Portfolio Hedging and Performance Analysis

Overview

This project aims to evaluate portfolio performance using historical data of 8 stocks and the NIFTY index over 6 months. It involves calculating individual stock betas, constructing investment and beta-weighted portfolios, simulating market hedging using NIFTY futures, and analyzing performance through return and risk metrics.

Data Sources

- **Book3.csv**: Contains daily returns of 8 stocks and NIFTY, plus beta values in the last row.
- **Portfolio Returns.csv**: Used for daily returns input.

Methods Used

1. **Portfolio Construction**
   - *Investment-Weighted Portfolio*: Based on actual capital invested.
   - *Beta-Weighted Portfolio*: Weights proportional to each stock's beta.
2. **Beta Calculation**
   - Computed using regression slope of stock returns vs NIFTY returns.
3. **Portfolio Beta and Hedging**
   - Portfolio beta = sum(weighted betas)
   - Hedging done via NIFTY futures: `Hedge Value = Beta * Portfolio Value`
   - Number of contracts = `Hedge Value / (NIFTY Level* Lot Size)`
4. **Performance Metrics**
   - Average Daily Return
   - Annual Return
   - Annual Volatility (std. dev. scaled)
   - Sharpe Ratio (risk-adjusted return with 6% risk-free rate)
5. **Plotting**
   - Cumulative return plots for NIFTY, investment-weighted, and beta-weighted portfolios.
   - Comparison bar chart for hedging exposure.

Metric	NIFTY	Investment Portfolio	Beta-Weighted Portfolio
Average Daily Return	-0.0364%	-0.0192%	0.0029%
Annual Return	-9.18%	-4.84%	0.74%
Annual Volatility	14.63%	18.27%	18.08%
Sharpe Ratio	-1.04	-0.59	-0.29

Results Summary

Conclusion

Despite a declining market (NIFTY return: -9.18%), both portfolios outperformed the index, particularly the beta-weighted one which achieved a small positive return. The beta-weighted portfolio had the least negative Sharpe ratio, suggesting better risk-adjusted performance. Hedging using NIFTY futures based on the portfolio beta was also demonstrated. This project highlights the impact of weighting strategies on risk-return tradeoffs and showcases how systematic risk exposure (beta) can guide both construction and hedging.