Group 3 Portfolio

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Summary

This report will analyze how we formed a portfolio of ten stocks and one T-bill. This portfolio will conduct two parts. The first half of this report will focus on the key statistics, analyst mean recommendations, and alpha of each stock by using tables and the CAPM model. The second half of this report will examine the optimal weights, return and risk, sharpe ratio, as well as the efficient frontier and capital allocation line on each stock and T-bill. The ten stocks we chose are Apple, Microsoft, Tesla, Google, Disney, Netflix, ExxonMobil, Coca-Cola, Costco, and Target. The T-bill we chose is the 4-week (1 month) T-bill. Our goal for this project is to give us an opportunity to apply asset allocation knowledge into the real world.

Stock's Beta

We created a table to analyze the beta of each stock. For each stock, we used the 5 years monthly data from Yahoo Finance. We are able to see a high systematic risk when the beta is bigger than 1. Therefore, Tesla has a high systematic risk.

10 Stocks	Beta
AAPL	1.19
MSFT	0.91
TSLA	2.08
GOOGL	1.06
DIS	1.16
NFLX	0.97
XOM	1.16
KO	0.66
COST	0.67
TGT	1.06

Key Statistics

Here we also created a table to examine the key statistics of each stock. For each stock, we used the 5 years monthly as well as current data from Yahoo Finance.

	Market Cap	Beta	Price/book	Forward P/E	PEG Ratio	ROA	Profit Margin
AAPL	2.70T	1.19	37.50	27.47	3.19	19.88%	26.58%
MSFT	2.10T	0.91	13.11	25.77	1.91	15.25%	38.50%
TSLA	1.02T	2.08	33.72	94.34	2.75	7.14%	10.25%
GOOGL	1.68T	1.06	6.66	21.83	0.88	14.49%	29.51%
DIS	237.54B	1.16	2.64	30.49	1.02	1.69%	4.22%
NFLX	154.88B	0.97	9.77	31.85	1.64	9.23%	17.23%
XOM	371.14B	1.16	2.20	10.52	1.94	4.98%	8.26%
KO	281.86B	0.66	12.26	26.45	2.89	7.79%	25.28%
COST	261.68B	0.67	13.48	45.45	4.67	8.56%	2.62%
TGT	109.69B	1.06	8.55	16.23	1.82	10.78%	6.55%

Analyst Mean Recommendations

Now let's examine the analyst mean recommendation for each stock. Below you will see that we created a table of the analyst mean recommendation and the mean price target of each stock.

Stock	Industry	Analyst Mean Recommendation	Price Target	Stock P/E Ratio (ttm)	Average Industry P/E Ratio	Stock P/S Ratio	Average Industry P/S Ratio
AAPL	Computer	Strong Buy	$192.09	26.57	27.96	6.712	4.95
MSFT	Software	Strong Buy	$363.09	29.56	25.45	11.13	4.77
TSLA	Domestic Automotive	Buy	$980.41	177.67	33.71	17.467	2.35
GOOGL	Internet Services	Strong Buy	$3,329.43	20.34	25.64	5.758	5.2
DIS	Media Conglomerate	Strong Buy	$184.95	66.33	26.66	2.843	4.77
NFLX	Broadcast, Radio and Television	Buy	$302.00	16.94	30.48	2.972	3.96
XOM	Oil and Gas	Buy	$91.93	15.82	31.49	1.163	1.91
KO	Beverages	Strong Buy	$70.00	28.72	25.16	6.889	4.02
COST	Retail – Discount Stores	Strong Buy	$612.63	42.85	13.96	1.119	1.28
TGT	Retail – Discount Stores	Strong Buy	$278.99	14.1	19.08	1.042	1.42

Explanation of Each Stock

All of these stocks are mega cap stocks as they all exceed 10 billion in market cap (NFLX , with the lowest market cap in the portfolio, has a market cap of more than 84 billion. Almost all of

these stocks are growth stocks, as their P/E ratios exceed that of their competitors in their respective industries. KO is the only value stock in this portfolio, as it pays a significant dividend. The tech stocks are certainly hot stocks, as seen in their growth post-pandemic, while the oil and retail stores are less so, albeit have also seen significant gains in the past 6 to 12 months, due to the reopening and the war in Ukraine. AAPL, MSFT, and TSLA have higher P/E ratios than their competitors, while GOOGL, DIS, and NFLX have lower P/E ratios than their competitors.

Alpha of Each Stock

Stock	Beta (5y)	Annual return on investment	Expected Rate of Return (Rf = 0.88%, $E(r_i)$ = 10%) in percentage]]	Alpha (Jensen)
AAPL	1.19	23.07	11.73	11.34
MSFT	0.94	17.98	9.45	7.59
TSLA	2.12	64.23	20.21	44.02
GOOGL	1.13	25.77	11.19	14.58
DIS	1.21	0.63	11.92	–11.29
NFLX	1.28	14.17	12.55	1.62
XOM	1.05	8.15	10.46	–2.31
KO	0.66	13.35	6.90	6.65
COST	0.69	18.34	7.17	11.17
TGT	1.06	24.80	10.55	14.25

Optimal Weight on Each Stock

Here we begin part 2 of our portfolio. We use CAL and efficient frontier to determine the optimal weights of our 10 stocks. Below you will see a table as well as a graph of the efficient frontier and capital allocation line:

Summary Information					
Stocks	Expected Return	St Dev (Risk)	Min Weight	Max Weight	(Optimal) Weight
AAPL	11.73%	2.04%	5.00%	15.00%	8.65%
MSFT	9.45%	2.23%	5.00%	15.00%	6.18%
TSLA	20.21%	3.83%	5.00%	15.00%	5.00%
GOOGL	11.19%	2.48%	5.00%	15.00%	14.23%
DIS	11.92%	2.04%	5.00%	15.00%	10.37%
NFLX	12.55%	5.28%	5.00%	15.00%	15.00%
XOM	10.46%	2.14%	5.00%	15.00%	7.73%
KO	6.90%	1.28%	5.00%	15.00%	12.28%
COST	7.17%	1.47%	5.00%	15.00%	11.68%
TGT	10.55%	2.38%	5.00%	15.00%	8.88%

the Efficient frontier and Capital allocation line
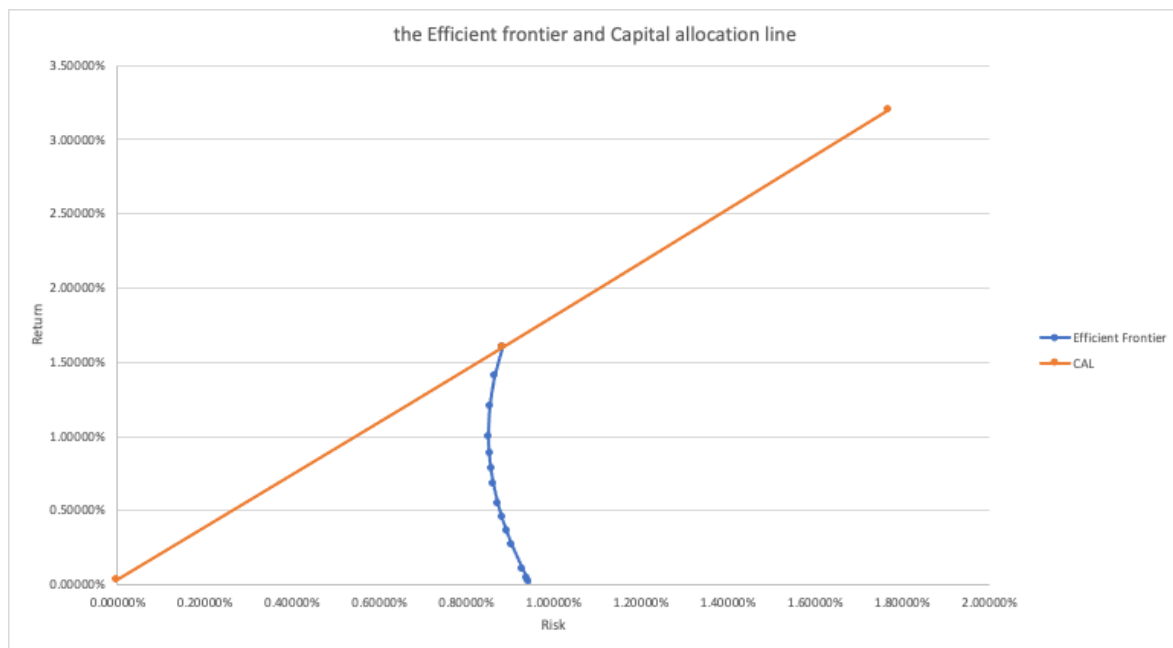
Risky Portfolio

For each stock, we used the 5 years monthly data from which we are able to calculate the risky portfolio of return and risk. Portfolio risk reflects the overall risk for a portfolio of investments which is the combined risk of each individual investment in a portfolio. We also calculate the value for an equal weight portfolio for annual risk, annual return, and annual variance. In Equal weight portfolio, yearly average return for 10 stocks is 31.59% where yearly risk for those stocks are 101.48%.

	Avg. Return	Yearly Avg. Ret	Risk/SD	Yearly Risk	Variance	Yearly Var
APPL	3.50%	42.01%	0.0846526459	1.0158317515	0.0072896234	0.0874754808
COST	2.45%	29.45%	0.0513311914	0.6159742979	0.0026803203	0.0321638445
DIS	0.96%	11.48%	0.0803863465	0.9646361583	0.0065733778	0.0788805347
GOOG	2.41%	28.97%	0.0643825590	0.7725907087	0.0042165813	0.0505989767
KO	1.02%	12.29%	0.0530550877	0.6366610528	0.0028633740	0.0343604891
MSFT	3.09%	37.11%	0.0521063432	0.6252761191	0.0027618825	0.0331425909
NFLX	2.92%	35.06%	0.0955296146	1.1463553755	0.0092832505	0.1113990060
TGT	2.77%	33.18%	0.0832181337	0.9986176050	0.0070446587	0.0845359053
TSLA	6.92%	83.03%	0.1956225717	2.3474708610	0.0389279869	0.4671358436
XOM	0.28%	3.34%	0.0853980408	1.0247764904	0.0074185637	0.0890227650
	Avg. Return	Yearly Avg. Ret	Risk/SD	Yearly Risk	Variance	Yearly Var
Equal Weight Portfolio	2.63%	31.59%	8.46%	101.48%	0.0089059619	0.1068715437
Target Return	30%					

Optimal Weight on T–bill & Risky Portfolio

Now let's calculate the optimal weight on T-bill and risky portfolio. We will use the 10 stocks and the 4-week T-bill. Here is our calculations:

$Y = (E(rp) - rf)/(A \cdot s^2)$, given that A = 4
Y = the weight of optimal risky portfolio
1 - y = the weight of T-bill

E(rp) = expected return of 10 stocks = 10.750%
4-week T-bill rate (risk free rate) = rf = 0.45%
s = standard deviation = $(v)^{(1/2)}$ = 39.56%

Y = (10.750 - 0.45)/(4*39.56^2) = 0.0016 = 0.16%
1 - 0.0016 = 0.9984 = 99.84%

Therefore, 0.16% is the optimal weight on risky portfolio and 99.84% is the optimal weight of T-bill.

Portfolio Return, Risk, & Sharpe Ratio

Portfolio Statistics	
Sharpe Ratio	22.12%
Expected Return	10.750%
Standard Deviation	39.56%
Total Weight	100%

VaR of the Risky Portfolio

The VaR of the risky portfolio is -1.35852. The formula below illustrates how to calculate the VaR of a risky portfolio.

VaR (risky portfolio) = return of risky portfolio - 1.65 * standard deviation of the risky portfolio
VaR (risky portfolio) = 0.3159 - (1.65)(1.0148) = -1.35852

Detailed Explanation of How the Terms of the VaR Formula are Calculated and What They Represent
Return of Risky Portfolio
The return of the risky portfolio value was obtained from the "Risky Portfolio" section of the report. It is the yearly average return value for an equal weight portfolio, which is 31.59% or 0.3159 in decimal form. In order to calculate the return of the risky portfolio, first the average

return of each individual stock was calculated by taking the average of the 5 year, monthly return data. Then, that average was multiplied by 12 to get the yearly return of each individual stock. Finally, the sum of the products of the yearly returns and weight of each stock was taken to get the value for the return of the risky portfolio.

Standard Deviation of the Risky Portfolio

The standard deviation of the risky portfolio value was also obtained from the "Risky Portfolio" section of the report. It is the yearly risk value for an equal weight portfolio, which is 101.48% or 1.0148. In order to calculate the standard deviation of the risky portfolio, first the risk or standard deviation of each individual stock was calculated by applying the 5 year monthly return data of each stock to the standard deviation function on Microsoft Excel. Then, the risk values were multiplied by the square root of 12 to get the yearly risk values of each individual stock. Then, the covariances of each pair of stocks was calculated and then the diagonal sum of the covariances was taken in order to calculate the portfolio variance. Finally the square root of the portfolio variance was taken in order to get the value of the standard deviation of the risky portfolio.

The Coefficient, 1.65

The coefficient, 1.65 represents that there is 95% confidence that the risky portfolio will not have a larger loss than the VaR calculated for the risky portfolio.

Conclusion

Our goal for this project is to give us an opportunity to apply asset allocation knowledge into the real world. We illustrated the key statistics of each stock, where AAPL, MSFT, and TSLA had higher P/E ratios than their competitors, while GOOGL, DIS, and NFLX had lower P/E ratios than their competitors. We analyzed the complete portfolio as well as examined the optimal weight of our 10 stocks and the 4-week T-bill by utilizing the past 5 years monthly data. Therefore, this complete portfolio help us gain a better understanding through the evaluation of each stock.

References

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https://tradingeconomics.com/united-states/4-week-bill-yield