InvestQuest Project - Assignment 3

Portfolio Diversification using HRP/HERC

Submission Deadline: 11/06/2025

Assignment Description

In this assignment, you are required to diversify a portfolio across different stocks listed on the **National Stock Exchange (NSE)** and **other major global stock exchanges** such as the **New York Stock Exchange (NYSE)**, **Tel Aviv Stock Exchange (TASE)**, and **Shanghai Stock Exchange (SSE)**. It is **insisted** that you include stocks from both NSE and at least one or more global exchanges.

You should use either the **Hierarchical Risk Parity (HRP)** or **Hierarchical Equal Risk Contribution (HERC)** methodology to allocate portfolio weights. The weight distribution must be **dynamic**, with switching of weights based on the market structure or changing asset correlations.

You must also incorporate **transaction costs** in your implementation. For each transaction where capital is withdrawn from an asset (i.e., its weight is reduced), apply a **0.3% cost on the amount withdrawn**.

Key Tasks

1. Collect historical price data for a diversified basket of stocks from:
   - National Stock Exchange (NSE), India
   - At least one of: NYSE (USA), TASE (Israel), SSE (China), or other major exchanges
2. Calculate the return series and the correlation matrix of selected assets.
3. Perform hierarchical clustering using appropriate distance metrics (e.g., correlation-based distance).
4. Allocate portfolio weights using HRP or HERC:
   - Make sure the weights are responsive to changing correlations and market dynamics.
   - Ensure the portfolio remains well-diversified across exchanges and sectors.
5. Implement dynamic reallocation of portfolio weights over time. The timing and logic of switching should be based on your own method (e.g., change in correlation structure or volatility).

6. At every reallocation step, apply a transaction cost of 0.3% for any amount withdrawn from an asset.

7. Clearly present:

    - Final asset allocation over time
    - Portfolio performance vs. benchmark (Plot).
    - Impact of transaction cost (Plot portfolio with and without transaction cost)

8. Submit a well-documented report and accompanying code. Include all plots and explanation of your logic.

9. You may use riskfolio-lib for implementing HRP and HERC.

Evaluation Criteria

- Proper implementation of HRP/HERC methodology
- Effective global diversification
- Realistic handling of transaction costs
- Clarity of analysis and presentation
- Code quality and documentation

Deliverables

- A short report (PDF) explaining your methodology, decisions, and key insights
- Code files used for data fetching, processing, and portfolio construction
- Relevant plots (asset weights over time, cumulative returns, etc.)