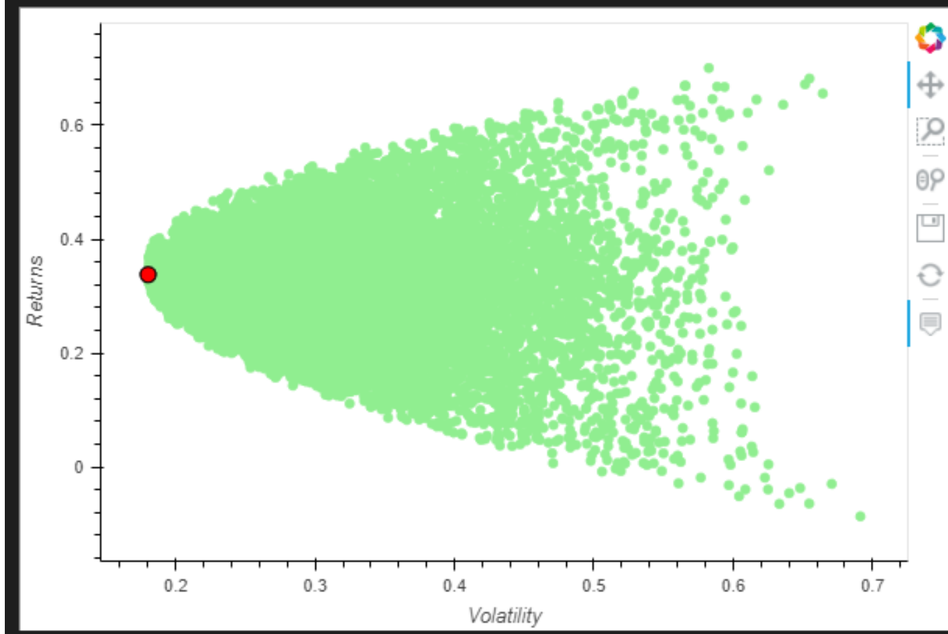
Diversified Portfolio

Crypto+ Stocks

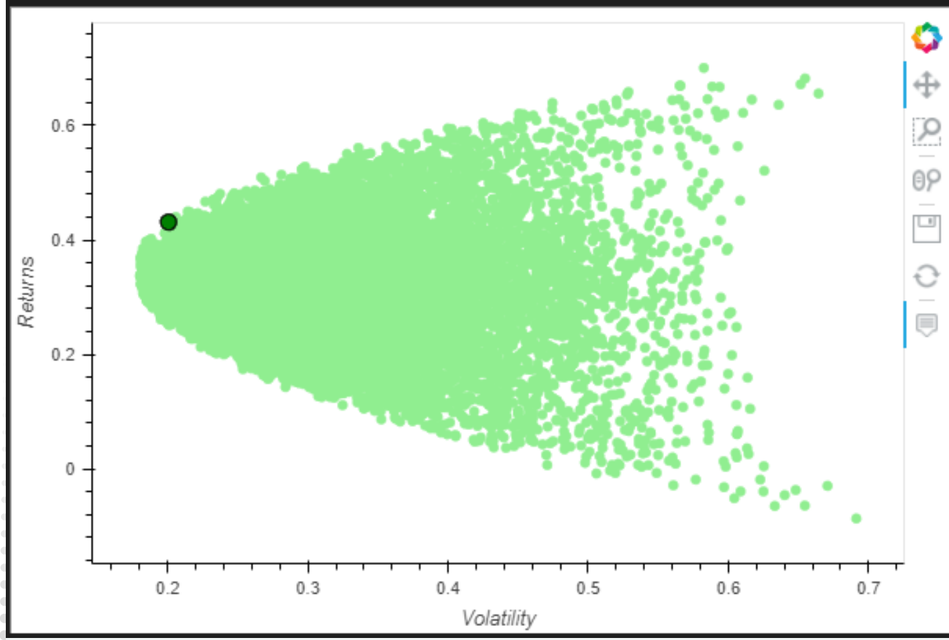
An Optimal portfolio investing strategy taking risk free rate into consideration would yield a 43.1% return while taking on a 20.1% risk.

Conservative strategy would yield a 33.8% return and at worse could see a 18% loss on portfolio value.

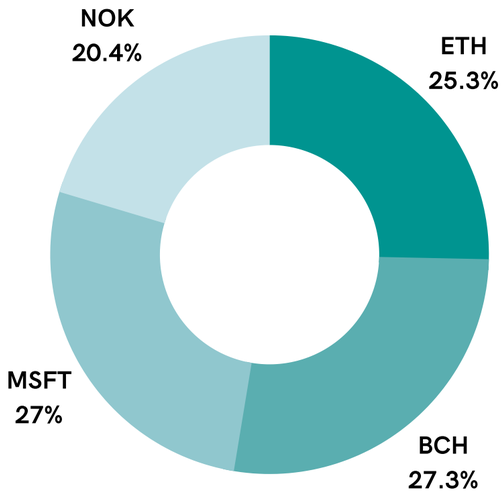
Minimum Volatility Portfolio



Optimal Risky Portfolio



Minimum Volatility Portfolio

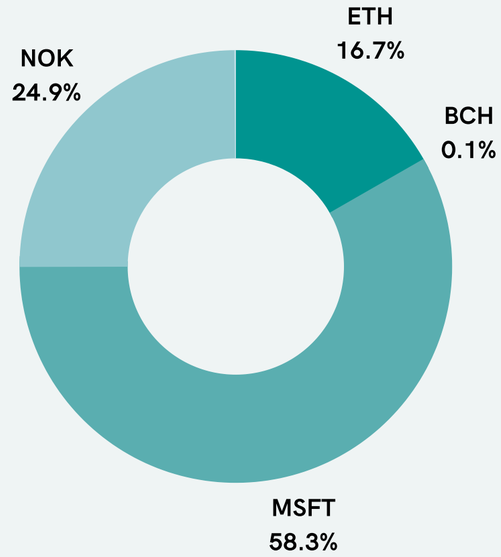


33.8%

Returns

18.0% Volatility

Optimal Risky Portfolio



43.1%

Returns

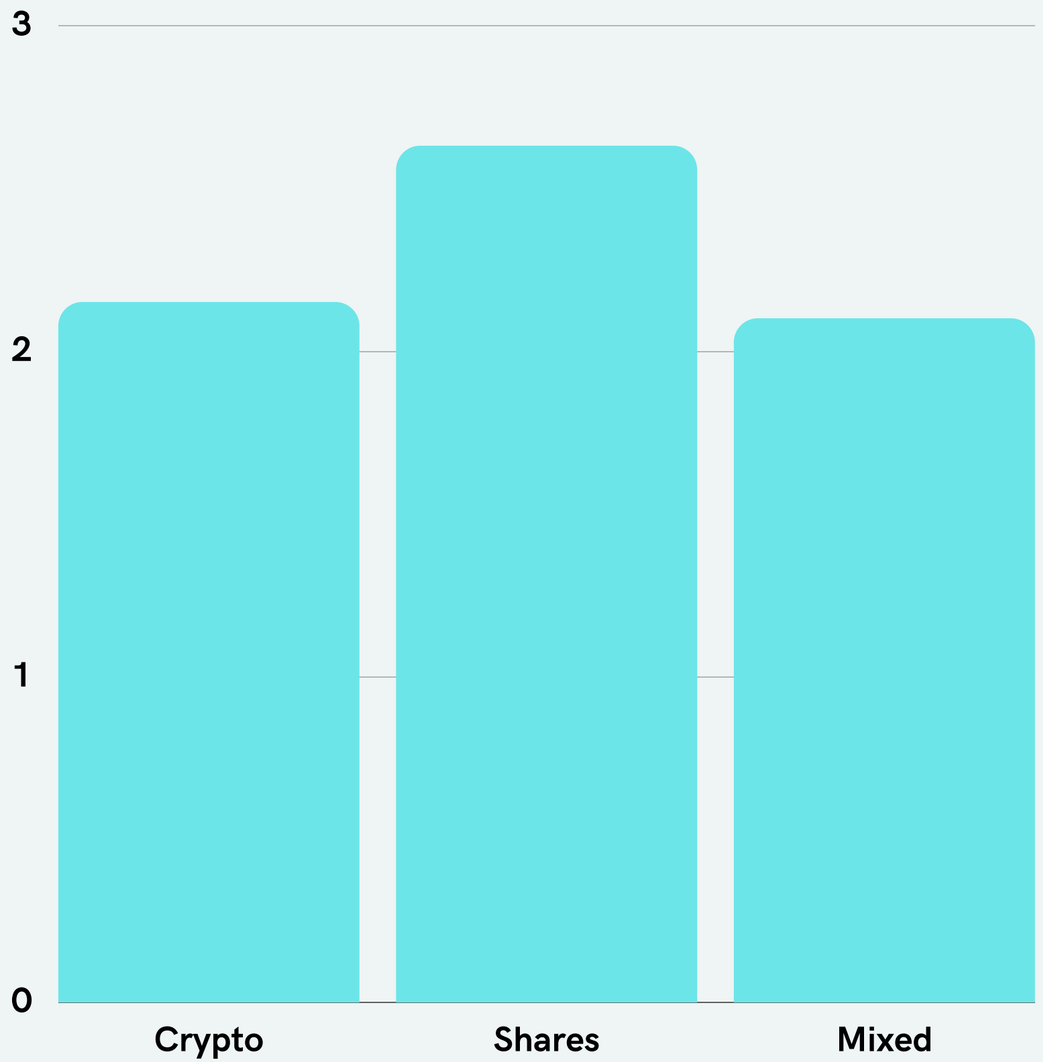
20.1% Volatility

Portfolio Performance

Comparison on Sharpe Ratio

At the optimal level on the efficient frontier model, shares-only portfolios outperformed crypto and diversified portfolio in the last four years.

Limitations applies.



Q & A

Any questions?