FINANCE AND RISK ANALYTICS

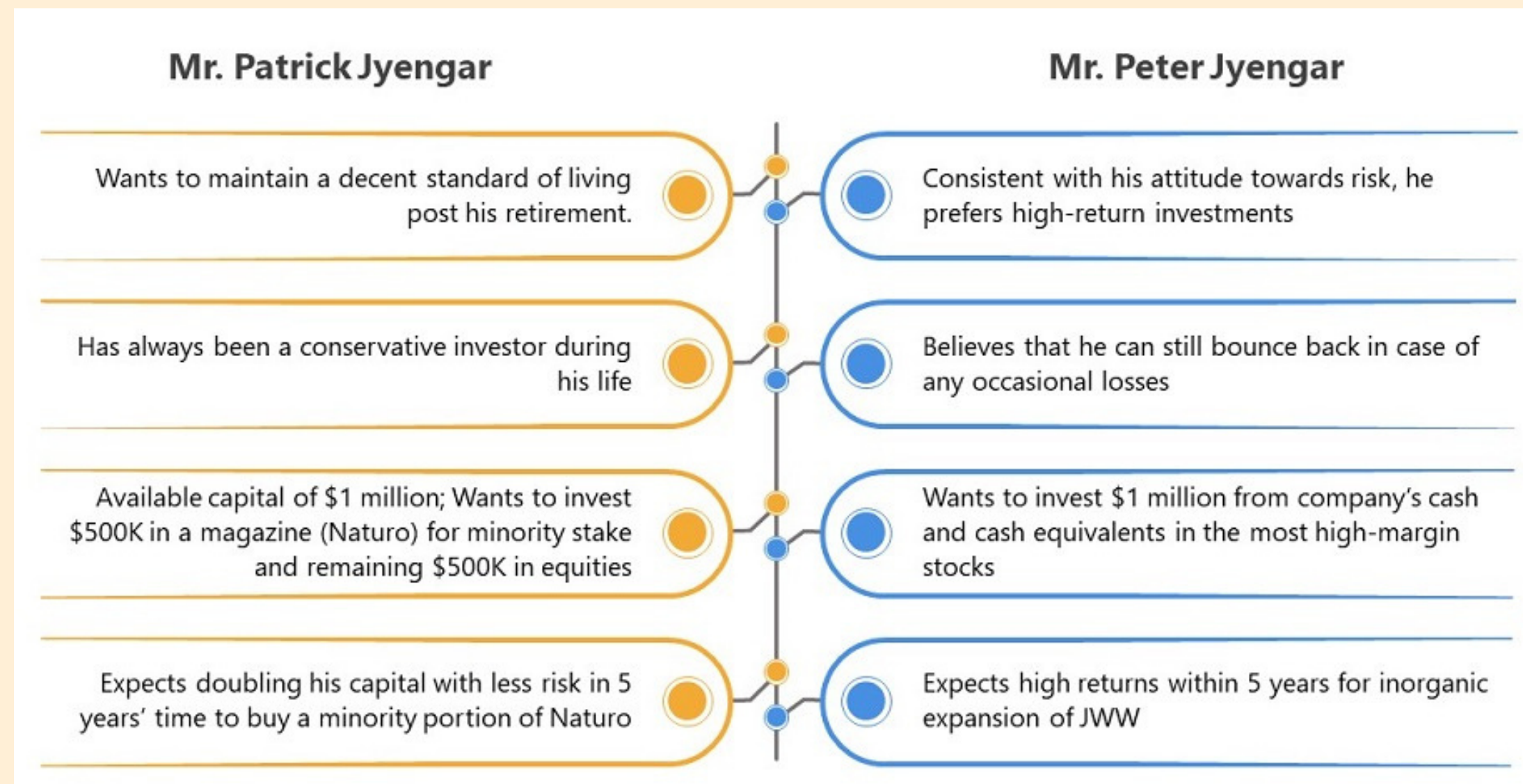**Submitted By: –** Kartikey Shukla

Batch: – DSC41

BUSINESS CASE

A portfolio manager makes investment decisions and carries out other related activities on behalf of vested investors. They work with a team of analysts and researchers, and their main objective is to realise the needs of the investor and suggest a suitable portfolio that meets all the expectations. They are responsible for establishing the best investment strategy, selecting appropriate investments along with the right allocation. However, in doing so, they face a lot of competition in the form of other portfolio managers and rival firms. Therefore, the portfolio manager has to use the available resources to provide the best solution to the investor.

Consider yourself working for an associate at an investment firm that manages accounts for private clients. Your role requires you to analyse a portfolio of stocks to provide consultation on investment management based on client's requirement.
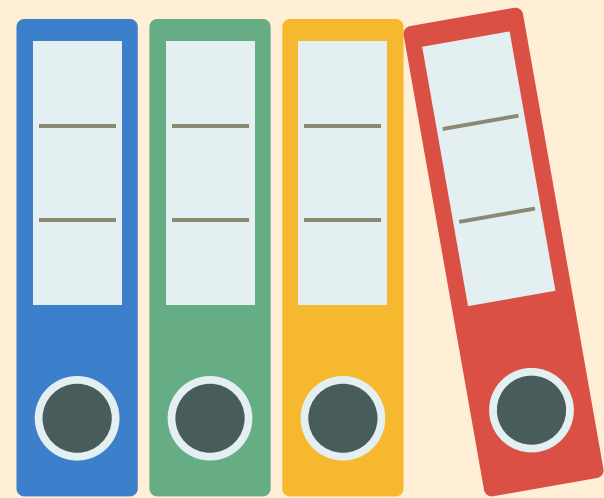
Your task is to provide consultation to two different investors, Mr Patrick Jyenger and Mr Peter Jyenger based on their requirements and financial objectives. You can refer to the elements mentioned in the video to develop the investor persona. The image below summarizes the profile of the two investors:

Mr. Patrick Jyengar	Mr. Peter Jyengar
Wants to maintain a decent standard of living post his retirement.	Consistent with his attitude towards risk, he prefers high-return investments
Has always been a conservative investor during his life	Believes that he can still bounce back in case of any occasional losses
Available capital of $1 million; Wants to invest $500K in a magazine (Naturo) for minority stake and remaining $500K in equities	Wants to invest $1 million from company's cash and cash equivalents in the most high-margin stocks
Expects doubling his capital with less risk in 5 years' time to buy a minority portion of Naturo	Expects high returns within 5 years for inorganic expansion of JWW

You must perform the required steps for both the individuals after understanding the investor persona independently.

Following points summarize the expected tasks in the assignment:

1) You must use the elements of technical analysis to understand the trend of the underlying stocks. The metrics associated with risk and returns must help you realize whether the security meets the criteria of your investor's financial goals.

2) You must use the metrics and the visualizations to compare the performance of the available securities against each other, and also against the market index, S&P500.

3) The findings should be aligned with the investor persona to select the appropriate stocks for the portfolio.

4) After the selection of stocks, the portfolio must be validated using the active investment strategy to estimate the prices in future. You must check if the portfolio has the potential to fulfil the financial goals set by the investor.

DATA DESCRIPTION

- You are provided with the following information for 24 stocks of leading companies listed in New York Stock Exchange(NYSE):
    - Date
    - Open price: Price of stock at the start of the day
    - Close price: Price of stock at the end of the day
    - High price: Highest price reached by the stock on that day
    - Low price: Lowest price reached by the stock on that day
    - Adjusted close price: Stock price adjusted to include the annual returns (dividends) that the company offers to the shareholders
    - Volume traded: Number of stocks traded on the day
- The information for every stock ranges from 1st October 2010 to 30th September 2020.
- The stocks belong to different domains:
    - Technology/IT
    - Travel/Aviation/Hospitality
    - Banking/Financial Services and Insurance
    - Pharmaceuticals/Healthcare/Life Sciences
- To help you with the market benchmark, you are given the S&P 500 index prices for the same period.

Ticker	Industry	Company Name
AAL	Aviation	American Airlines Group Inc
ALGT	Aviation	Allegiant Travel Company
ALK	Aviation	Alaska Air Group Inc
DAL	Aviation	Delta Air Lines Inc
HA	Aviation	Hawaiian Holdings Inc
LUV	Aviation	Southwest Airlines Co
BCS	Finance	Barclays
CS	Finance	Credit Suisse
DB	Finance	Deutsche Bank
GS	Finance	Goldman Sachs
MS	Finance	Morgan Stanley
WFC	Finance	Wells Fargo
JNJ	Healthcare	Johnson & Johnson
MRK	Healthcare	Merck and CO inc.
PFE	Healthcare	Pfizer inc
UNH	Healthcare	UnitedHealthGroup Inc
BHC	Pharmaceuticals	Bausch Health Companies inc
RHHBY	Pharmaceuticals	Roche Holding AG
AAPL	Technology	Apple Inc
AMZN	Technology	Amazon
FB	Technology	Facebook
GOOG	Technology	Alphabet
IBM	Technology	IBM
MSFT	Technology	Microsoft

APPROACH

The entire capstone can be divided into the following aspects:

- Preliminary Steps - Data loading
- Data Exploration
- Stock Analysis and Portfolio Management
- Reporting

PRELIMINARY STEPS

Under preliminary steps, you are expected to load the entire data into the working environment (Python). The entire data must be merged into a single dataframe with only the required columns.

IMPORTING NECESSARY LIBRARIES

```
In [116]:  import numpy as np
           import pandas as pd
           import plotly.graph_objects as go
           import seaborn as sns
           import matplotlib.pyplot as plt
```

DATA LOADING

```
In [117]:  # IMPORTING Annexure-I dataset

           Annexure_1 = pd.read_csv('Annexure-I.csv')
           Annexure_1.head()
```

Out[117]:

	Ticker	Industry	Company Name
0	AAL	Aviation	American Airlines Group Inc
1	ALGT	Aviation	Allegiant Travel Company
2	ALK	Aviation	Alaska Air Group Inc
3	DAL	Aviation	Delta Air Lines Inc
4	HA	Aviation	Hawaiian Holdings Inc

```
In [118]:  # IMPORTING S&P500 dataset

           SP500 = pd.read_csv('S&P500.csv')
           SP500.head()
```

Out[118]:

	Date	Open	High	Low	Close	Adj Close	Volume
0	01-10-2010	1143.489990	1150.300049	1139.420044	1146.239990	1146.239990	4298910000
1	04-10-2010	1144.959961	1148.160034	1131.869995	1137.030029	1137.030029	3604110000
2	05-10-2010	1140.680054	1162.760010	1140.680054	1160.750000	1160.750000	4068840000
3	06-10-2010	1159.810059	1162.329956	1154.849976	1159.969971	1159.969971	4073160000
4	07-10-2010	1161.569946	1163.869995	1151.410034	1158.060059	1158.060059	3910550000

```
In [119]:  # IMPORTING Aviation Stocks dataset

           AAL  = pd.read_csv('AAL.csv')
           ALGT = pd.read_csv('ALGT.csv')
           ALK  = pd.read_csv('ALK.csv')
           DAL  = pd.read_csv('DAL.csv')
           HA   = pd.read_csv('HA.csv')
           LUV  = pd.read_csv('LUV.csv')
```

```
In [120]:  # IMPORTING Finance Stocks datset

           BCS = pd.read_csv('BCS.csv')
           CS  = pd.read_csv('CS.csv')
           DB  = pd.read_csv('DB.csv')
           GS  = pd.read_csv('GS.csv')
           MS  = pd.read_csv('MS.csv')
           WFC = pd.read_csv('WFC.csv')
```

```
In [121]:  # IMPORTING Pharma_Healthcare Stocks dataset

           BHC   = pd.read_csv('BHC.csv')
           JNJ   = pd.read_csv('JNJ.csv')
           MRK   = pd.read_csv('MRK.csv')
           PFE   = pd.read_csv('PFE.csv')
           RHHBY = pd.read_csv('RHHBY.csv')
           UNH   = pd.read_csv('UNH.csv')
```

```
In [122]:  # IMPORTING Technology Stocks dataset

           AAPL = pd.read_csv('AAPL.csv')
           AMZN = pd.read_csv('AMZN.csv')
           FB   = pd.read_csv('FB.csv')
           GOOG = pd.read_csv('GOOG.csv')
           IBM  = pd.read_csv('IBM.csv')
           MSFT = pd.read_csv('MSFT.csv')
```

Merging Stocks in a single Dataframe

Now, we are merging all the DataFrames in a single DataFrame.
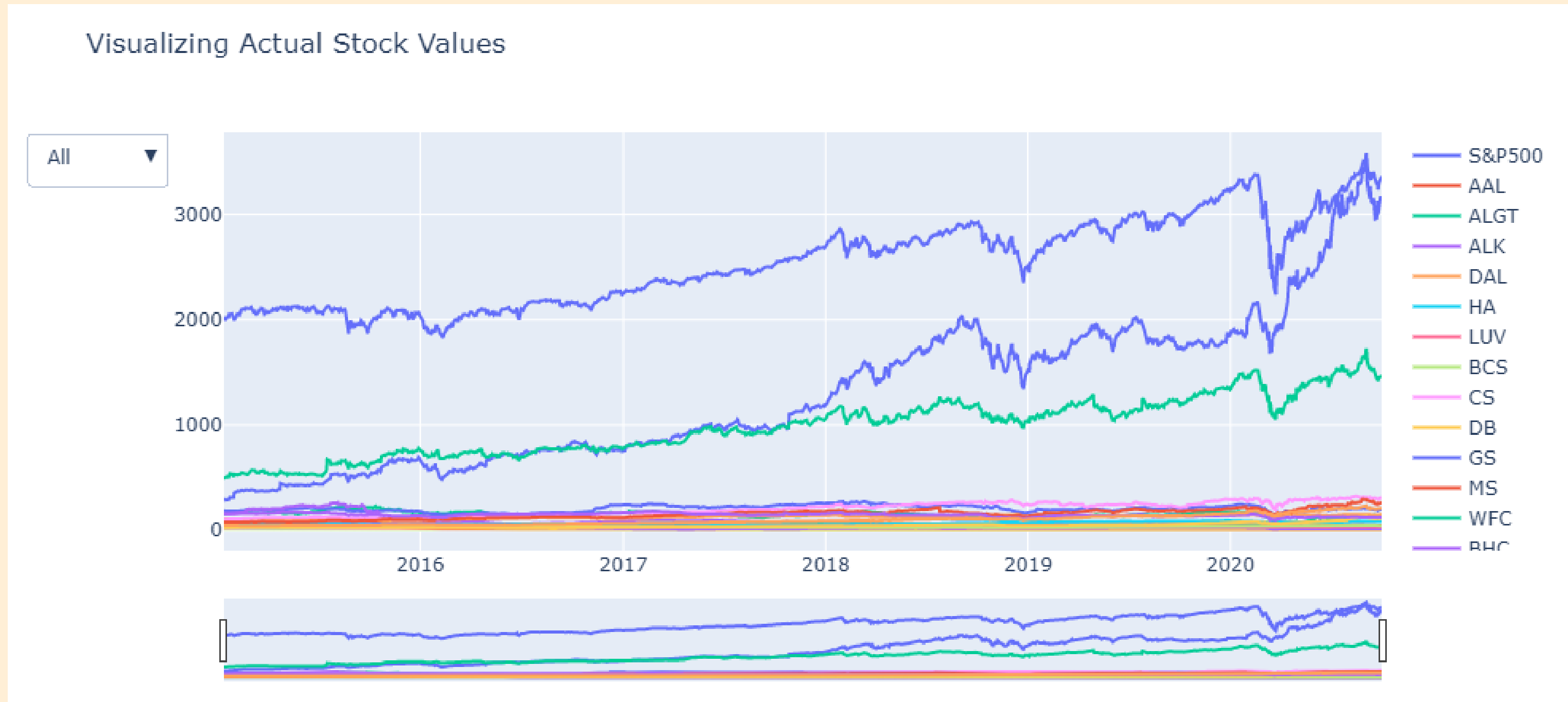
```
In [125]:  data = pd.merge(SP500, AAL, how='inner', on='Date')
           data = pd.merge(data, ALGT, how='inner', on='Date')
           data = pd.merge(data, ALK, how='inner', on='Date')
           data = pd.merge(data, DAL, how='inner', on='Date')
           data = pd.merge(data, HA, how='inner', on='Date')
           data = pd.merge(data, LUV, how='inner', on='Date')

           data = pd.merge(data, BCS, how='inner', on='Date')
           data = pd.merge(data, CS, how='inner', on='Date')
           data = pd.merge(data, DB, how='inner', on='Date')
           data = pd.merge(data, GS, how='inner', on='Date')
           data = pd.merge(data, MS, how='inner', on='Date')
           data = pd.merge(data, WFC, how='inner', on='Date')

           data = pd.merge(data, BHC, how='inner', on='Date')
           data = pd.merge(data, JNJ, how='inner', on='Date')
           data = pd.merge(data, MRK, how='inner', on='Date')
           data = pd.merge(data, PFE, how='inner', on='Date')
           data = pd.merge(data, RHHBY, how='inner', on='Date')
           data = pd.merge(data, UNH, how='inner', on='Date')

           data = pd.merge(data, AAPL, how='inner', on='Date')
           data = pd.merge(data, AMZN, how='inner', on='Date')
           data = pd.merge(data, FB, how='inner', on='Date')
           data = pd.merge(data, GOOG, how='inner', on='Date')
           data = pd.merge(data, IBM, how='inner', on='Date')
           data = pd.merge(data, MSFT, how='inner', on='Date')
```
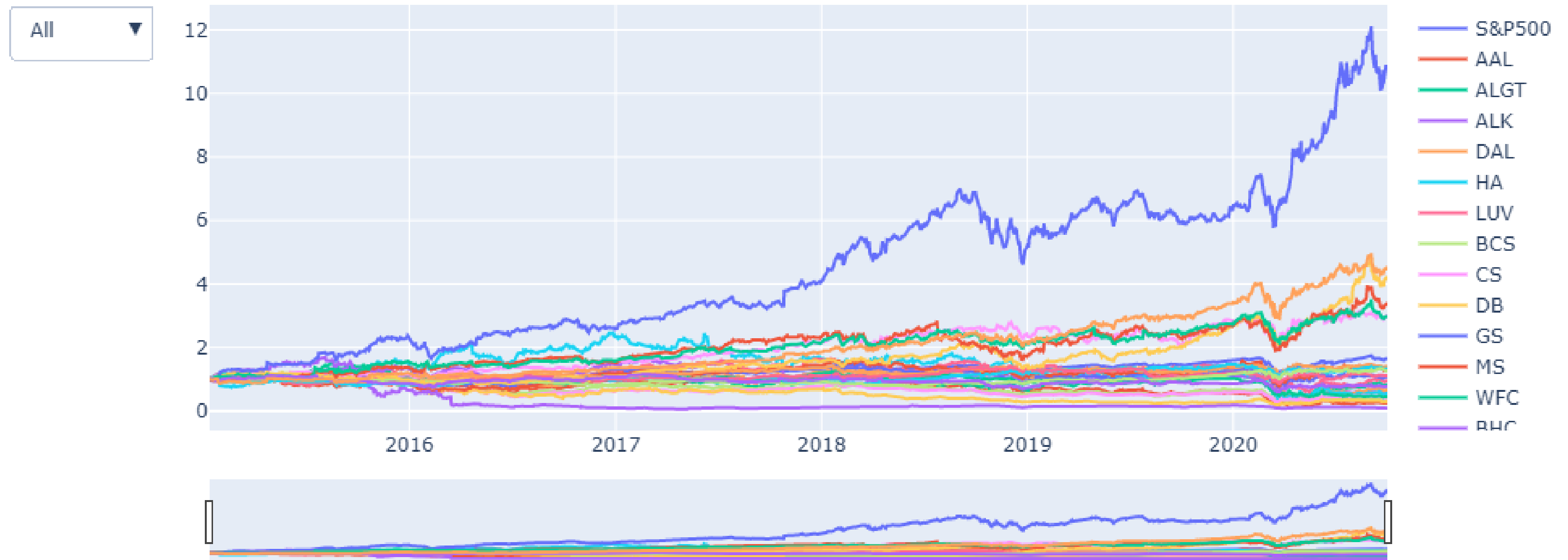
DATA EXPLORATION

Visualizing Actual Stock Values

Legend: S&P500, AAL, ALGT, ALK, DAL, HA, LUV, BCS, CS, DB, GS, MS, WFC, BHC

FROM THE ABOVE VISUALIZATION IT CAN BE DETERMINED THAT AMAZON AND GOOGLE HAVE A UPWARD TREND.
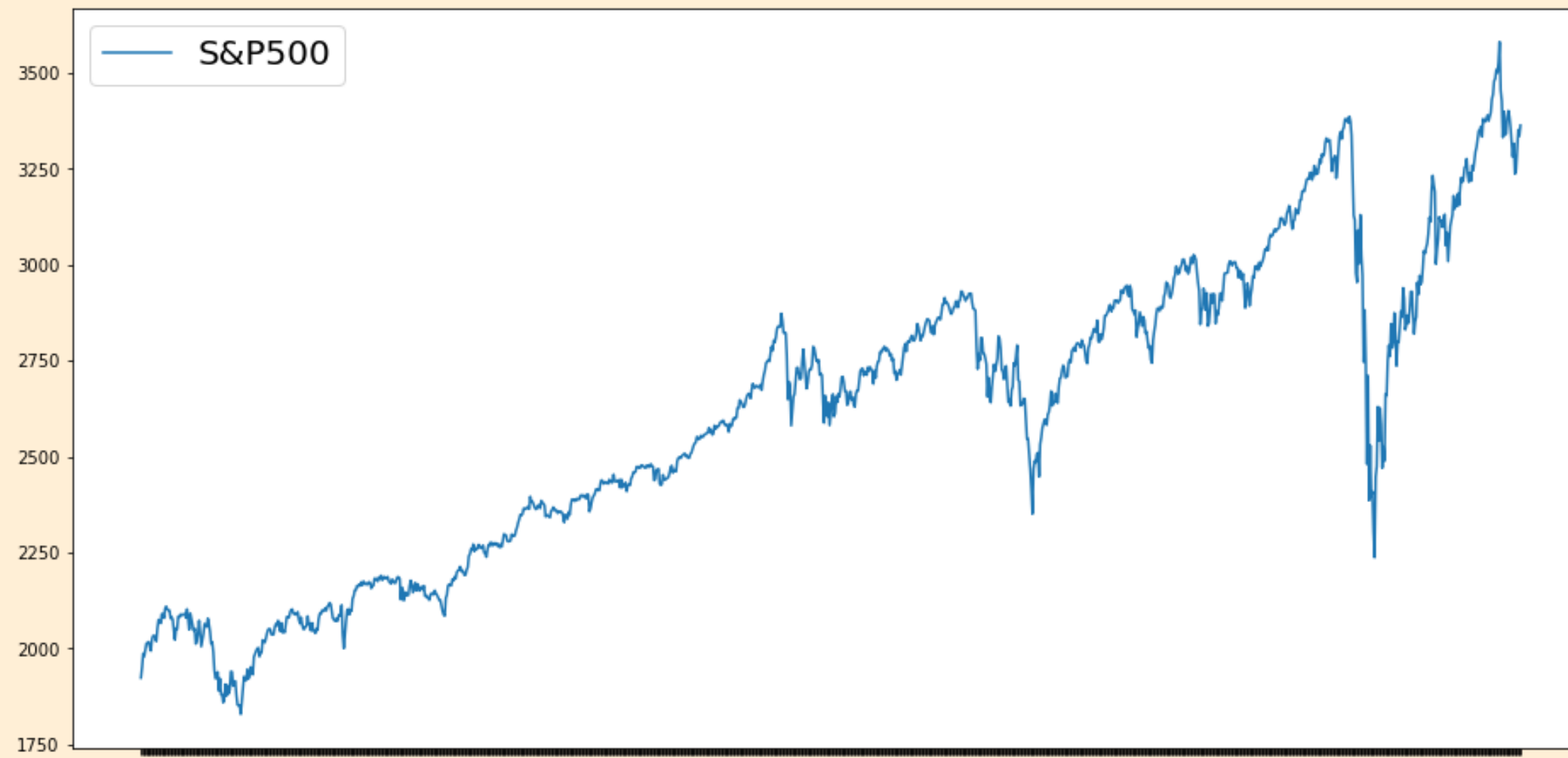
Visualizing Normalized Stock Values

FROM THE NORMALIZED STOCKS ABOVE, IT CAN BE OBSERVED THAT THERE ARE QUITE A FEW STOCKS WHICH ARE PERFORMING BETTER THAN S&P500.
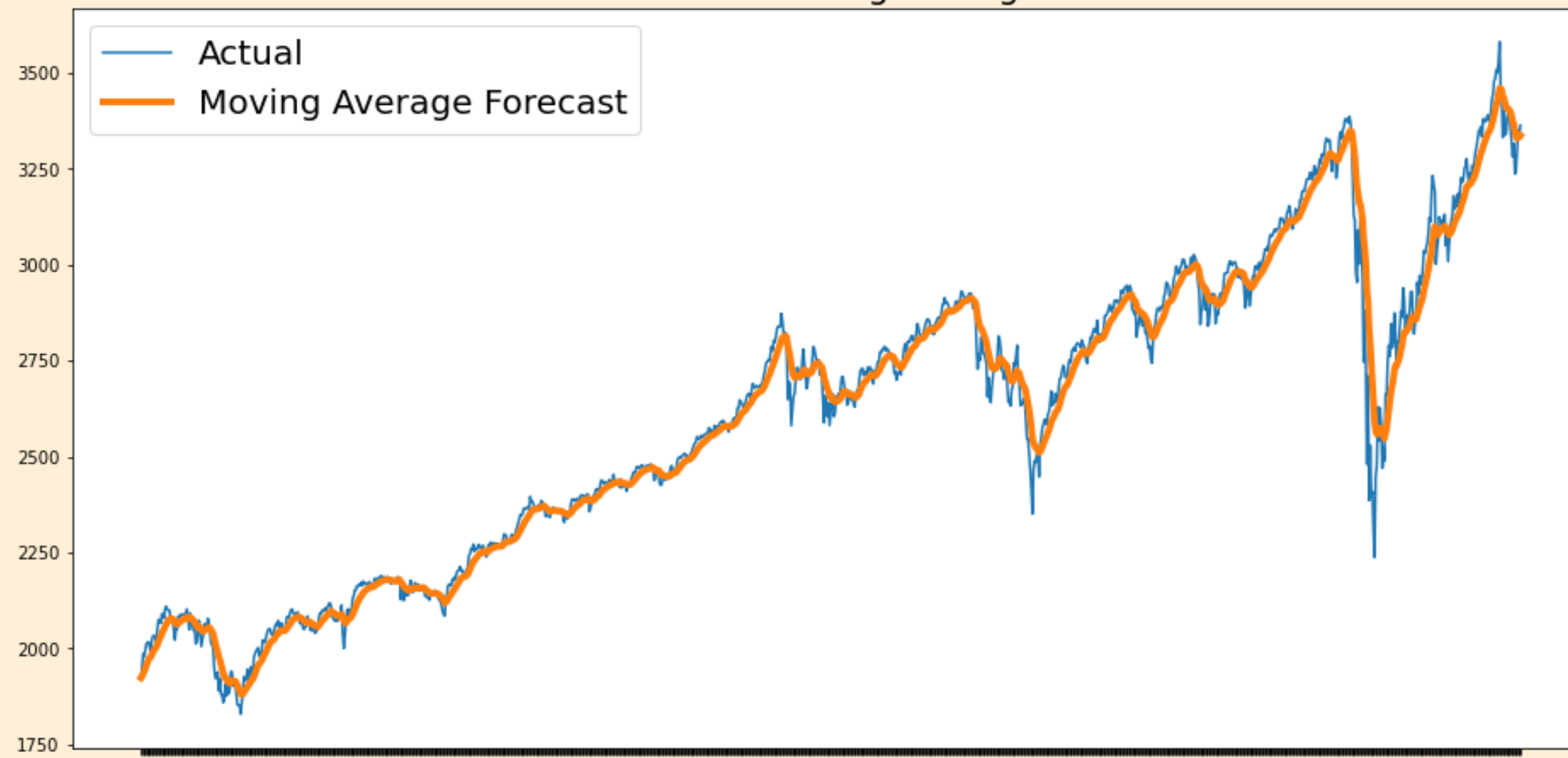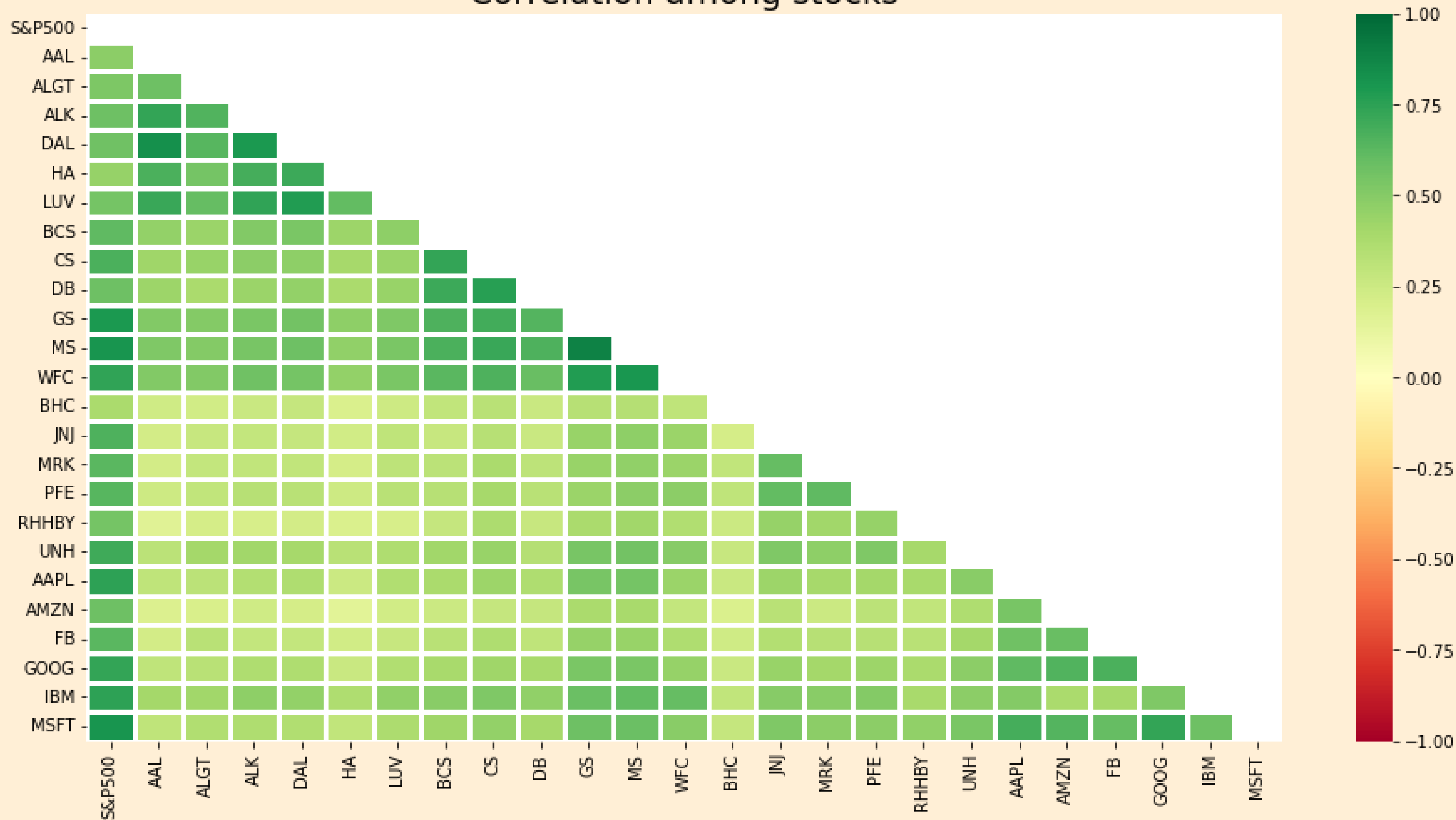
Visualizing Daily Returns

Correlation among stocks

A. MR. PATRICK JYENGER

BASED ON THE PORTFOLIO OF MR. PATRICK JYENGAR, HIS REQUIREMENTS ARE LOW RISK AND DOUBLE RETURNS.
BELOW ARE THE 5 STOCKS WITH THE LOWEST RISK:

	Avg_daily_returns	Risk	Ann_returns	Ann_Risk	Cum_returns	SHARPE ratio
JNJ	0.000321	0.012248	0.080766	0.194427	1.423599	0.376830
RHHBY	0.000237	0.013429	0.059632	0.213178	1.235141	0.244547
PFE	0.000171	0.013589	0.043093	0.215717	1.119927	0.165000
MRK	0.000296	0.013991	0.074709	0.222096	1.331461	0.302613
GOOG	0.000904	0.016948	0.227833	0.269033	2.991848	0.818979

Portfolio Returns = 1138766.0026862654 and **Portfolio Risk= 0.21135455866092662**
The estimated portfolio returns for the stocks JNJ, RHHBY, PFE and MRK is $1,138,766 with 21.13% risk which is near to the market or S&P500 risk.**
Therefore, we recommend Mr.Patrick Jyenger to invest the amount in the below stocks equally to get 2.4X returns with a 21% risk .

- **Johnson & Johnson**
- **Roche Holding AG**
- **Pfizer inc**
- **Merck and CO inc.**
- **Google**

Mr.Patrick Jyenger's Portfolio

Investment = $ 500,000   Risk = 21%   Returns = $ 1,138,766
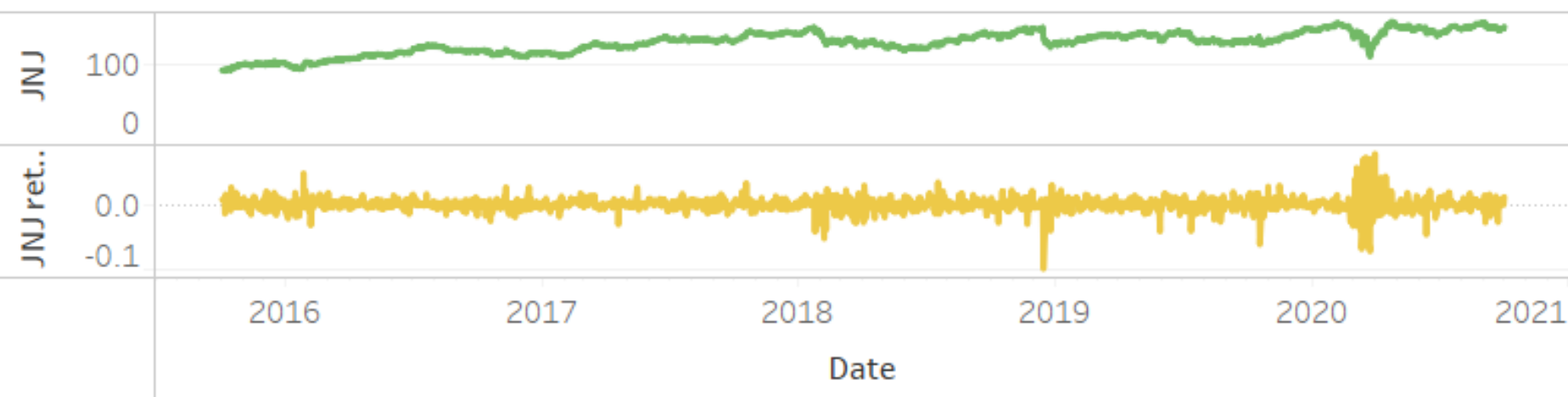
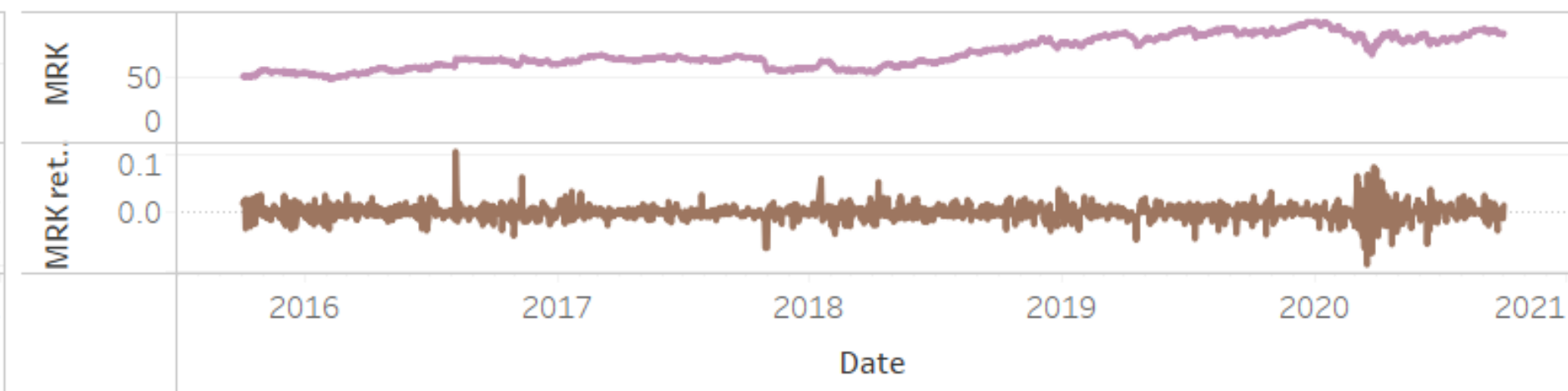## Daily Returns
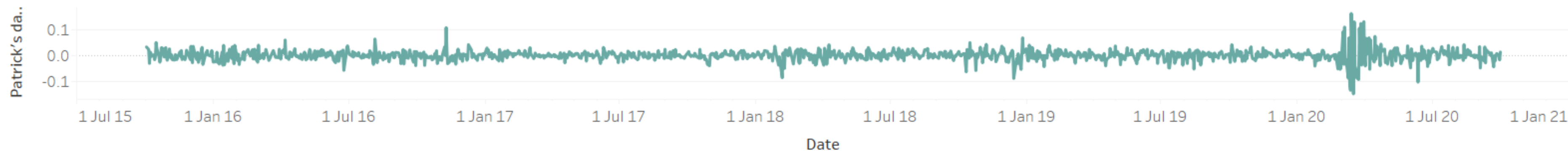
Roche Holding AG
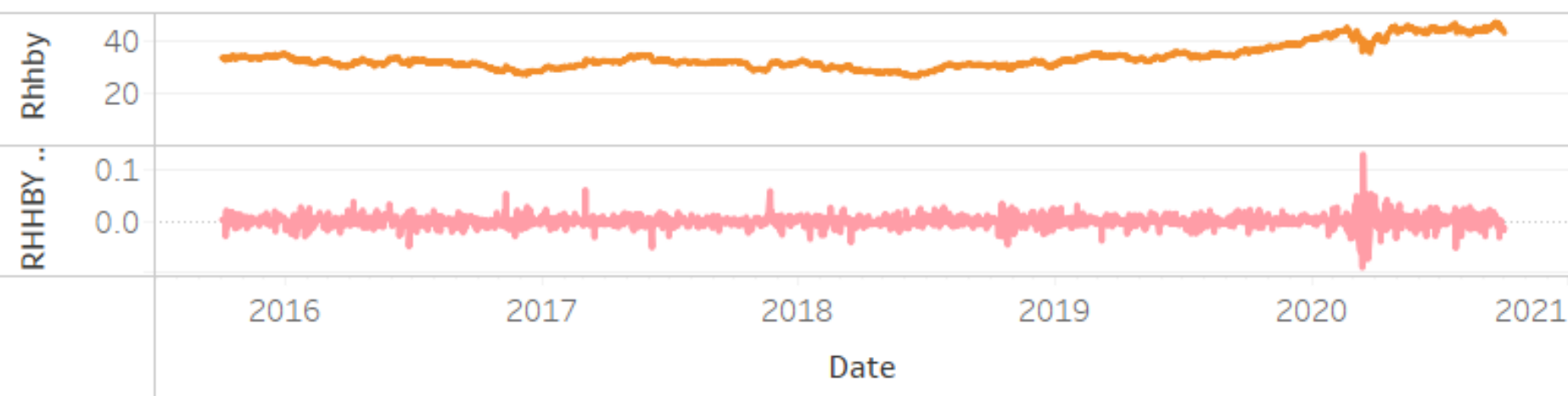
Pfizer Inc
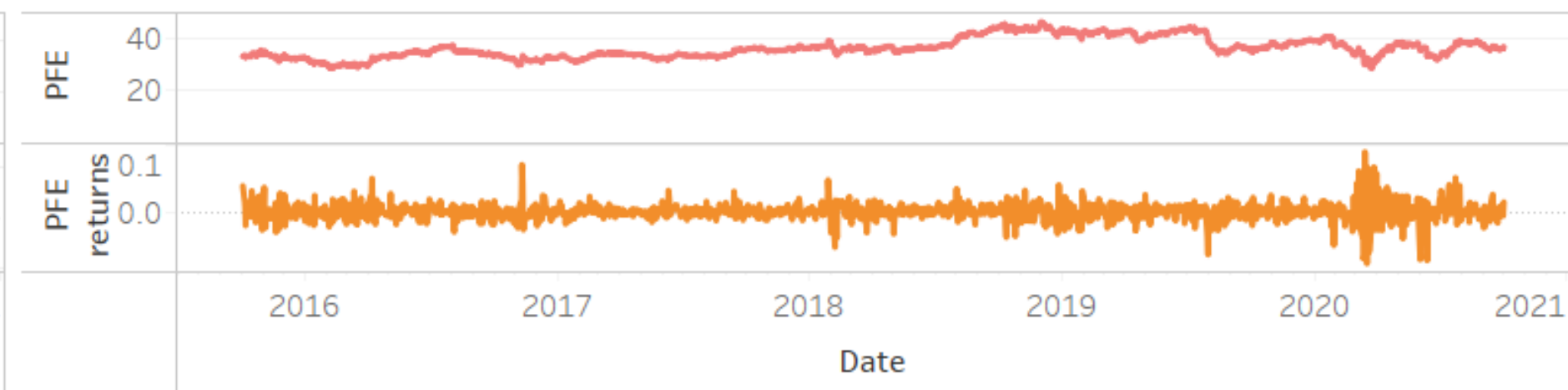
Johnson & Johnson

Merck and Co Inc

B. MR. PETER JYENGER

BASED ON THE PORTFOLIO OF MR. PETER JYENGAR, HIS REQUIREMENTS ARE HIGH RETURNS WITH ANY RISK.
BELOW ARE THE 6 STOCKS WITH THE HIGHEST RETURNS:

	Avg_daily_returns	Risk	Ann_returns	Ann_Risk	Cum_returns	SHARPE ratio
AMZN	0.001841	0.019463	0.464049	0.308958	10.805154	1.477706
MSFT	0.001202	0.017593	0.302820	0.279275	4.513520	1.057452
AAPL	0.001175	0.018523	0.296206	0.294044	4.240183	0.981848
FB	0.001052	0.019900	0.265181	0.315904	3.413712	0.815694
UNH	0.000927	0.017524	0.233487	0.278183	3.040175	0.812369
GOOG	0.000904	0.016948	0.227833	0.269033	2.991848	0.818979

Portfolio Returns = 5834098.664257467 and **Portfolio Risk= 0.29089961099929895**

The estimated portfolio returns for the stocks AMZN, MSFT, AAPL, FB, UNH, GOOG are $5,834,098 which is 4 times the investment with a risk of 29%.

Therefore, we recommend Mr. Peter Jyenger to invest in the below stocks to get a 4X return with a 29% risk:

- Amazon
- Microsoft
- Apple
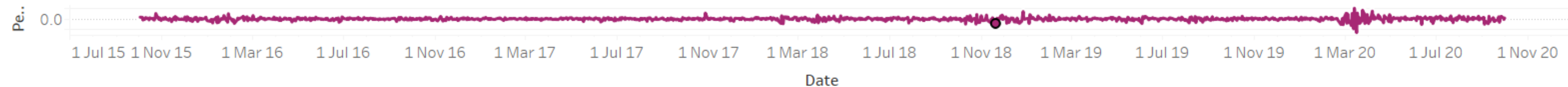- Facebook
- United Health group Inc
- Google

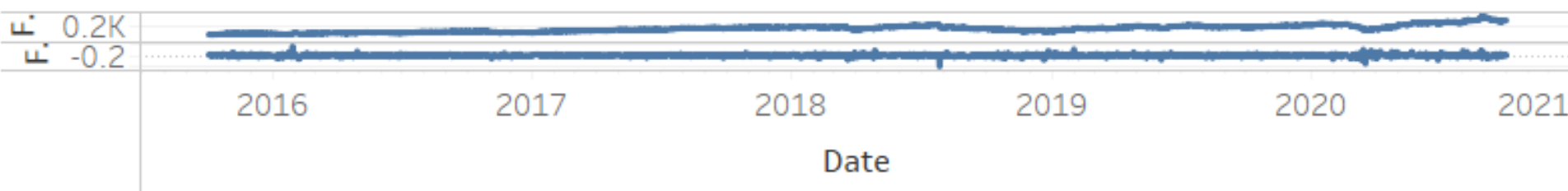# Mr.Peter Jyenger's Portfolio

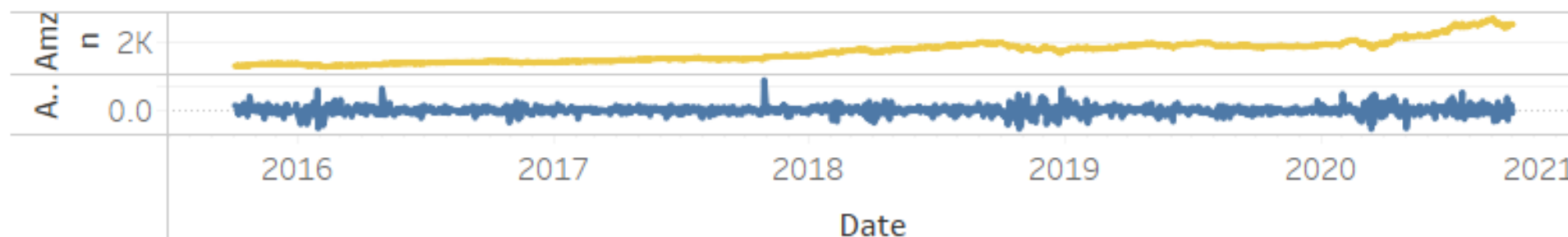Investment = $ 1,000,000   Risk = 29%   Returns = $ 5,834,098
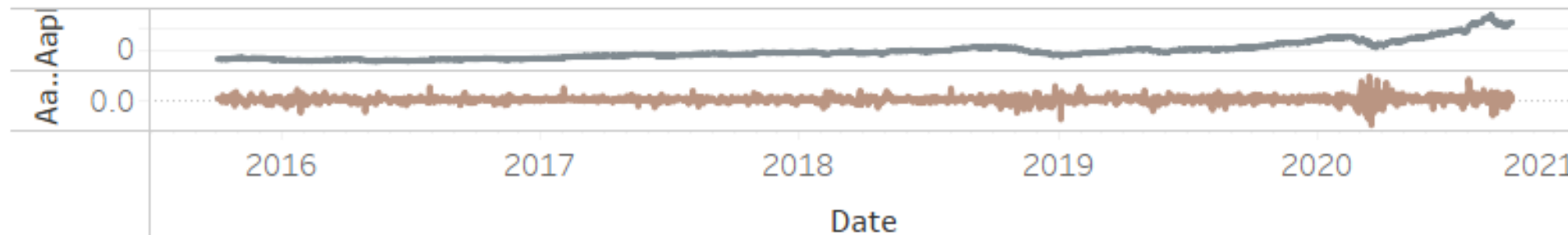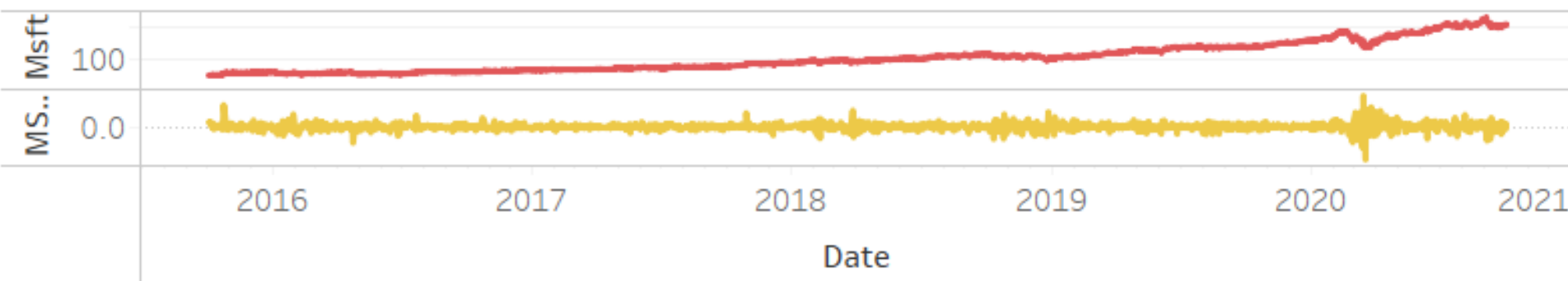
Daily Returns

Facebook

Amazon

Google
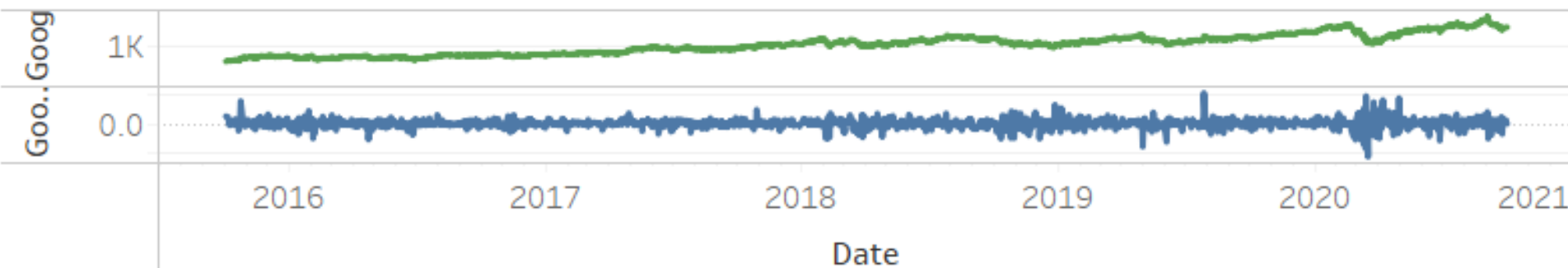
Apple

Microsoft

United Health Group Inc