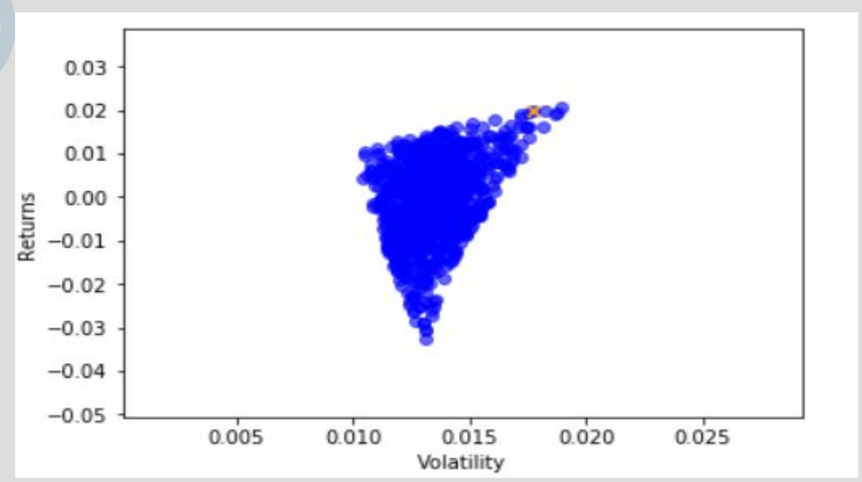
Dynamic Optimization of NIFTY 50

Abstract/Introduction

- The NIFTY 50 is the flagship index on the National Stock Exchange of India Ltd.(NSE). The NIFTY 50 covers major sectors of Indian economy and offers investment managers exposure to the Indian market in a single portfolio

  NIFTY 50 is a 50 stock, float-adjusted market-capitalization weighted index for India.

- Through Harry Markowitz's Modern Portfolio Theory, and using the efficient frontier, we wish to showcase portfolios more efficient in terms of returns than the NIFTY 50 with the same constituents.

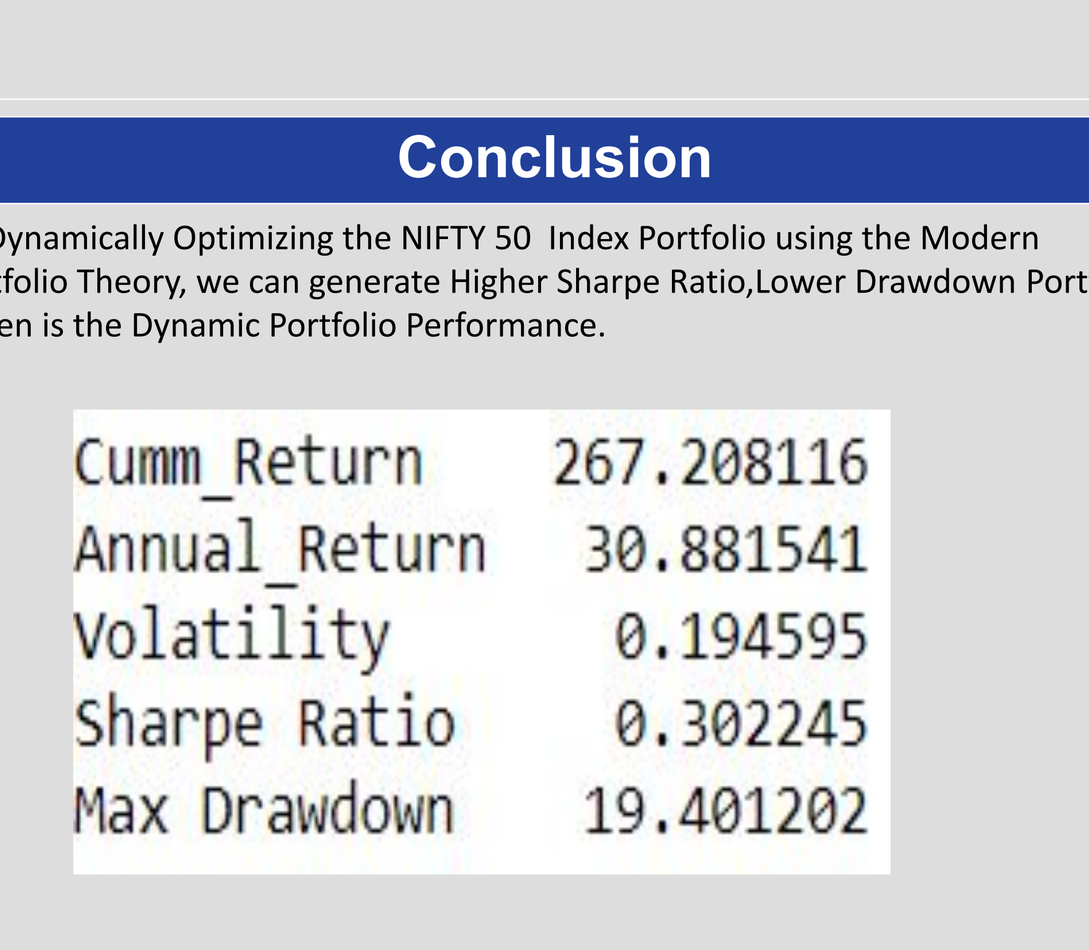


Results

- NIFTY 50 returns used as the benchmark for comparison.
- The Results we obtained from our Dynamic Portfolio are as follows -

1. Sharpe Ratio 0.3 as compared to NIFTY50 Sharpe Ratio of 0.13
2. Maximum Drawdown of 19.4% as compared to 22.5%.
3. Cummulative Returns of 267% as compared to 34% of NIFTY50.

Portfolio Returns



Methodology

- **<u>Selection of stocks</u>**:

  Picking current 50 constituents of NIFTY 50.

  <u>Assumption</u>: Constituents of NIFTY 50 are constant in the time period considered for analysis

  <u>Justification</u>: A maximum of 10% of the size of the index can be changed in a calendar year. Each change in NIFTY 50 is small, so the continuity of the index is maintained.

- Period of Analysis: 1st January 2015 till date

- **<u>Portfolio Construction</u>**:
  - <u>Assignment of weights</u>:

    Weightage reviewed every month.

    Weights for every month changed dynamically by optimizing the portfolio every month.

    Portfolio Optimization:

    Constructing efficient frontier from returns of the past 4 months and selecting weights corresponding to maximum Sharpe ratio on the efficient frontier.
  - <u>Expected returns:</u>

    Portfolio's expected returns calculated in terms of cumulative return of the monthly returns of each month.

Conclusion

By Dynamically Optimizing the NIFTY 50 Index Portfolio using the Modern Portfolio Theory, we can generate Higher Sharpe Ratio,Lower Drawdown Portfolio. Given is the Dynamic Portfolio Performance.

Cumm_Return	267.208116
Annual_Return	30.881541
Volatility	0.194595
Sharpe Ratio	0.302245
Max Drawdown	19.401202

References

Modern Portfolio Theory:
https://www.math.ust.hk/~maykwok/courses/ma362/07F/markowitz_JF.pdf

https://www.investopedia.com/terms/m/modernportfoliotheory.asp