

# PORTFOLIO OPTIMIZATION WITH PYTHON

BY: ARIEL PATINO

# Agenda

- Introduction
- Portfolio Candidates
- Exploring Statistical Metrics
- Determining Optimal Portfolio
- Final Recommendations

# Introduction: Preface and Rules to Analysis

- The 10 Stocks chosen for the initial analysis are all relatively large-cap stocks at the top of their respective industries in the US stock market (all different industries). Further information about each of these 10 stocks is provided over the following slides.
- Historical Period for Analysis: July 1<sup>st</sup>, 2022 – July 1<sup>st</sup>, 2024. Chosen to represent realistic and current post-pandemic market conditions.
- After initial statistical analysis of 10 stocks, an optimal portfolio of 5-8 stocks will be chosen for further analysis.
- Detailed code of financial analysis is provided in .ipynb file posted alongside this presentation.



# Stock Portfolio Candidates

# Apple Inc.

**Market/Ticker:** NasdaqGS: AAPL

**Industry:** Consumer Electronics

**Sector:** Technology

**Market Cap:** \$3.32 Trillion

**Beta Measure:** 1.24

**PE Ratio (TTM):** 36.55

**EPS (TTM):** 6.42



# Amazon.com Inc.

**Market/Ticker:** NasdaqGS: AMZN

**Industry:** Internet Retail

**Sector:** Consumer Cyclical

**Market Cap:** \$2.05 Trillion

**Beta Measure:** 1.15

**PE Ratio (TTM):** 53.99

**EPS (TTM):** 3.57



# Meta Platforms, Inc.

**Market/Ticker:** NasdaqGS: META

**Industry:** Internet Content & Information

**Sector:** Communication Services

**Market Cap:** \$1.28 Trillion

**Beta Measure:** 1.21

**PE Ratio (TTM):** 28.18

**EPS (TTM):** 17.36



# Tesla, Inc.

**Market/Ticker:** NasdaqGS: TSLA

**Industry:** Auto Manufacturers

**Sector:** Consumer Cyclical

**Market Cap:** \$669.28 Billion

**Beta Measure:** 2.31

**PE Ratio (TTM):** 65.93

**EPS (TTM):** 3.90



# Exxon Mobil Corporation

**Market/Ticker:** NYSE: XOM

**Industry:** Oil & Gas Integrated

**Sector:** Energy

**Market Cap:** \$453.21 Billion

**Beta Measure:** 0.89

**PE Ratio (TTM):** 14.22

**EPS (TTM):** 8.16



# Bank of America Corporation

**Market/Ticker:** NYSE: BAC

**Industry:** Banks - Diversified

**Sector:** Financial Services

**Market Cap:** \$312.89 Billion

**Beta Measure:** 1.36

**PE Ratio (TTM):** 15.29

**EPS (TTM):** 2.90



# The Coca-Cola Company

**Market/Ticker:** NYSE: KO

**Industry:** Beverages – Non-Alcoholic

**Sector:** Consumer Defensive

**Market Cap:** \$272.61 Billion

**Beta Measure:** 0.59

**PE Ratio (TTM):** 25.78

**EPS (TTM):** 2.49



# Verizon Communications Inc.

**Market/Ticker:** NYSE: VZ

**Industry:** Telecom Services

**Sector:** Communication Services

**Market Cap:** \$175.69 Billion

**Beta Measure:** 0.39

**PE Ratio (TTM):** 15.53

**EPS (TTM):** 2.67





# NIKE, Inc.

**Market/Ticker:** NYSE: NKE

**Industry:** Footwear & Accessories

**Sector:** Consumer Cyclical

**Market Cap:** \$115.96 Billion

**Beta Measure:** 1.01

**PE Ratio (TTM):** 19.50

**EPS (TTM):** 3.73



# Palantir Technologies Inc.

**Market/Ticker:** NYSE: PLTR

**Industry:** Software - Infrastructure

**Sector:** Technology

**Market Cap:** \$57.63 Billion

**Beta Measure:** 2.70

**PE Ratio (TTM):** 239.46

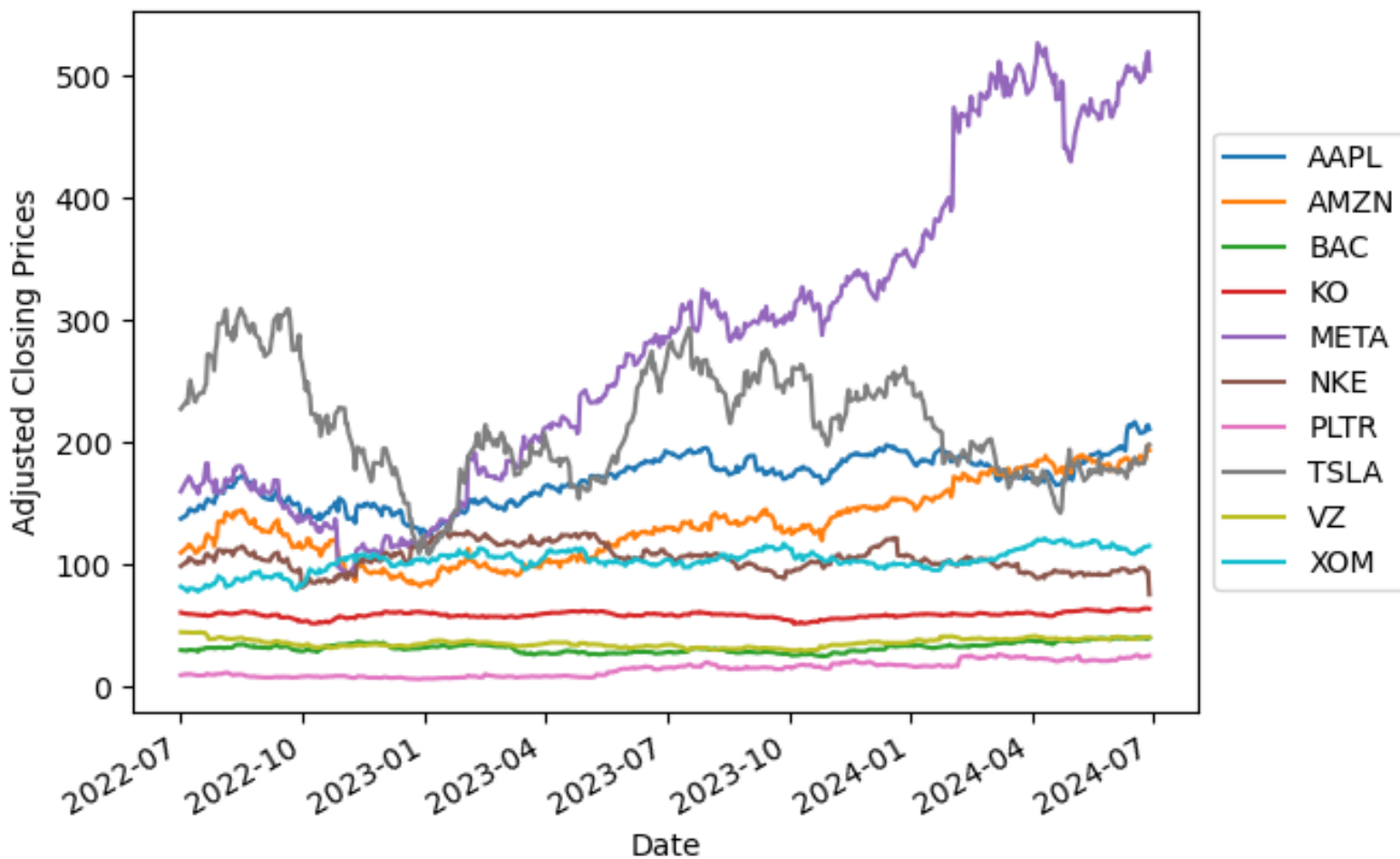
**EPS (TTM):** 0.12





# Exploring Statistical Metrics

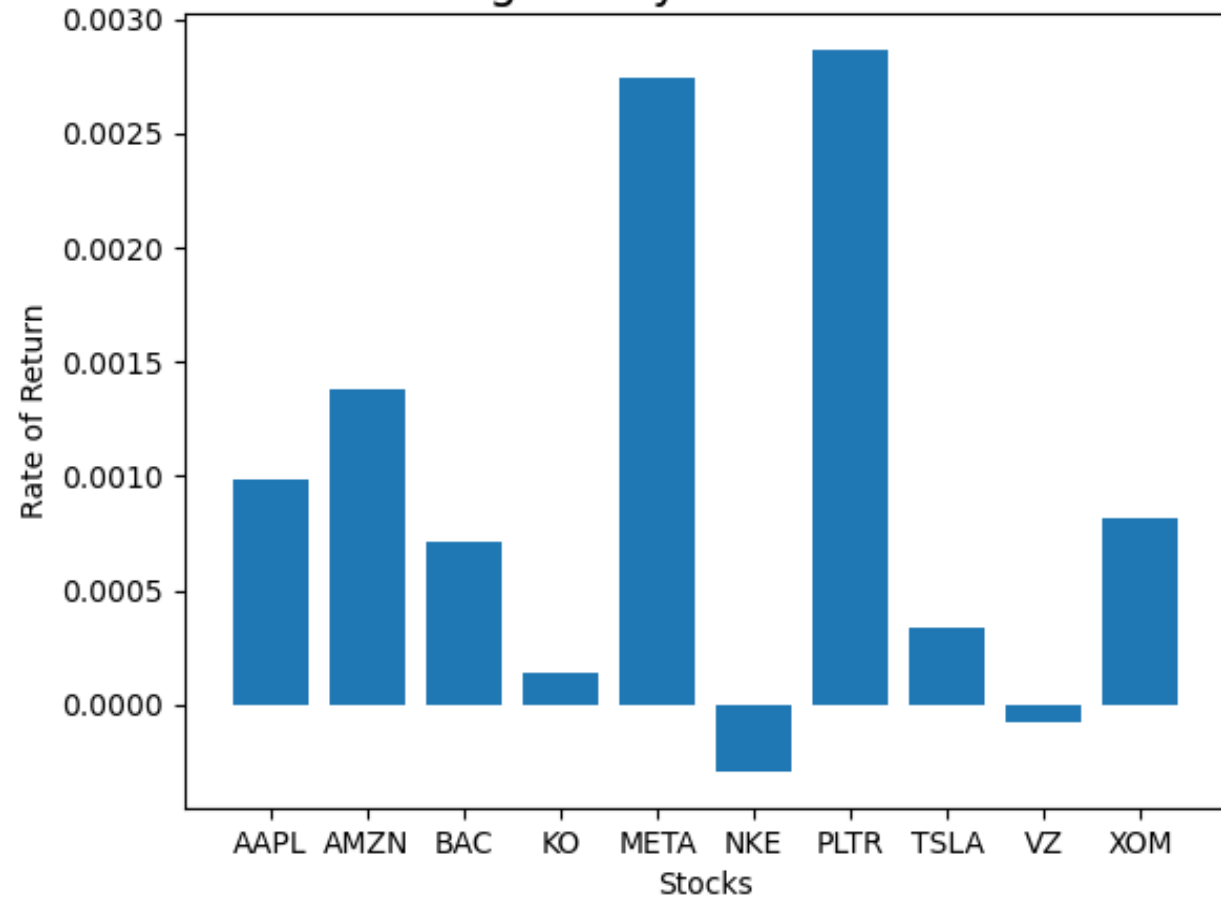
Portfolio Stock Prices over Time



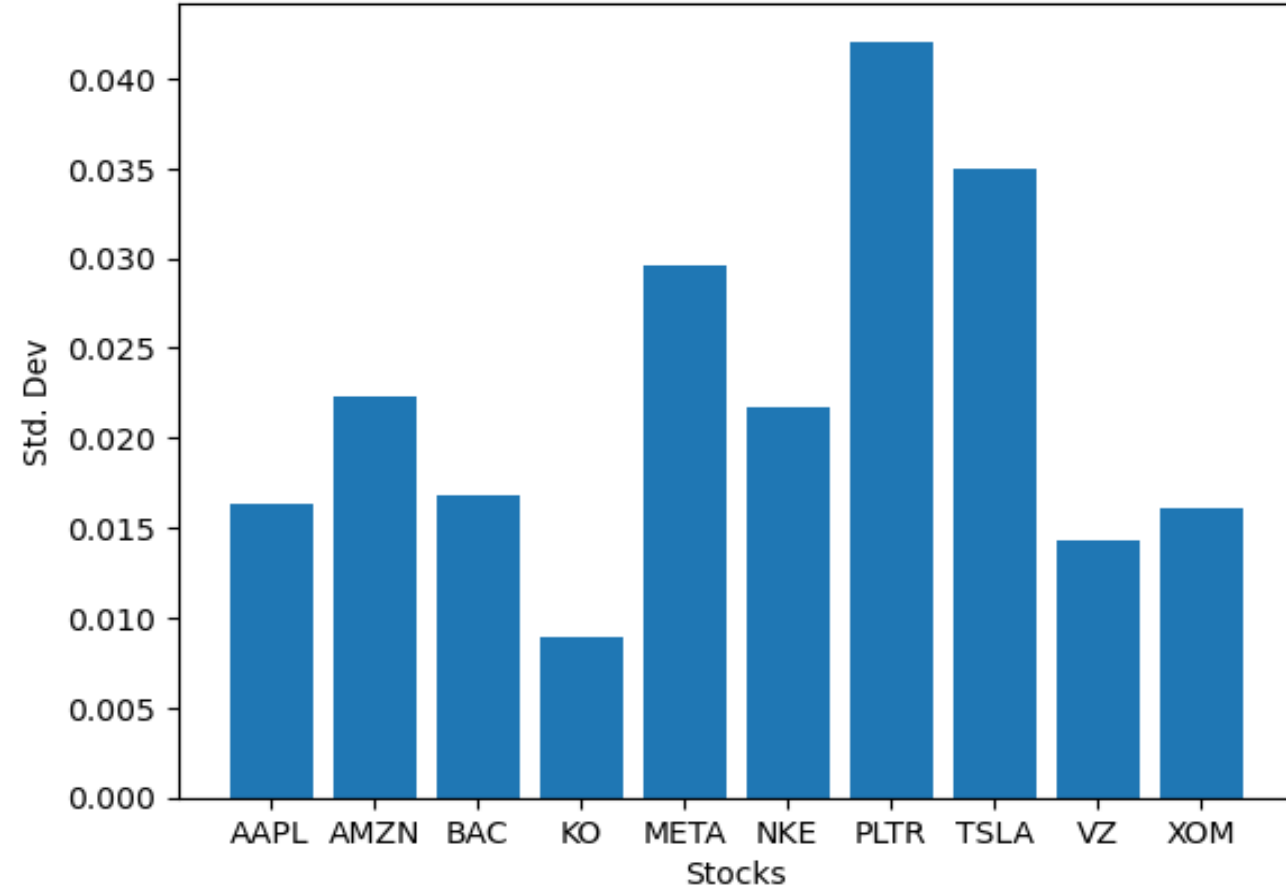
**STOCK  
PRICES OVER  
TIME**

# Average Daily Returns and Standard Deviations

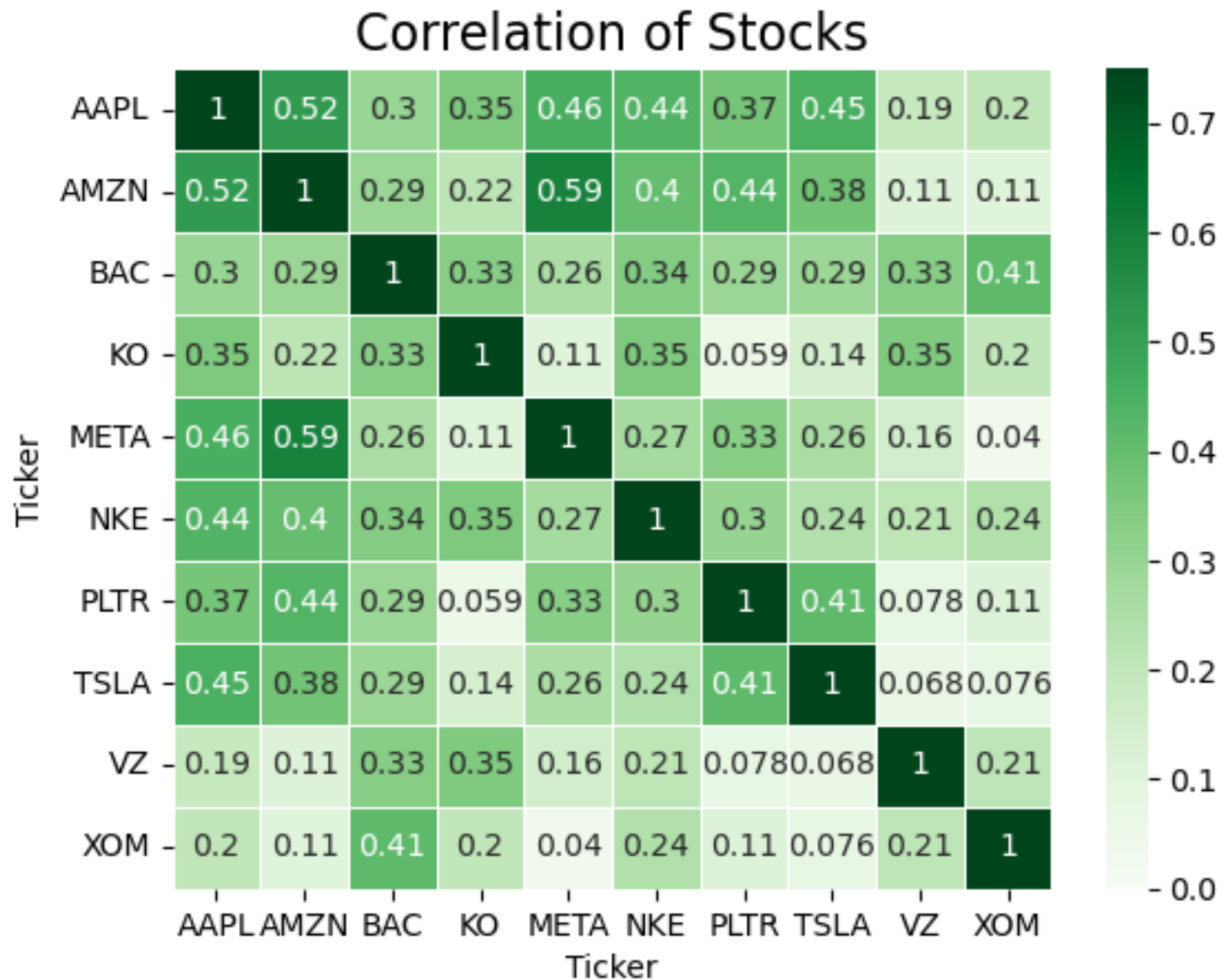
## Average Daily Rate of Returns



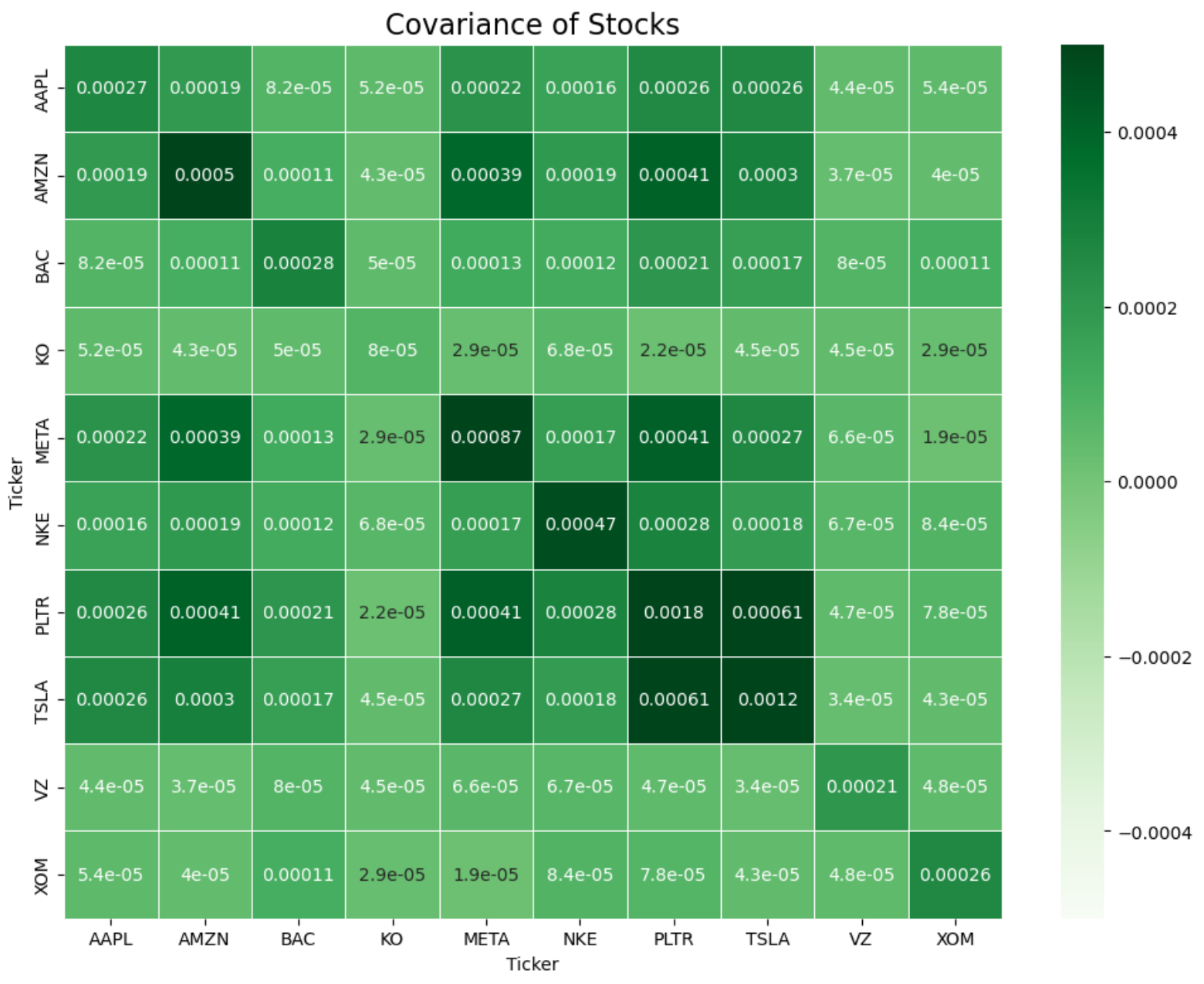
## Average Daily Standard Deviation of Stocks

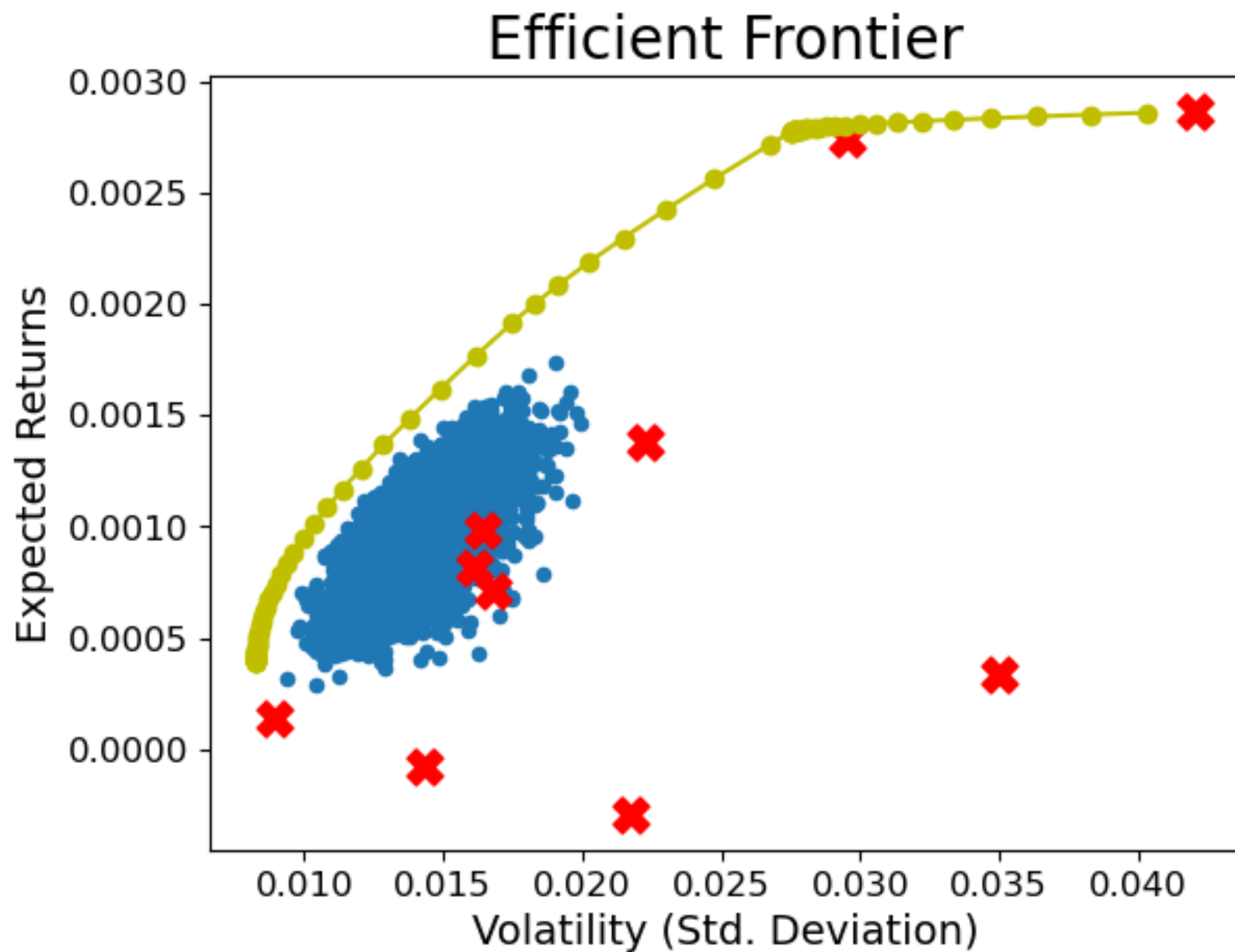


# PORTFOLIO STOCKS CORRELATION HEATMAP



# PORTFOLIO STOCKS COVARIANCE HEATMAP





EFFICIENT  
FRONTIER  
GRAPH





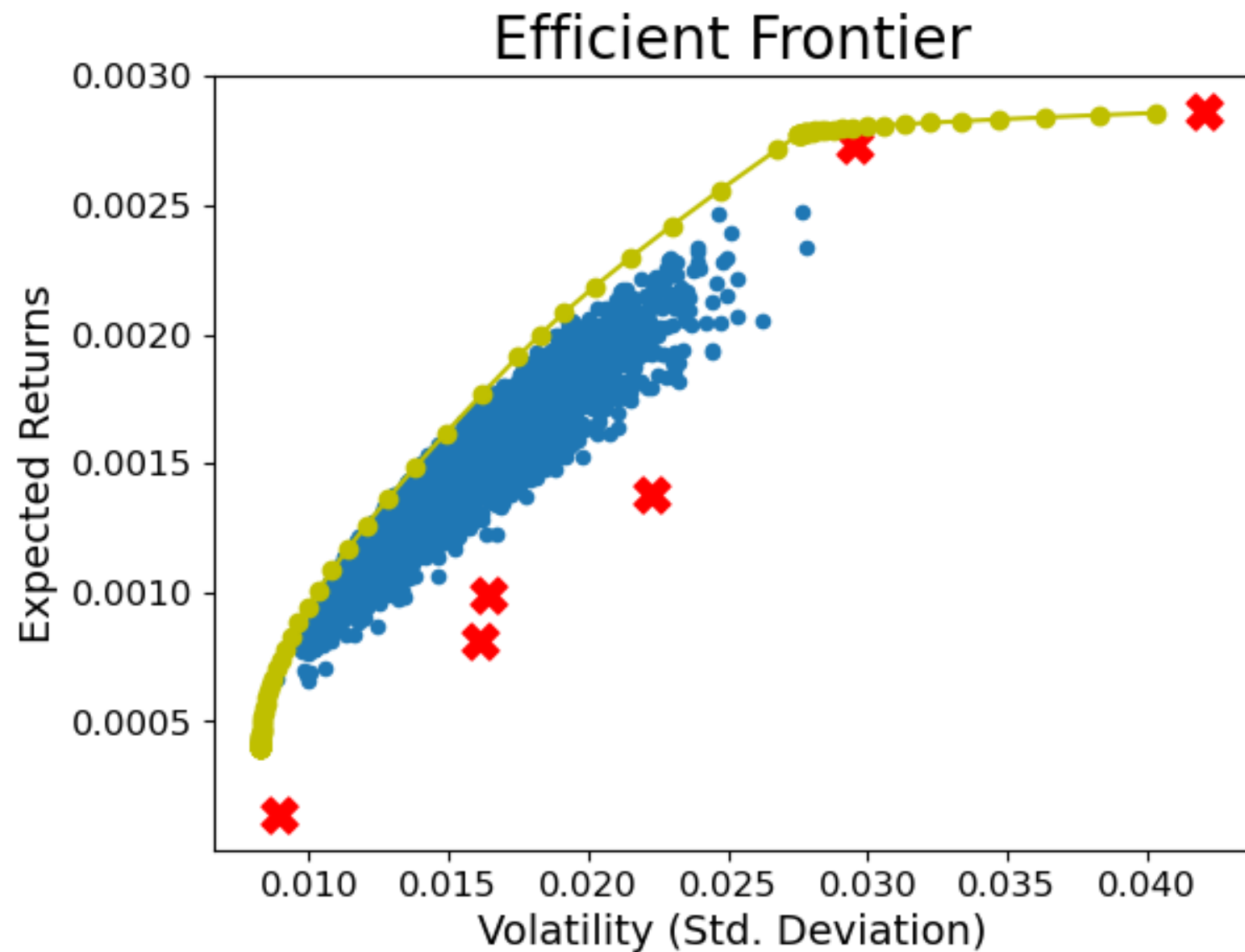
# Takeaways

- Stocks with Negative Average Returns: NKE and VZ. These stocks will be removed due to negative returns and lack of unique diversification prospects.
- BAC and TSLA: Can also be removed due to less than stellar returns, and relatively high correlation coefficients with stronger candidates (META, PLTR, AMZN), signifying lack of unique diversification opportunities offered by other candidates (KO, XOM).

## Final Portfolio:

**AAPL, AMZN, META, XOM, KO, PLTR**





# UPDATED EFFICIENT FRONTIER GRAPH

*Note: Tighter bunching of random portfolios near the efficient frontier, signaling less negative variability in potential returns.*

# Final Recommendations

- In this final portfolio, PLTR and META act as the highest risk, highest potential return assets. More risk-tolerant investors will look to increase their respective holdings in these stocks.
- AMZN and AAPL are more in the middle ground of this portfolio in terms of potential risk and returns. These are great options for all types of investors, allowing solid potential returns while relatively limiting the risk compared to other options.
- KO and XOM act as lower risk and lower potential return diversification opportunities from the higher return stocks in the portfolio. More risk-adverse investors will look to increase holdings in these stocks, particularly KO.

**THANK YOU**

Ariel Patino

571-253-3358

[ajpatino10@gmail.com](mailto:ajpatino10@gmail.com)