PROJECT 1 - ASSET ALLOCATION

OBJECTIVE:

To show that Markowitz Mean-Variance Optimization Produces a Risk-Return Pair that is superior than that produced by a Naïve diversification strategy. The optimum Portfolio(tangency) will be the one that has the highest Sharpe Ratio- ***maximum excess return over the risk-free rate per unit of risk***. We also compare the performance of the 2 portfolios with that of the NIFTY index over the same period.

We carry out this exercise with a portfolio of 5 stocks. Allocations after optimization are given below:

STOCKS	APPLE	ADANIPOWER	GOOGLE	HERO-MOTO-CORP	SBI
EQUAL-WEIGHTS	0.2	0.2	0.2	0.2	0.2
EFFICIENT -WEIGHTS	0.27107	0.22429	0.02560	0.00946	0.46956

PORTFOLIO	RETURN	RISK	SHARPE RATIO
NAIVE	27.944%	20.969%	1.26
EFFICIENT	33.288%	21.589%	1.42

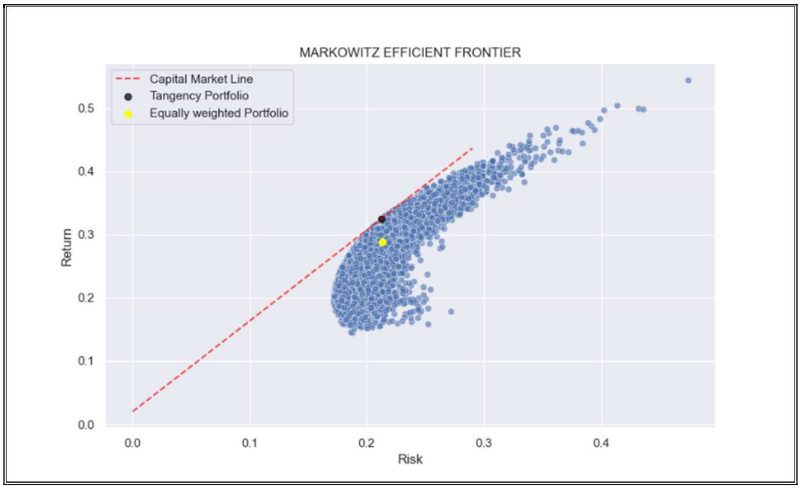

Figure: Summarizes the above optimization in a graph

COMPARISON WITH THE BENCHMARK – NIFTY-50 INDEX

PORTFOLIO	CUMULATIVE RETURN	CAGR	MAX. DRAWDOWN	MAX. DRAWDOWN DAYS	AVERAGE DRAWDOWN	AVERAGE DRAWDOWN DAYS
NAIVE	81.11%	16.2%	-16.97%	400	-4.43%	34
EFFICIENT	108.11%	20.35%	-26.22%	353	-4.72%	33
NIFTY - 50	48%	10.42%	-28.91%	386	-2.42%	34

CONCLUSION:

1. The Efficient portfolio provides a superior return compared to the "Naive" portfolio for almost the same level of risk. However, this is a one period exercise and the portfolio needs to be rebalanced in the next period.
2. Quantitatively, the efficient portfolio surpasses the Naïve Portfolio in almost all metrics as mentioned in the table above.
3. Comparing the Efficient Portfolio with the index, we see that the Portfolio has a cumulative return of 108.11% compared to 48% of the index. Even though the Portfolio and the index have the almost the same average draw down days, the portfolio has a greater average drawdown, which shows the superior performance of the portfolio.

NOTE: Market data for the above exercise from 2021-04-05 to 2023-12-31. Source : Yahoo Finance.
The risk-free rate has been assumed to be 2%
*** The stocks have been chosen based on their recent performance.