ANALYZE FINANCIAL DATA WITH PYTHON

A Capstone Project

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THE JOURNEY

Introduction

Portfolio Candidate's Performance Over Time

Explore The Volatility, Correlations And Covariances

Determine Optimal Portfolio

Determine Risk Tolerance Based Portfolios

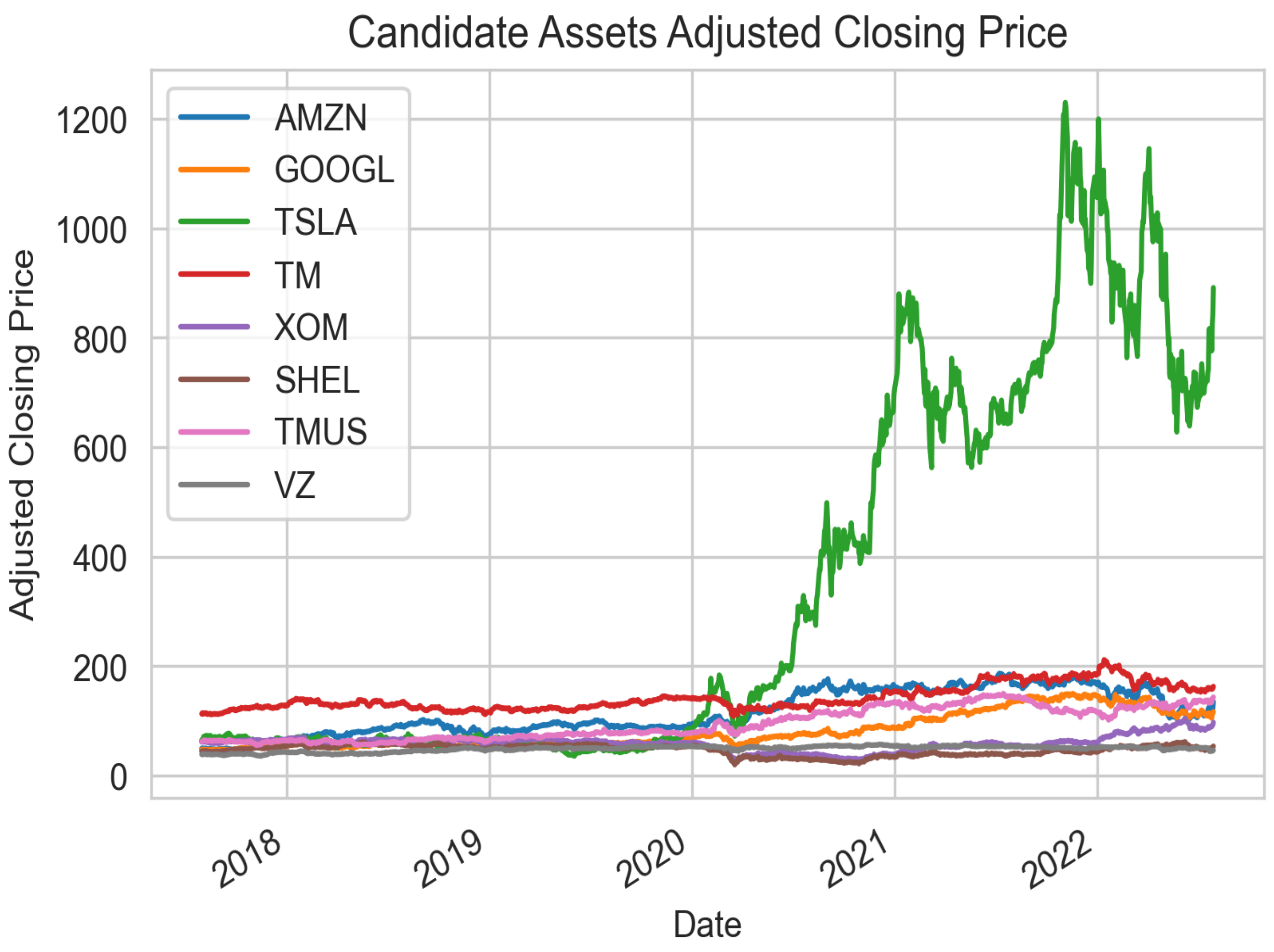
INTRODUCTION

- The candidates for selection for the optimal portfolio are made up of eight companies across four major industry sectors.   They are Amazon - AMZN, Google - GOOGL, Tesla - TSLA, Toyota - TM, Exxon Mobil - XOM, Shell - SHEL, T-Mobile - TMUS and Verizon – VZ.
- The maximum Sharpe Ratio will be used to determine the Optimal portfolio.
- The risk profiles used to offer client, will be:
  - Risk Averse – 0.02
  - Moderate Risk-Taker – 0.03
  - Risk Tolerant – 0.04

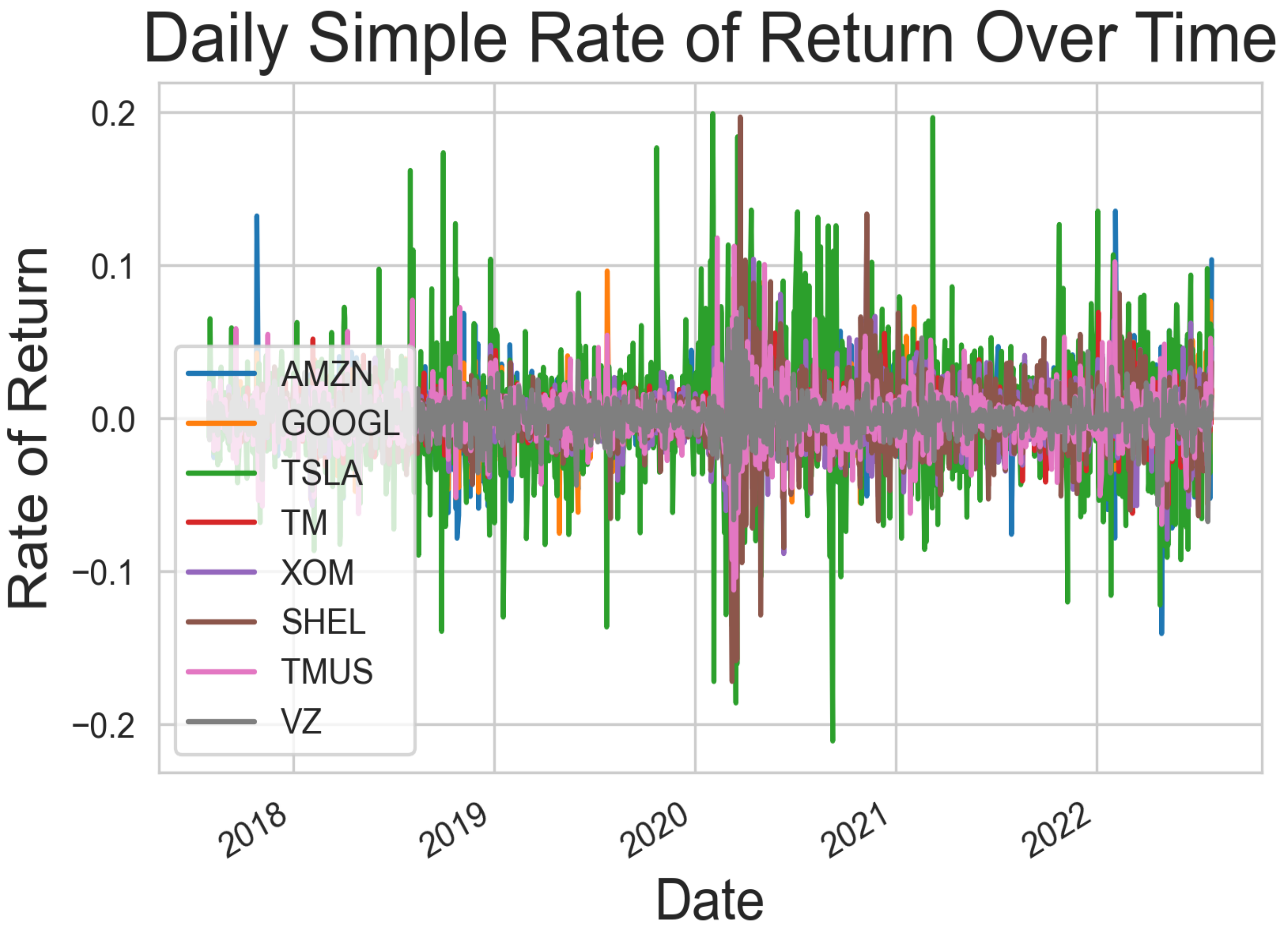
PORTFOLIO CANDIDATE’S PERFORMANCE OVER TIME

- What Are The Adjusted Closing Prices Over Time?
- What Are The Daily Simple Rates of Return Over Time Per Stock?
- What Are The Daily Mean Rates of Return?

WHAT ARE THE ADJUSTED CLOSING PRICES OVER TIME?



WHAT ARE THE DAILY SIMPLE RATES OF RETURN OVER TIME PER STOCK?



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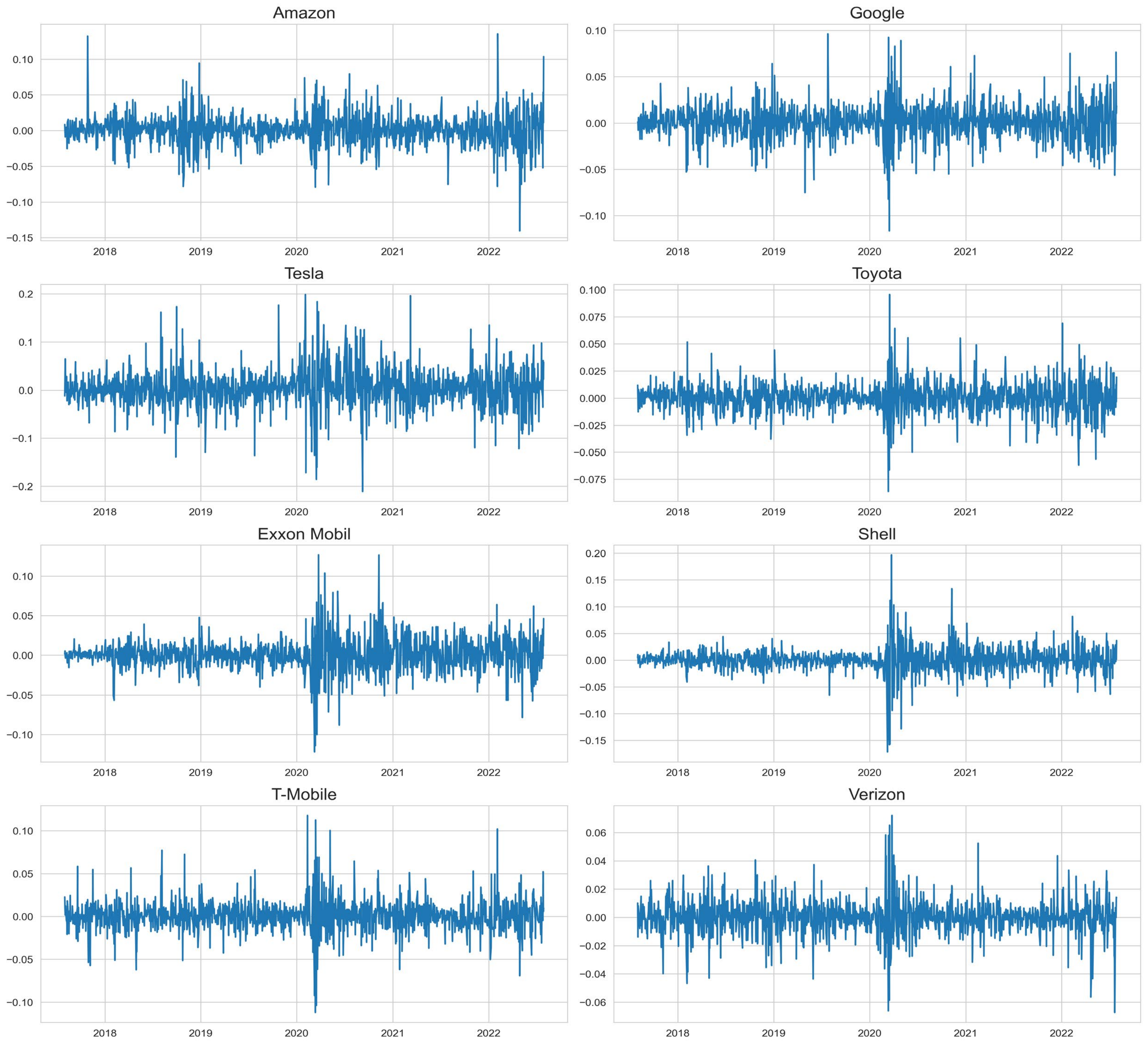
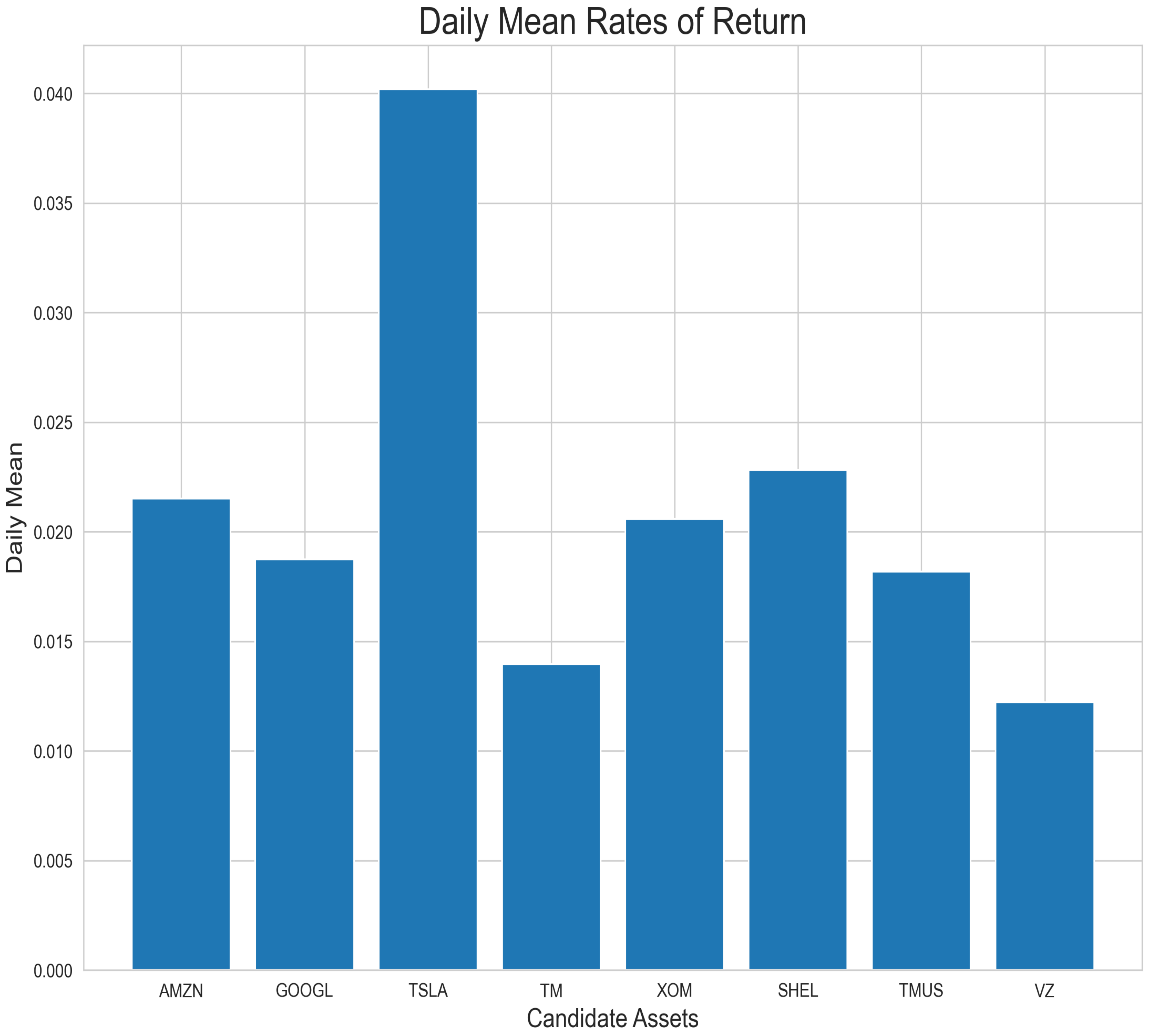


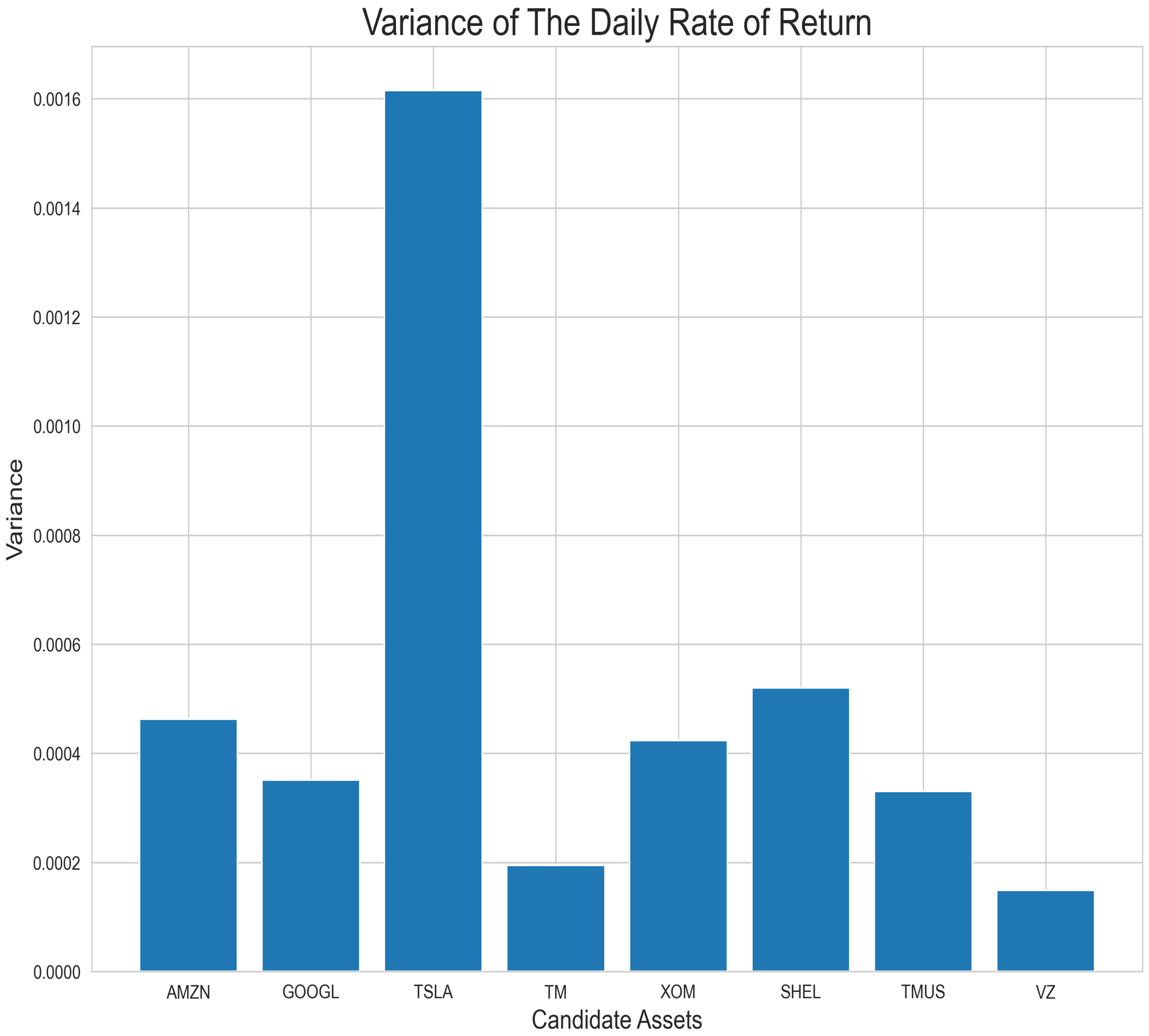
WHAT ARE THE DAILY MEAN RATES OF RETURN?



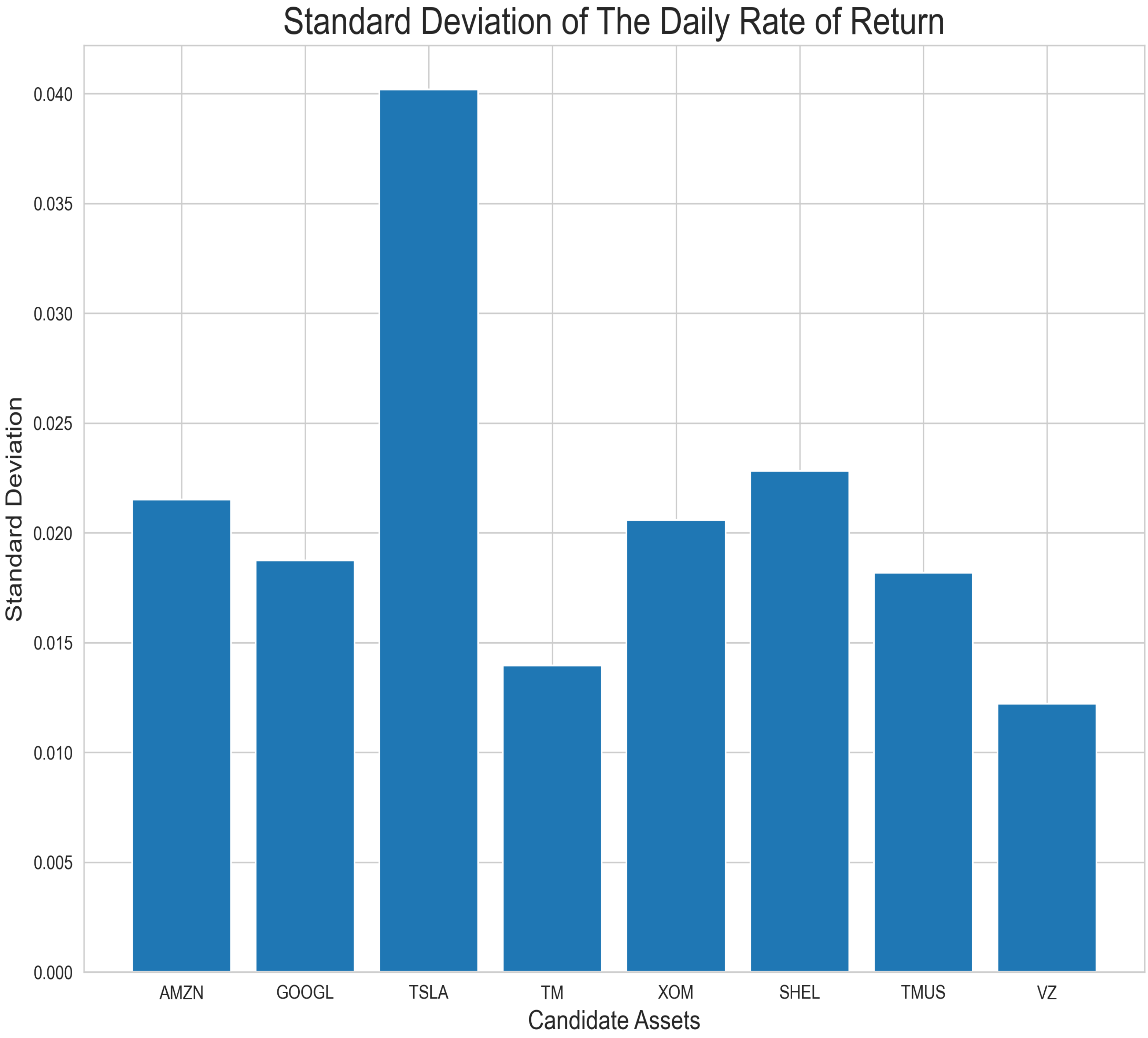
EXPLORE THE VOLATILITY, CORRELATIONS AND COVARIANCES

- What Is The Variance of The Daily Rate of Return?
- What Is The Standard Deviation of The Daily Rate of Return?
- What Are The Correlations Between the Candidate Assets?
- What Are The Covariances Between the Candidate Assets?
- What Does The Covariance Heat Map Look Like?

WHAT IS THE VARIANCE OF THE DAILY RATE OF RETURN?



WHAT IS THE STANDARD DEVIATION OF THE DAILY RATE OF RETURN?



WHAT ARE THE CORRELATIONS BETWEEN THE CANDIDATE ASSETS?

	AMZN	GOOGL	TSLA	TM	XOM	SHEL	TMUS	VZ
AMZN	1.000000	0.669968	0.414774	0.351716	0.211725	0.191790	0.427824	0.173485
GOOGL	0.669968	1.000000	0.406042	0.486312	0.380145	0.365216	0.489863	0.285748
TSLA	0.414774	0.406042	1.000000	0.281754	0.199982	0.235871	0.271863	0.065906
TM	0.351716	0.486312	0.281754	1.000000	0.423040	0.417866	0.335024	0.321188
XOM	0.211725	0.380145	0.199982	0.423040	1.000000	0.788334	0.310117	0.345514
SHEL	0.191790	0.365216	0.235871	0.417866	0.788334	1.000000	0.324680	0.272844
TMUS	0.427824	0.489863	0.271863	0.335024	0.310117	0.324680	1.000000	0.408742
VZ	0.173485	0.285748	0.065906	0.321188	0.345514	0.272844	0.408742	1.000000

Most of the candidate assets have loose to moderate correlations.

WHAT ARE THE COVARIANCES BETWEEN THE CANDIDATE ASSETS?

	AMZN	GOOGL	TSLA	TM	XOM	SHEL	TMUS	VZ
AMZN	0.000463	0.000270	0.000359	0.000106	0.000094	0.000094	0.000167	0.000046
GOOGL	0.000270	0.000351	0.000306	0.000127	0.000147	0.000156	0.000167	0.000065
TSLA	0.000359	0.000306	0.001616	0.000158	0.000165	0.000216	0.000199	0.000032
TM	0.000106	0.000127	0.000158	0.000195	0.000121	0.000133	0.000085	0.000055
XOM	0.000094	0.000147	0.000165	0.000121	0.000424	0.000370	0.000116	0.000087
SHEL	0.000094	0.000156	0.000216	0.000133	0.000370	0.000521	0.000135	0.000076
TMUS	0.000167	0.000167	0.000199	0.000085	0.000116	0.000135	0.000330	0.000091
VZ	0.000046	0.000065	0.000032	0.000055	0.000087	0.000076	0.000091	0.000149

Most of the candidate assets have loose covariances.

WHAT DOES THE COVARIANCE HEAT MAP LOOK LIKE?

DETERMINE OPTIMAL PORTFOLIO

Asset	Weight	Shares
AMZN	0.07017	52
GOOGL	0.06169	53
TSLA	0.54018	60
TMUS	0.32795	229

Expected annual return: 46.1%
Annual volatility: 40.1%
Sharpe Ratio: 1.10
Funds remaining: $569.90

The portfolio's initial investment is $100,000. Shares are based on prices as of the close of market on 5 August 2022.

ANALYSIS OF SHARPE RATIO

Sharpe Ratio Grading Thresholds:

- Less than 1: Bad
- 1 – 1.99: Adequate/good
- 2 – 2.99: Very good
- Greater than 3: Excellent

Analysis: The Sharpe Ratio, 1.10, for this portfolio is Adequate/good.

DETERMINE RISK TOLERANCE BASED PORTFOLIOS

The initial scenario used the following more conservative risk criteria for determining the portfolios:

- Risk Averse – 0.01
- Moderate Risk-Taker – 0.015
- Risk Tolerant – 0.02

This resulted in only data for the Moderate Risk-Taker and the Risk Tolerant portfolios being produced.

	Returns	Volatility	AMZN Weight	GOOGL Weight	TSLA Weight	TM Weight	XOM Weight	SHEL Weight	TMUS Weight	VZ Weight
Risk Averse										
Moderate Risk-Taker	0.0011	0.015	0.1136	0.1842	0.2062	0.0596	0.022	0.0311	0.1509	0.2325
Risk Tolerant	0.0015	0.0194	0.2333	0.0877	0.3166	0.0163	0.104	0.0143	0.2186	0.0091

DETERMINE RISK TOLERANCE BASED PORTFOLIOS

A second scenario used the following risk criteria for determining the portfolios:

- Risk Averse – 0.01
- Moderate Risk-Taker – 0.03
- Risk Tolerant – 0.04

This resulted in the Moderate Risk-Taker and the Risk Tolerant portfolios being identical.

	Returns	Volatility	AMZN Weight	GOOGL Weight	TSLA Weight	TM Weight	XOM Weight	SHEL Weight	TMUS Weight	VZ Weight
Risk Averse	0.0015	0.0194	0.2333	0.0877	0.3166	0.0163	0.104	0.0143	0.2186	0.0091
Moderate Risk-Taker	0.0018	0.0234	0.1029	0.2008	0.4781	0.0077	0.1005	0.0182	0.0305	0.0613
Risk Tolerant	0.0018	0.0234	0.1029	0.2008	0.4781	0.0077	0.1005	0.0182	0.0305	0.0613

THANK YOU

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