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# CAPSTONE PROJECT

## FINANCE AND RISK ANALYTICS

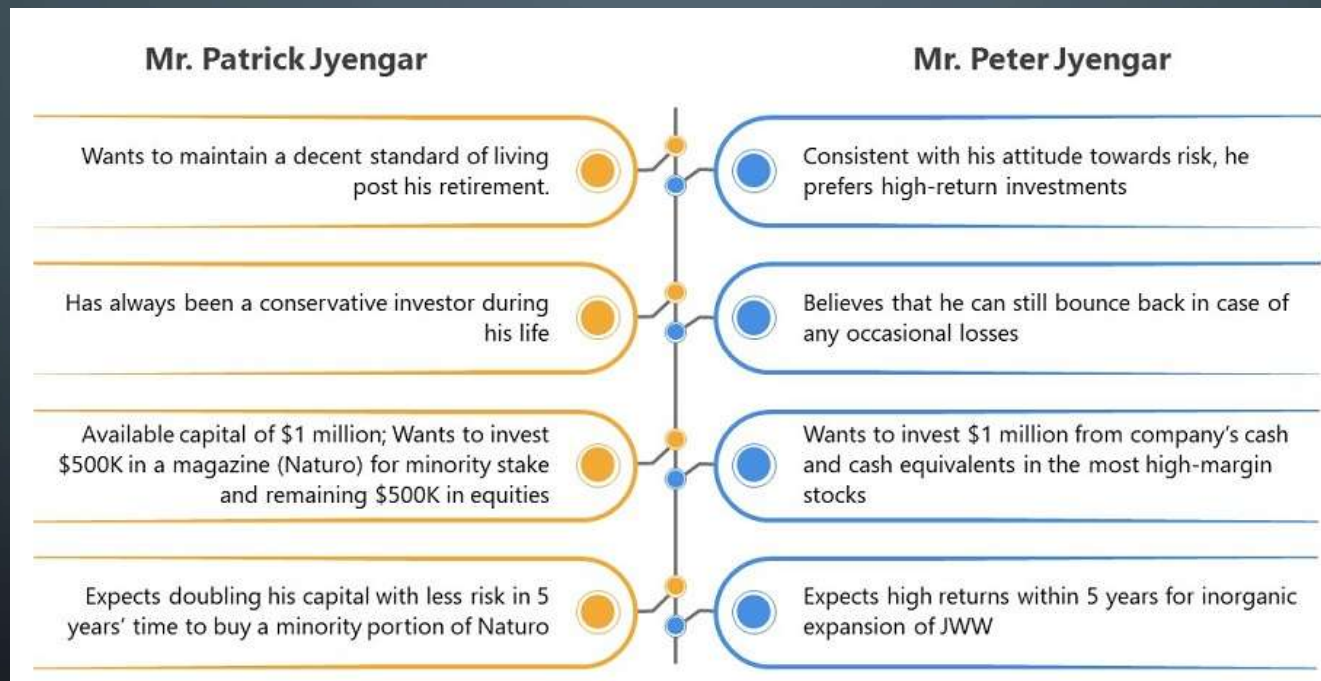
SIDDHARTHA SRIVASTAVA AND HARSH PATIL – DS C74

# AGENDA

- Business Case
- Data Provided
- Conclusion (Suggested Portfolio)
- Data Insights
  - Returns & Risk
  - Sector Analysis
  - Correlation
- Appendix
  - Steps followed
  - Summary of Metrics
  - Portfolio Returns

# BUSINESS CASE

- Analyse a portfolio of stocks to provide consultation on investment management based on two clients' requirements



# DATA PROVIDED

- Prices for 24 stocks of leading companies listed on New York Stock Exchange (NYSE)
- The information for every stock ranges from 1st October 2010 to 30th September 2020
- Sectors covered
  - Technology/IT
  - Travel/Aviation/Hospitality
  - Banking/Financial Services and Insurance
  - Pharmaceuticals/Healthcare/Life Sciences
- S&P 500 index prices provided as benchmark for the same period
- Steps followed have been provided as Appendix - I for reference
- **Assumption: Data for past 5 years is to be analysed and used to project next 5 years returns**

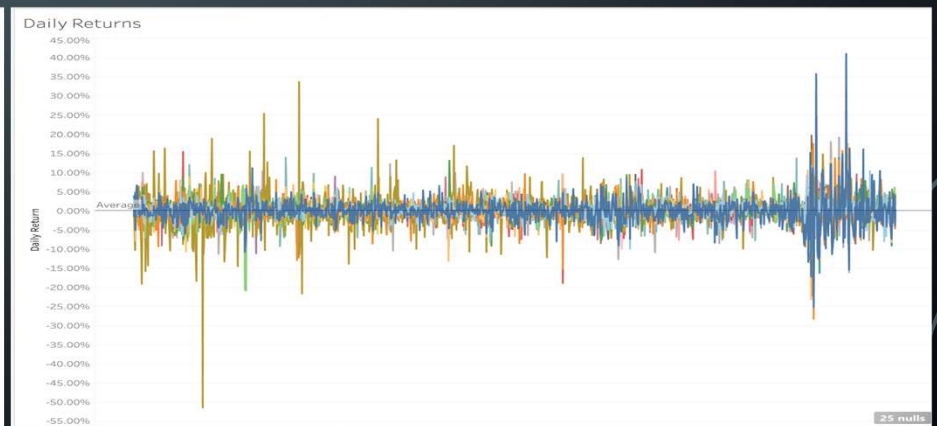
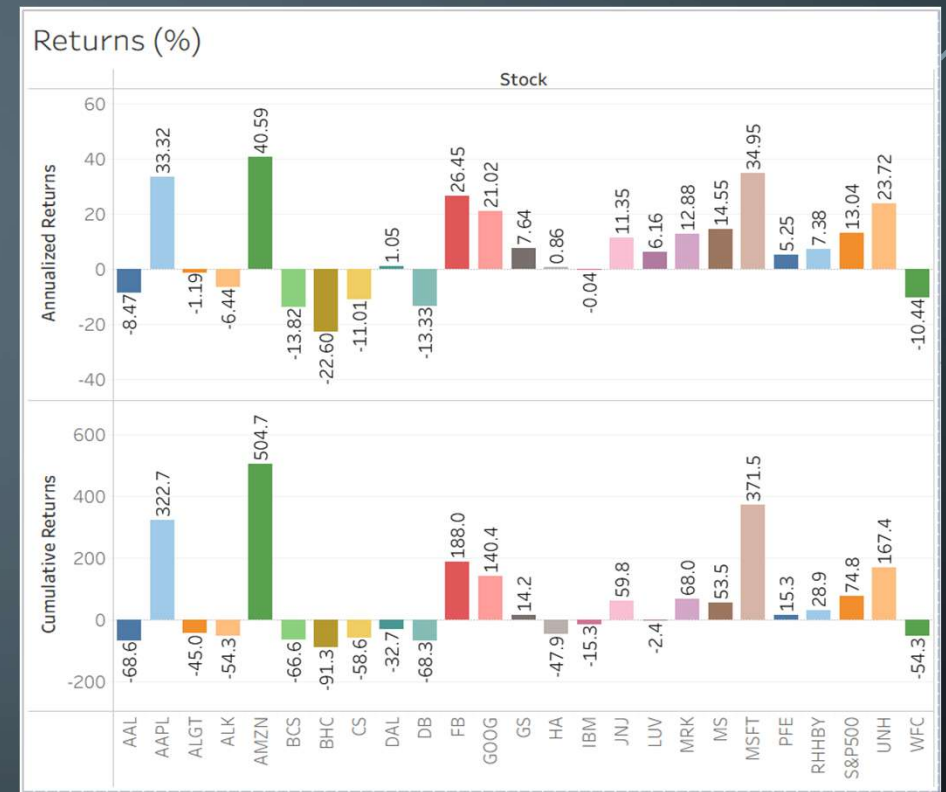
# CONCLUSION: SUGGESTED PORTFOLIO

	Mr. Patrick Jyengar	Mr. Peter Jyengar
Invested amount	USD 500,000	Invested Amount: USD 1,000,000
Expected Return	Double	High
Expected Risk	Low	No conditions
Suggested stocks & allocation	JNJ (Johnson & Johnson) – 25% RHHBY (Roche Holding AG) – 25% MRK (Merck and Co Inc) – 25% MSFT (Microsoft) – 25%	AMZN (Amazon) – 20% MSFT (Microsoft) – 20% AAPL (Apple) – 20% FB (Facebook) – 20% UNH (United Health Group Inc) – 20%
Expected return (after 5 yrs) *	132%	310%
Portfolio Risk (Annualized)	22.85	29.65
Portfolio Value (after 5 yrs) *	USD 1,116,000	USD 4,100,000

\* Past 5 years returns are used to project next 5 years returns

# DATA INSIGHTS - RETURNS

- 12 stocks (+ S&P500) provided positive cumulative returns over this 5 year period
- Recommended stocks have been selected from the above 12 stocks
- AMZN, AAPL and MSFT are the top 3 performers in terms of both Annualized and Cumulative Returns

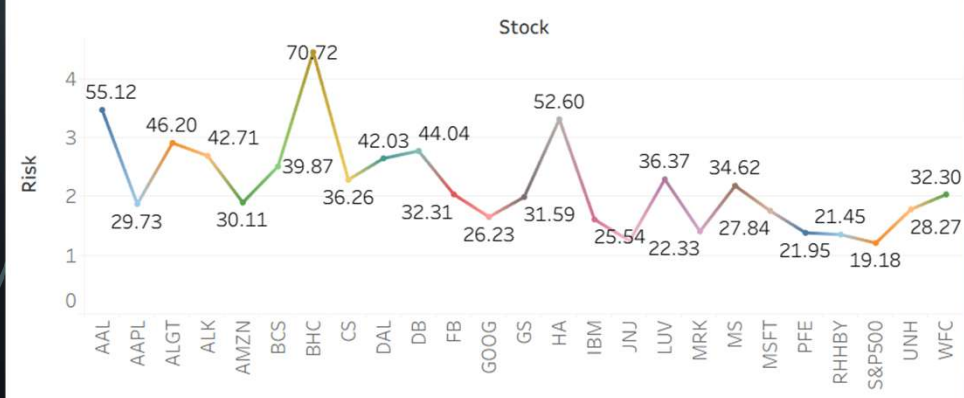


# DATA INSIGHTS - RISK

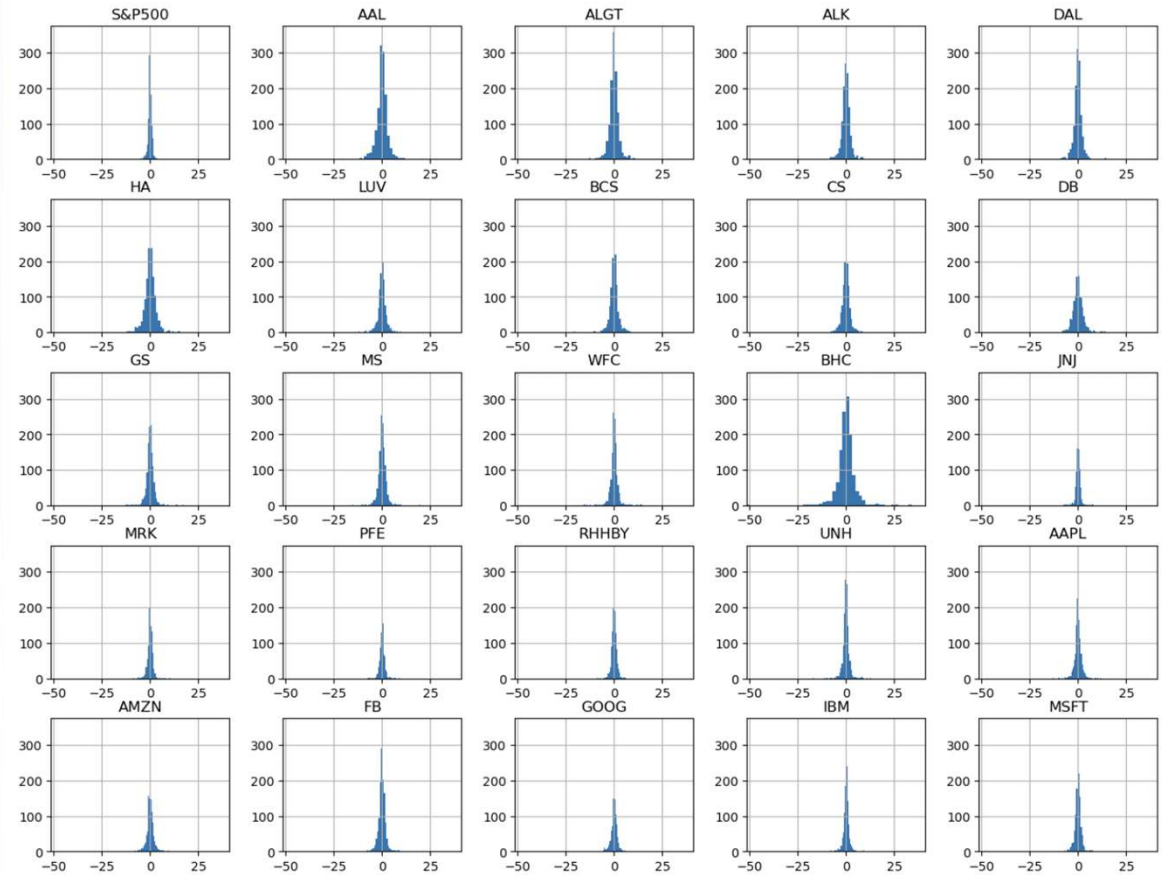
- The following stocks are the least risky:

- JNJ
- RHHBY
- PFE
- MRK
- GOOG

Annualized Risk



Histogram of Daily Return Deviations from Mean





# DATA INSIGHTS

## SECTOR ANALYSIS - I

### Aviation

- Aviation has a negative correlation to S&P 500
- Returns have likely dipped because of Coronavirus pandemic since early 2020
- There is some positive correlation between Delta and Allegiant and Delta and Southwest Airlines

### Finance

- Finance does not have a clear correlation to S&P 500 (though it is positive for some stocks)
- Most stocks dipped in early 2020 but have been able to recover since then
- Goldman Sachs and Morgan Stanley are highly correlated within the sector





# DATA INSIGHTS

## SECTOR ANALYSIS - II

### Pharma / HealthCare

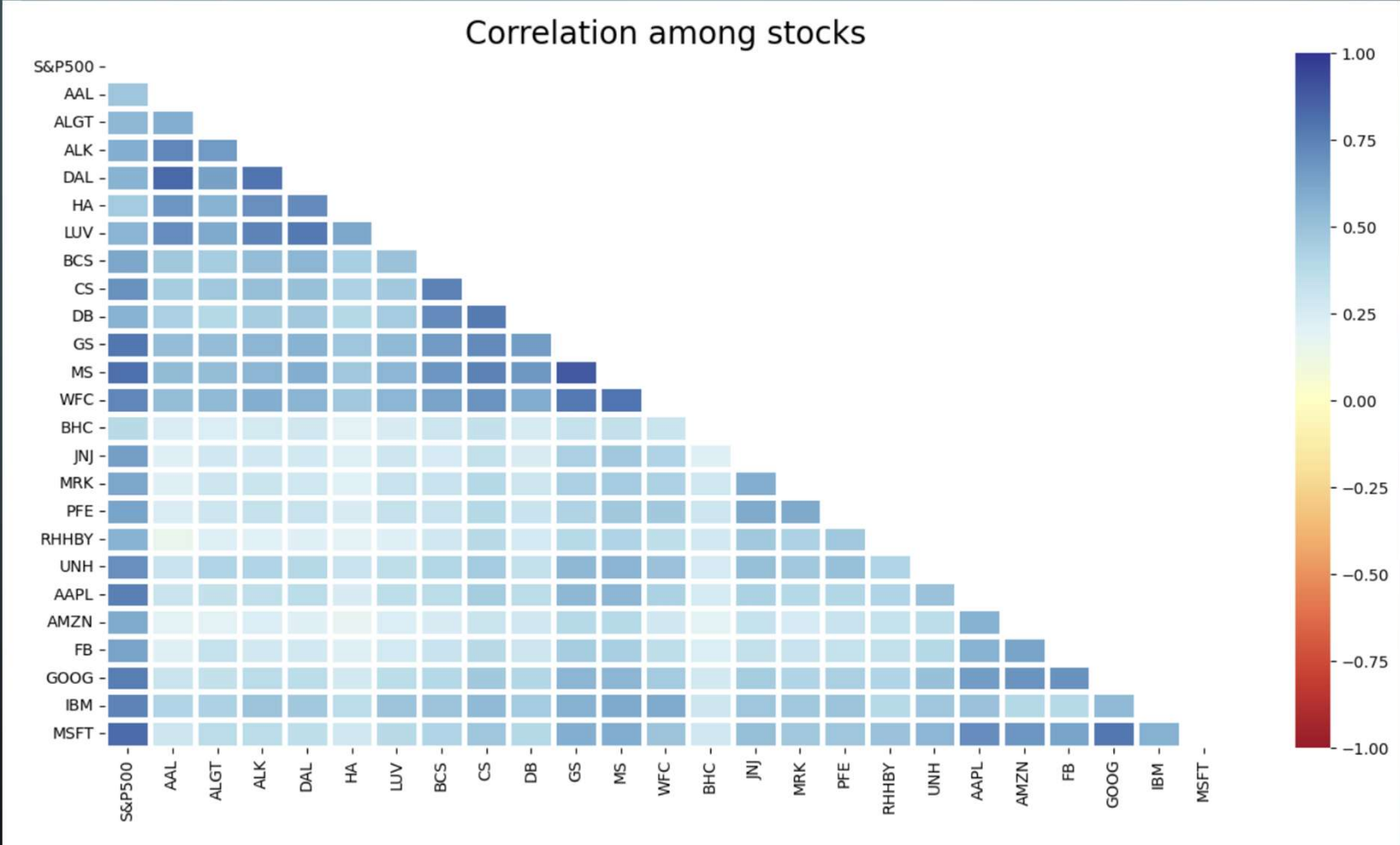
- Pharma/Healthcare has a positive correlation to S&P 500
- Pharma showed positive growth in 2020 during the Coronavirus pandemic
- In general, Pharma stocks have the lowest risk, hence suggested for low risk investors

### Technology

- Technology has a positive correlation to S&P 500
- Most stocks have outperformed the S&P 500 index
- In terms of returns, technology is the strongest sector, hence suggested for investors looking for high returns



## DATA INSIGHTS - CORRELATION



# APPENDIX 1: STEPS FOLLOWED

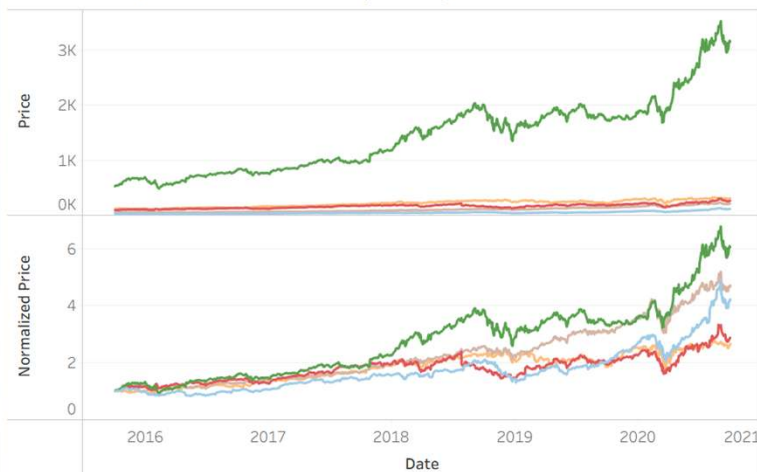
- Reduced data to past 5 years
- Merged individual datasets in one single dataset
- Examined dataset for missing values and outliers
- Performed required calculations: Daily returns, Dispersion from mean, Max/min prices, Risk/Volatility, Sharpe Ration, Correlation
- Compared stocks against each other and within industry vs S&P 500
- Identified the best stocks suited for the portfolios based on the requirements provided
- Tools used: Jupyter Notebook, Tableau

# APPENDIX 2: SUMMARY OF METRICS

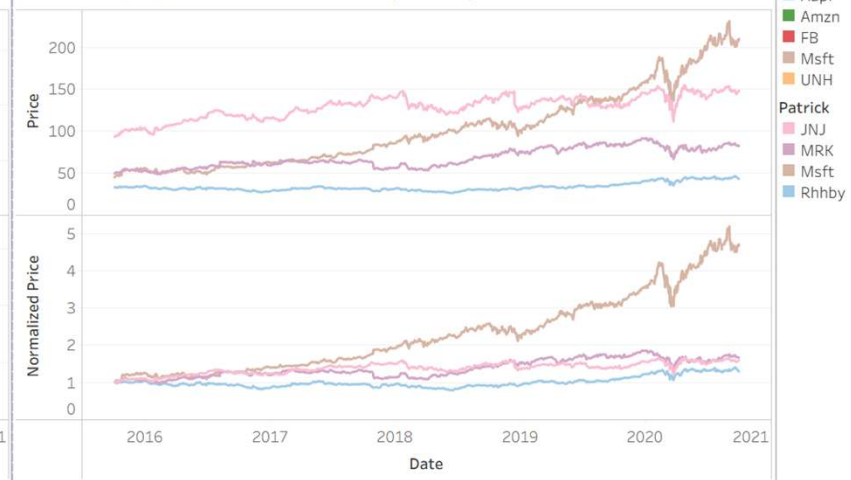
	Avg Daily Returns	Risk	Minimum	Maximum	Annualized Returns	Annualized Risk	Cumulative Returns	Sharpe ratio
<b>S&amp;P500</b>	0.051749	1.208006	-11.984055	9.382774	13.040656	19.176501	74.808459	0.640923
<b>AAL</b>	-0.033611	3.472483	-25.224647	41.097038	-8.470057	55.123957	-68.647960	-0.167260
<b>ALGT</b>	-0.004708	2.910086	-28.329955	29.242785	-1.186343	46.196183	-45.040827	-0.041916
<b>ALK</b>	-0.025574	2.690691	-23.238509	20.307943	-6.444588	42.713402	-54.343762	-0.168439
<b>DAL</b>	0.004181	2.647807	-25.992439	21.017103	1.053570	42.032636	-32.658005	0.007222
<b>HA</b>	0.003424	3.313174	-26.497129	24.583741	0.862866	52.595001	-47.877072	0.002146
<b>LUV</b>	0.024460	2.291330	-15.109442	14.444134	6.163837	36.373735	-2.369175	0.148839
<b>BCS</b>	-0.054837	2.511873	-21.851852	15.104167	-13.819019	39.874742	-66.622252	-0.365370
<b>CS</b>	-0.043672	2.284161	-18.259804	16.344725	-11.005358	36.259932	-58.613533	-0.324197
<b>DB</b>	-0.052886	2.774288	-17.488789	14.024390	-13.327353	44.040452	-68.325792	-0.319646
<b>GS</b>	0.030334	1.989900	-12.705308	17.580307	7.644200	31.588685	14.174524	0.218249
<b>MS</b>	0.057752	2.180951	-15.600000	19.770045	14.553615	34.621529	53.492057	0.398700
<b>WFC</b>	-0.041431	2.034942	-15.867617	14.534653	-10.440560	32.303698	-54.296267	-0.346417
<b>BHC</b>	-0.089683	4.455074	-51.462924	33.744400	-22.600018	70.722113	-91.347439	-0.330166
<b>JNJ</b>	0.045050	1.245905	-10.037876	7.997719	11.352656	19.778133	59.793934	0.536080
<b>MRK</b>	0.051124	1.406695	-8.899025	10.408024	12.883185	22.330584	68.017012	0.543344
<b>PFE</b>	0.020852	1.382614	-7.734635	8.960690	5.254808	21.948310	15.263822	0.205246
<b>RHHBY</b>	0.029271	1.351412	-8.960935	13.011775	7.376346	21.452996	28.868151	0.308877
<b>UNH</b>	0.094126	1.781039	-17.276876	12.798934	23.719727	28.273114	167.361278	0.812423
<b>AAPL</b>	0.132215	1.872922	-12.864695	11.980826	33.318190	29.731721	322.741369	1.095402
<b>AMZN</b>	0.161053	1.896856	-7.922081	13.216371	40.585455	30.111660	504.687770	1.322925
<b>FB</b>	0.104970	2.035420	-18.960922	15.521445	26.452355	32.311293	187.960421	0.795460
<b>GOOG</b>	0.083410	1.652039	-11.100820	10.448543	21.019428	26.225301	140.409630	0.772896
<b>IBM</b>	-0.000172	1.608610	-12.850727	11.301051	-0.043284	25.535898	-15.265686	-0.031065
<b>MSFT</b>	0.138704	1.753947	-14.739031	14.216888	34.953498	27.843048	371.486208	1.228439

# APPENDIX 3: PORTFOLIO RETURNS

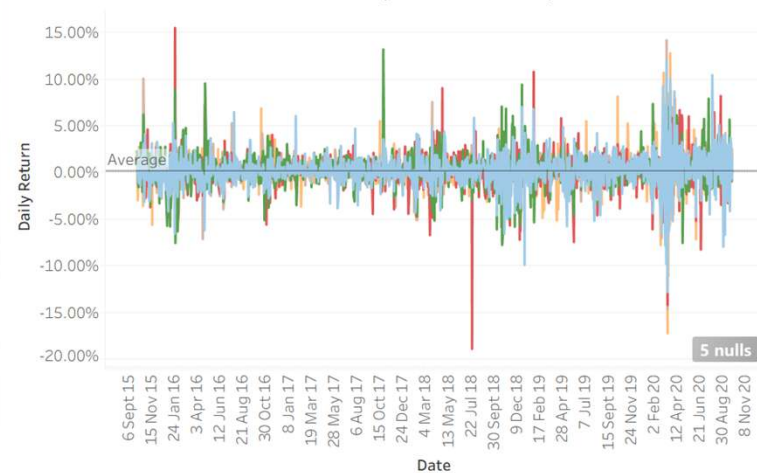
Mr. Peter Jyengar's Portfolio (Prices)



Mr. Patrick Jyengar's Portfolio (Prices)



Mr. Patrick Jyengar's Portfolio (Daily Returns)



Mr. Patrick Jyengar's Portfolio (Daily Returns)

