FINANCIAL & RISK ANALYSIS

BY

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AGENDA

- Objective

- Background

- Key Findings

- Recommendations

- Appendix

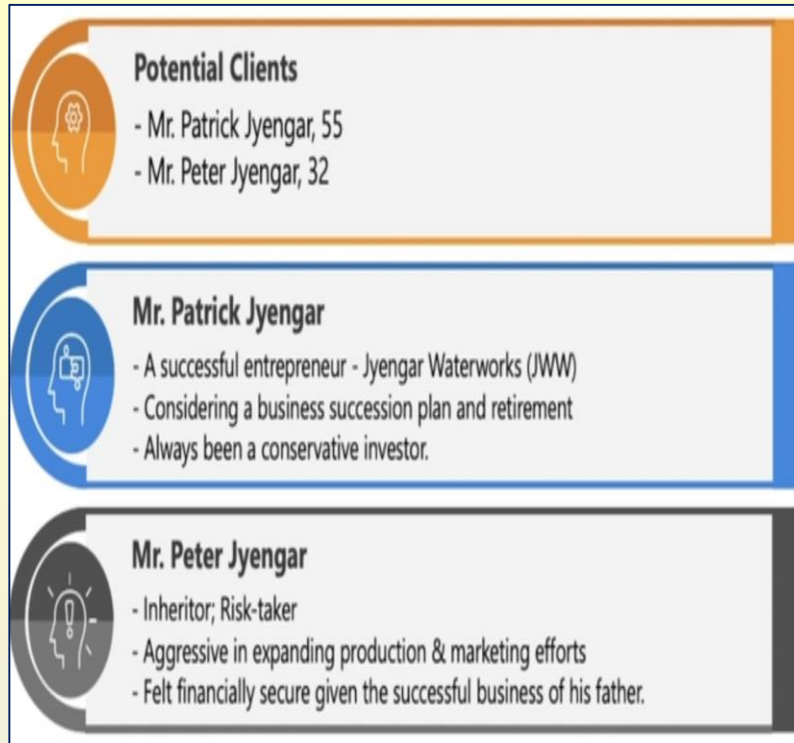 - Data sources

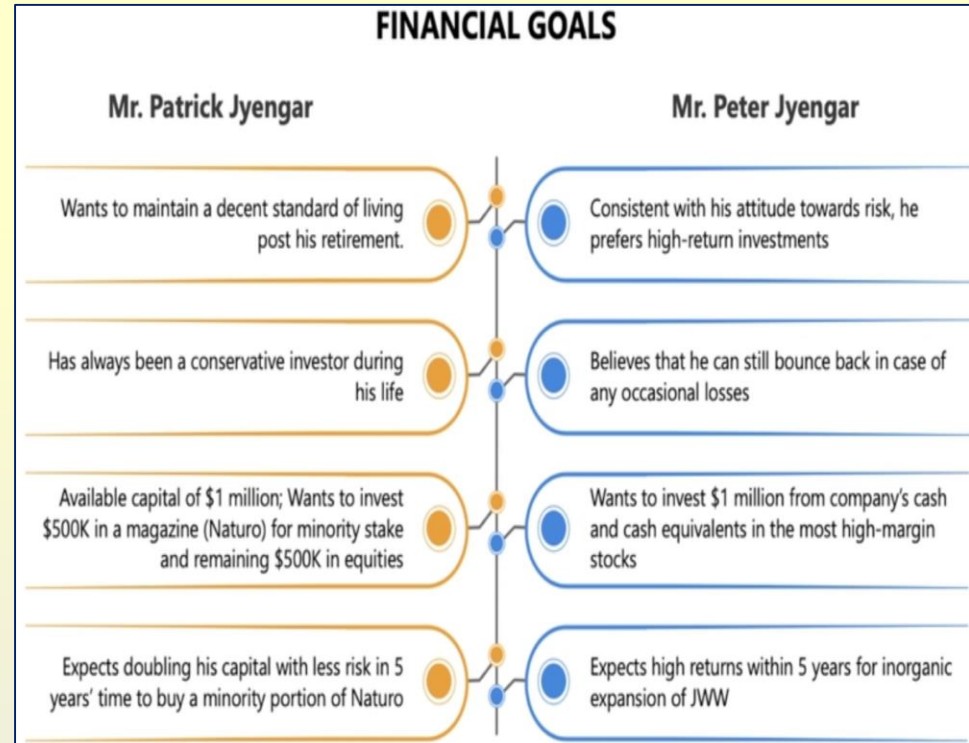 - Data methodology

  - Data model assumption

OBJECTIVE

- Our goal is to increase the return of father and son by analysing following various attributes of stock selected among the 4 sectors (Aviation, Finance, Pharma&Health care, Technology):-

  - For Father
    - Increase the amount invested in stocks ($ 500K) to double in next 5 years
    - Taking moderate risk to double the amount by selecting stocks from the sector considered for investment

  - For Son
    - Increase the amount invested in stocks ($ 1 million) to give maximum returns in next 5 years
    - Taking maximum risk to give maximum returns by selecting stocks from the sector considered for investment

- Improve our shared understanding of the market conditions and Customers

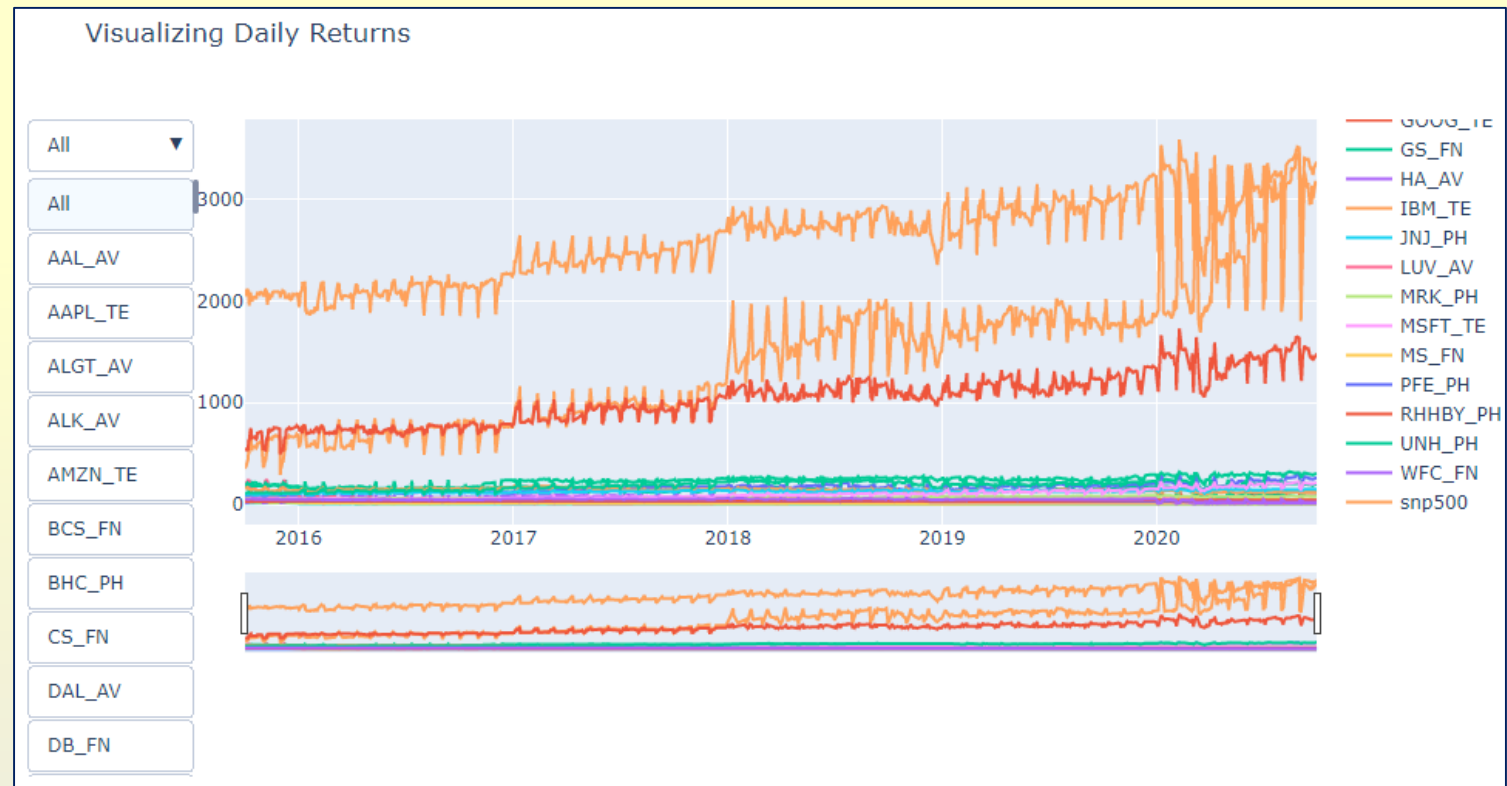- Provide recommendations to father (Mr. Patrick Jyengar) and son (Mr. Peter Jyengar)

Potential Clients
- Mr. Patrick Jyengar, 55
- Mr. Peter Jyengar, 32

Mr. Patrick Jyengar
- A successful entrepreneur - Jyengar Waterworks (JWW)
- Considering a business succession plan and retirement
- Always been a conservative investor.

Mr. Peter Jyengar
- Inheritor; Risk-taker
- Aggressive in expanding production & marketing efforts
- Felt financially secure given the successful business of his father.

Brief snapshot of father(Mr. Patrick Jyengar) & son (Mr. Peter Jyengar

FINANCIAL GOALS

Mr. Patrick Jyengar

- Wants to maintain a decent standard of living post his retirement.
- Has always been a conservative investor during his life
- Available capital of $1 million; Wants to invest $500K in a magazine (Naturo) for minority stake and remaining $500K in equities
- Expects doubling his capital with less risk in 5 years' time to buy a minority portion of Naturo

Mr. Peter Jyengar

- Consistent with his attitude towards risk, he prefers high-return investments
- Believes that he can still bounce back in case of any occasional losses
- Wants to invest $1 million from company's cash and cash equivalents in the most high-margin stocks
- Expects high returns within 5 years for inorganic expansion of JWW

Future financial goals of father & son

Visualizing Daily Returns

- Although the stocks of AMZN and GOOG has shown some kind of fluctuation in the early 2020 due to the covid pandemic but the daily return of AMZN and GOOG is in upward trend and in line with SNP500 market index although daily return of other stocks are almost flat

Closing Price without Normalisation
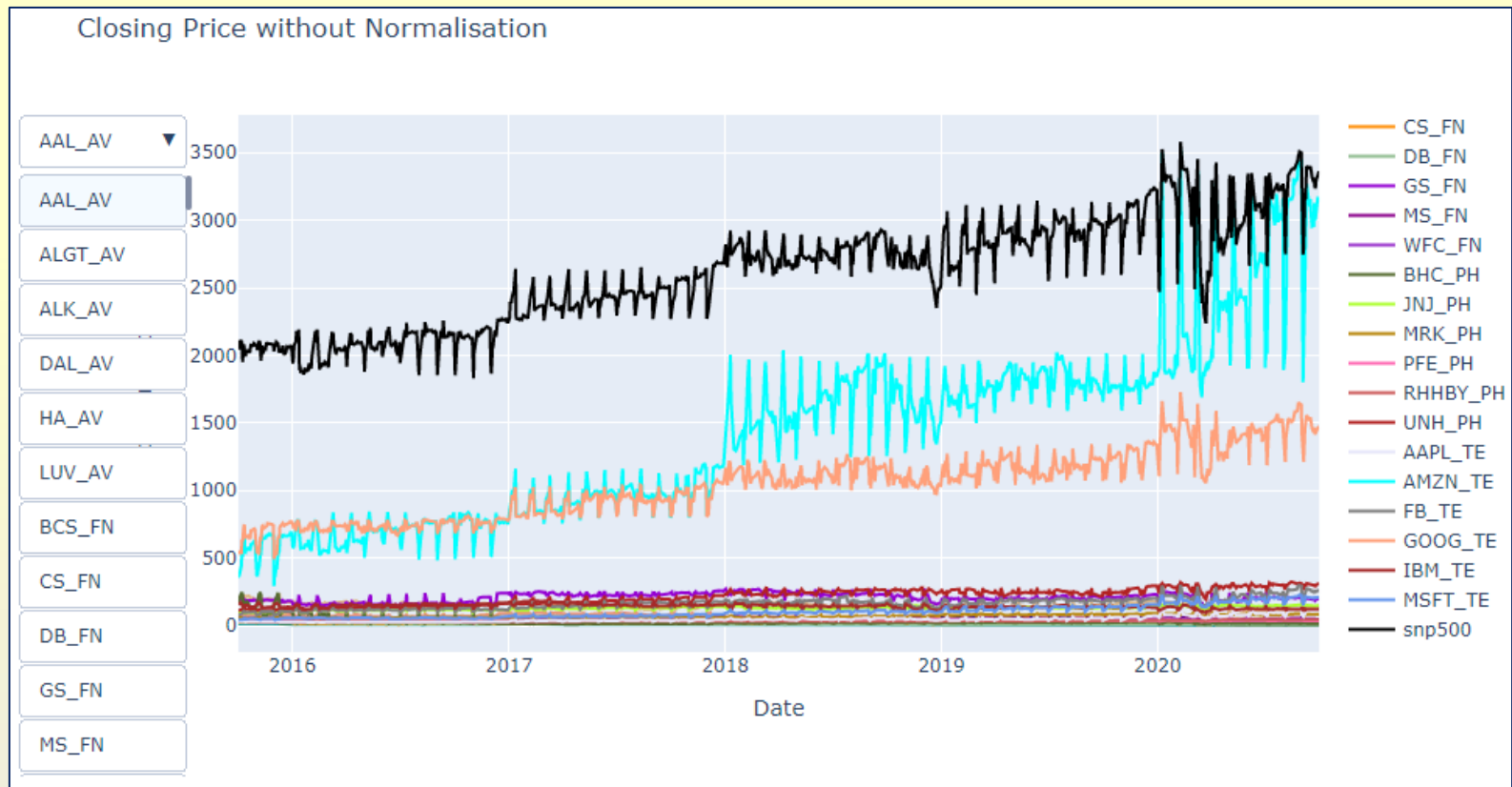
- It is quite evident the two highest stock prices belongs to Amazon(AMZN) and Google(GOOG) from the Technology sector

- However if we see the market index, it took a sharp downward trend during early 2000 mainly due to the outbreak of Covid pandemic in US and also the shares of AMZN and GOOG but others stocks were going flat through out

KEY FINDINGS 3

Closing Price with Normalisation
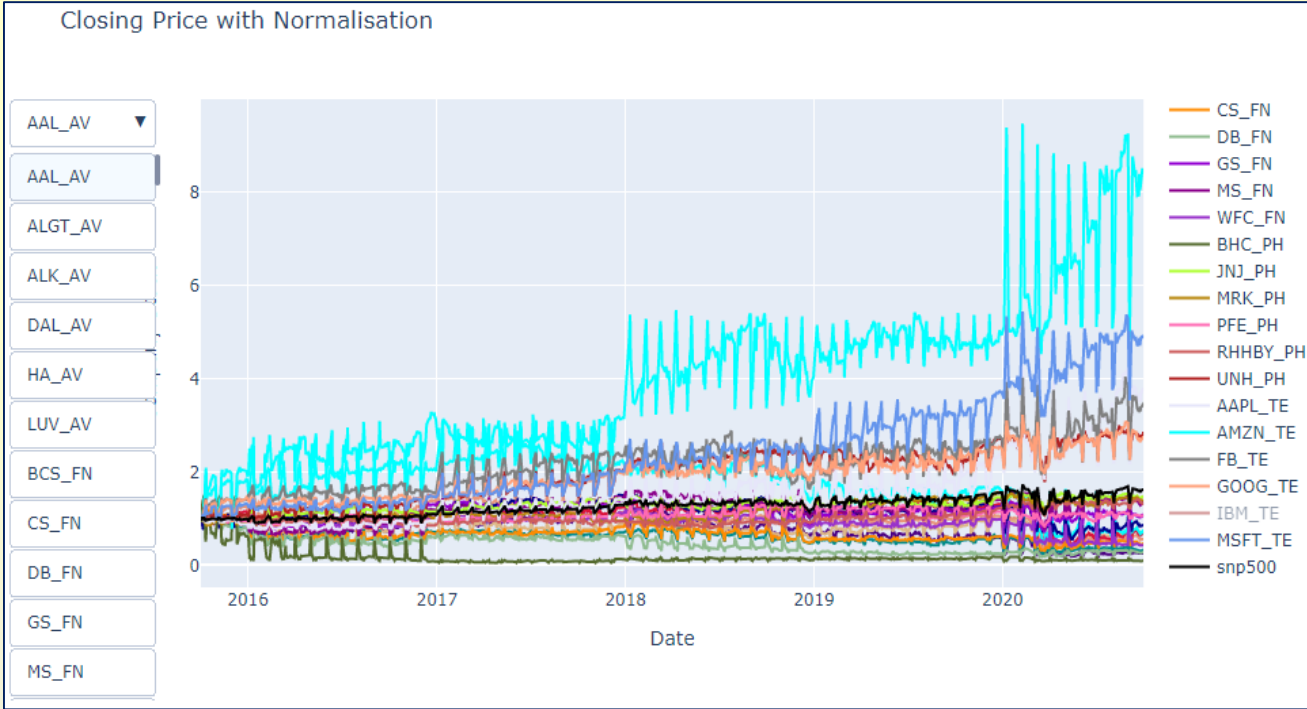
- After normalization, here the stocks from Aviation sector and Finance sector are not performing as per the market trend(SNP500) rather they are showing some negative trend. Unlike other Finance stock, Morgan Stanley (MS) has performed well and has followed the Market trend though on the lower side.

- Stocks from Pharmaceutical sector like JNJ and MRK is more or less following the market trend, stocks of RHHBY is performing below the market trend but still there is increase in value. Similar is the case with PFE, there is a nominal increase in the price of stock throughout the period. BHC is the worst performing stock in the pharma sector while UNH is the best performer stock in pharma

- Technology sector is the best performing stock when compared with the market index in which AMZN is the best performer
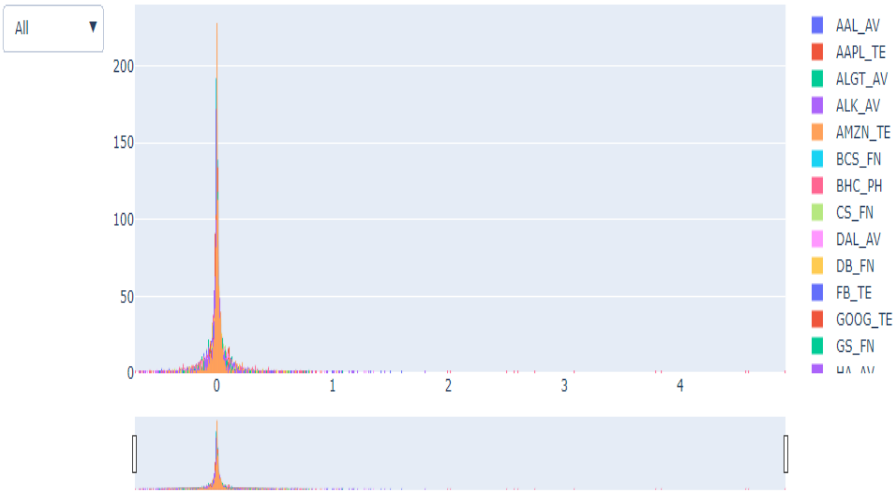
Relative Strength of the stocks wrt snp500
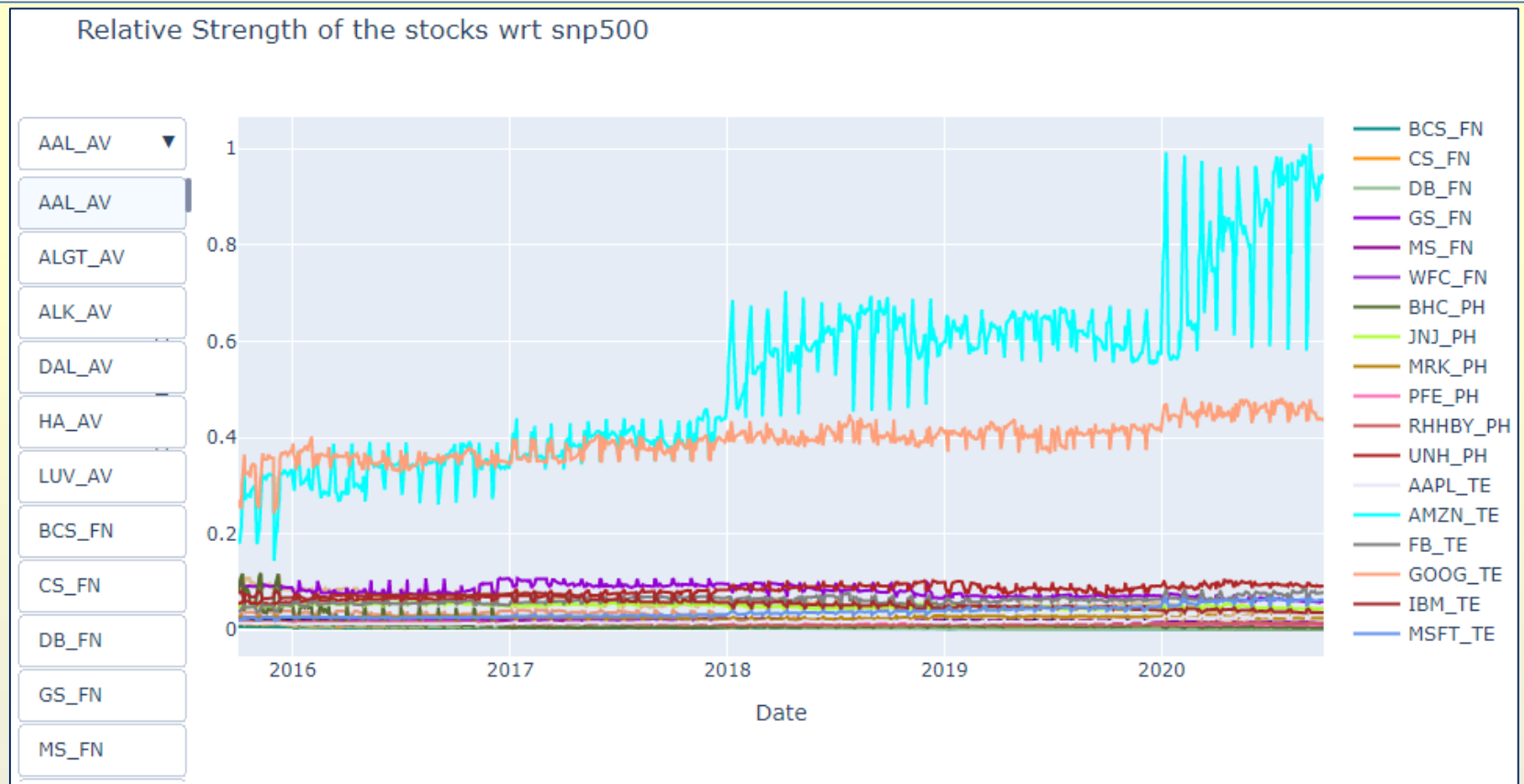
- All the stocks in Aviation , Finance are showing either downward or no trend where as most of the stocks in Technology except IBM are showing an upward trend

- In Pharma sector except UNH which has upward trend, others are showing either downward or no trend

Stock Price Dispersion from Mean

- This histogram can be used to measure the risk and volatility of a stock. The more dispersion in the histogram, the more volatile a stock is or in other words more risk is involved.
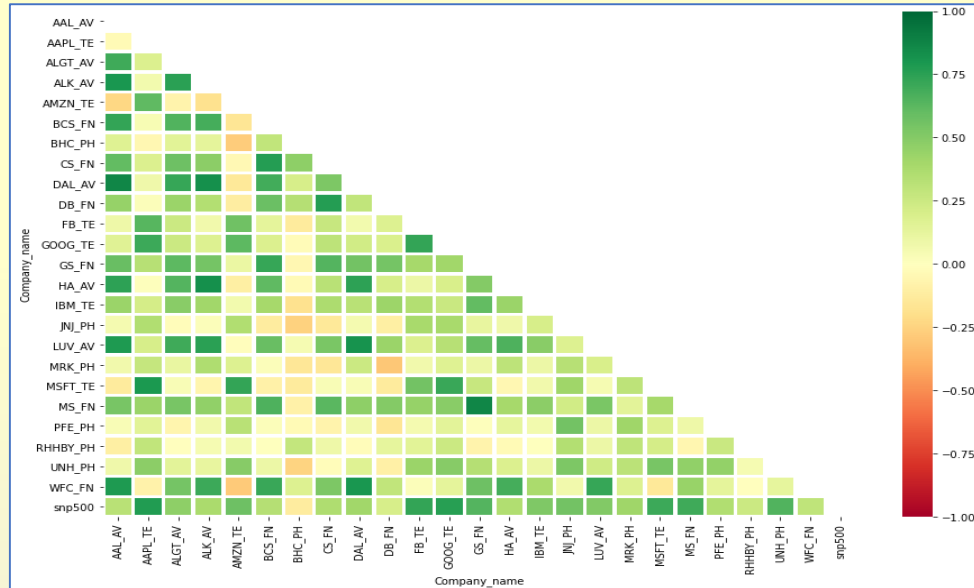
- From the above correlation matrix, I can observe that GOOG has high correlation with MSFT which are from the Technology sector
- Also JNJ has high correlation with RHHBY and UNH which are from the Pharmaceutical and Health care sector
- Also most of the aviation stock as represented by suffix _AV are more or less correlated to Finance sector as represented by suffix _FN
- Also highest mean stocks such as AAPL and AMZN from Technology stocks are highly correlated to each other

```
AAL_AV -0.7442247605457807
AAPL_TE 2.796426874165772
ALGT_AV -0.3309131472061466
ALK_AV -0.43965122657253053
AMZN_TE 7.441635335120644
BCS_FN -0.6763565891472869
BHC_PH -0.9053189573716275
CS_FN -0.5377839592025961
DAL_AV -0.325242718446602
DB_FN -0.7237750739888195
FB_TE 2.4831757818014153
GOOG_TE 1.744505556651799
GS_FN 0.08891419147067814
HA_AV -0.297164667393675
IBM_TE -0.23265641060363795
JNJ_PH 0.4836074535846031
LUV_AV -0.1434444756382931
MRK_PH 0.4095157148518509
MSFT_TE 3.937324222409588
MS_FN 0.3371127765486728
PFE_PH 0.07467053735458062
RHHBY_PH 0.2984531301652067
UNH_PH 1.8610625506005092
WFC_FN -0.5691772035917171
snp500 0.6257450035697938
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Cumulative Returns from each Stock

- On the basis of the Cumulative Return it is evident that there are 6 Stocks where Cumulative returns are very high than Cumulative Return of **SNP 500**.These are **AAPL,AMZN,FB,GOOG,MSFT,UNH**. All these 5 companies are from Technology Sector and since most of the Technology companies have Work from Home facility prior to Covid-19, so it is expected that due to covid while many other Sectors have faced a lot of decline in stock prices while Tech companies have performed in a positive manner and there was very less interruption in work for these companies. The sixth company is a Pharma Company and obviously Post-Covid period Pharma companies are on a rise.

- Moreover, there are **5** other stock which are giving Positive cumulative Returns below than that of **SNP500**.These Companies are **JNJ, MRK, RHHBY, PFE and MS**. The first 4 companies belong to Pharma Sector and Post Covid period, the Pharma sector is on boom considering increased sales and production of Vaccine related medicine and also Post covid medical treatment of higher number of patients, the sector is in demand and so is the stock prices of these companies. Still these company's stocks are not performing according to the market trend i.e; the performance index **SNP500**. The fifth one is a Finance company which is providing cumulative Return may be because it has performed better even during Pre -Covid Times and the internal financial health of the company is strong enough to absorb the risks arising out of financial condition post Covid period

- On the other hand ,there are 12 Companies whose stocks are providing negative cumulative returns. These are **Aviation sector(AAL,ALGT,ALK,DAL,HA,LUV),Finance Sector(BCS,BHC,CS,DB,WFC), Technology sector(IBM)**. The first 6 companies belong to Aviation sector and it is quite evident in the covid period that aviation sector is the most hardly hit and this sector will take some time to recover. As I have considered the past trend of 5 years to predict the future in the next 5 years and since these stocks have shown negative return, it is unlikely possible that these stocks will perform in the near future. So I have not considered these stocks. The next 5 companies belong to Finance sector. Post covid there has been a halt on the economic activities worldwide. So these finance companies are providing negative cumulative return. The last company belongs to Technology sector and unlike other company stocks taken in this project, it is providing negative cumulative return. This might be due to some past trend of the stocks of IBM. May be there is some issues before Covid which carried on or even worsened after Covid. **So I have concluded that I will exclude these stocks while deciding the portfolio of the investors**

Company_name	mean	std	Annualized_Return	Annualized_Risk	Sharpe_Ratio
RHHBY_PH	0.100739	4.006363	25.386188	63.599041	0.399042
JNJ_PH	0.109541	3.899605	27.604418	61.904314	0.445800
PFE_PH	0.113919	4.613907	28.707464	73.243498	0.391843
snp500	0.119236	3.960603	30.047473	62.872616	0.477791
MRK_PH	0.152114	4.893995	38.332723	77.689759	0.493311
IBM_TE	0.163181	6.137537	41.121710	97.430385	0.421986
GOOG_TE	0.240108	5.589784	60.507279	88.735075	0.681802
UNH_PH	0.268137	5.944337	67.570435	94.363430	0.715986
GS_FN	0.286838	7.515768	72.283141	119.309118	0.605785
MSFT_TE	0.333351	6.202550	84.004408	98.462421	0.853086
WFC_FN	0.343769	10.207636	86.629701	162.041199	0.534569
MS_FN	0.360000	8.093724	90.720077	128.483881	0.706023
LUV_AV	0.403903	9.395907	101.783582	149.155392	0.682349
CS_FN	0.405908	10.032113	102.288724	159.254855	0.642249
FB_TE	0.435557	8.142385	109.760374	129.256357	0.849110
BCS_FN	0.490348	11.144448	123.567614	176.912626	0.698425
AAPL_TE	0.513044	8.738694	129.287141	138.722474	0.931930
DB_FN	0.548108	12.158629	138.123315	193.012254	0.715581
AMZN_TE	0.585944	8.656870	147.657807	137.423554	1.074418
ALK_AV	0.610964	12.101384	153.962859	192.103512	0.801419
DAL_AV	0.624991	12.333901	157.497762	195.794612	0.804365
ALGT_AV	0.665337	12.374890	167.664883	196.445286	0.853456
AAL_AV	0.849191	15.429248	213.996062	244.931714	0.873666
HA_AV	0.991366	15.590668	249.824168	247.494188	1.009384
BHC_PH	3.132928	37.591593	789.497963	596.748037	1.322988

Final Statistics for each Stock

- Here I have done the descriptive analysis of all the 24 stocks for the last 5 years in order to decide the portfolio of Mr. Patrick Jyengar (Father) and Mr. Peter Jyengar (Son) as per the expected return of both father and son

- Based on the analysis of Annualized return, Annualised Risk and Sharpe Ratio, I have selected stocks of Mr. Patrick and Mr. Peter based on the risk taking capability of each one of them

RECOMMENDATION I

- Based on the descriptive analysis, I have chosen 2 stocks from Pharmaceutical and Healthcare sector i.e; JNJ and RHHBY and 2 stock from Technology sector i.e; MSFT and GOOG for Mr. Patrick Jyenger(Father)

- Predicted return of Mr. Patrick Jyenger will be $13,07,986 after a period of 5 years on an investment of $5,00,000 on the chosen portfolio.

- The selected stocks are providing good Cumulative Returns and average Annualized Risk is around 58.00 % while Market trend is around 63.00%. As he is old/retired and risk averse capability is less, so I have chosen the stocks which have average Annualized risk a bit higher in comparison to the market trend(S&P500) so that he can achieve his objective . The sharpe ratio of the portfolio choosen for Mr. Patrick Jyenger is 0.82 which is way higher than that of the Market Trend(S&P500) i.e; 0.47. A high Sharpe ratio suggests that these stocks are highly preferred by the investors

RECOMMENDATION II

- Based on the descriptive analysis, I have choosen 2 stocks from Pharmaceutical and Healthcare sector i.e; JNJ and UNH and 2 stock from Technology sector i.e; MSFT and AMZN for Mr. Peter Jyenger(Son)

- Predicted return of Mr. Peter Jyenger will be $44,30,907 after a period of 5 years on an investment of $10,00,000 on the chosen portfolio.

- The selected stocks are providing good Cumulative Returns and average Annualized Risk is around 178.00 % while Market trend is around 63.00%. As he has more a risk taking capability person, so I have chosen the stocks which have high risk and high return in comparison to the market trend(S&P500) and also at the same time diversified the portfolio so that he can achieve his objective . The sharpe ratio of the portfolio choosen for Mr. Peter Jyenger is 1.01 which is way higher than that of the Market Trend(S&P500) i.e; 0.47. A high Sharpe ratio suggests that these stocks are highly preferred by the investors

Data Sources :-

- Here is a snapshot of our Data Dictionary

  - Name of Stocks of all the 4 sectors namely Aviation, Finance, Pharma & Healthcare, Technology and SNP500 market index

  - Closing Price of each stocks considered to derive calculations namely Daily return, Cumulative Return, Relative Strength in comparison with S&P500, Normalized Return, Annualized Risk, Annualized Return, Sharpe Ratio and Standard deviation

  - Stocks of last 5 years starting from 1st Oct,2015 to 30th Sep,2020 considered to select the stocks for Mr. Patrick Jyengar and Mr. Peter Jyengar based on the risk taking capabilities and the returns after 5 years

- I have used the following data source

  - Dataset.rar, Aviation.rar, Finance.rar, Pharma_healthcare.rar, Technology.rar, S&P500.csv

Continued…….

Data Methodology :-

- I have conducted a thorough analysis of final dataset by combining the all 4 sector stocks with S&P500 stocks. The process included :-

  - Cleaning the data set by dropping the NULL values from the dataset

  - I did EDA by plotting different graphs in case of Normalization of stocks, Without Normalization and Relative Strength w.r.t S&P500, Stock Dispersion from Mean, Correlation of stocks with each other

  - I have created various visualization to derive insights for further recommendation

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Data Assumption :-
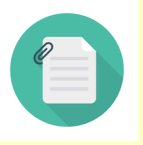
- It is assumed that by considering the Annualized Return, Annualized Risk, Sharpe Ratio and comparing values with S&P500 market index, 4 stocks were chosen for each of the investors which can fulfill the desired return of the investors

- In order to diversify the portfolio, 2 stocks each from Technology and Pharma were chosen for Mr Patrick and Mr. Peter Jyengar.

- By investing in equal proportion in each of the stocks, the desired returns were predicted by calculating the returns after 5 years for Mr Patrick and Mr. Peter Jyengar.

- Last 5 years calculation were considered to predict the return for the next 5 years

- I have dropped the Missing values from the final dataset to calculate descriptive analysis and select ideal portfolio of both Mr Patrick and Mr. Peter Jyengar.