

Introduction

- 100s of proposed performance measures (ranging from very simple to more advanced, measured in different scales, linear/non-linear, etc) are used to assess securities, evaluate portfolios, create asset allocation profiles, capital adequacy/efficiency, risk management and so on (e.g., return, VaR, Sharpe, Calmar, etc)
- Assessments hinge on the relative range of individual performance measures, and usage is based on some form of a grid of select measures with associated weights
- We propose a Unifying Framework of Performance Measures as an Explainability Index (EI) that captures the multi-dimensionality and nuances measured by the individual measures, where it balances the different input categories of performance measures according to default or specified preferences and gives a composite bounded score between 0 and 1.
- We also propose a relative measure as the Risk of Target (RoT) that leverages the EI for comparing the performance of assets/portfolios/etc with their targets and assesses the drivers of divergence.

Construction Framework

1. Select Assets and/or Portfolio with referenced target/benchmarks
2. Set evaluation period and intervals for estimating performance measures. Option to (a) use historic, predicted, simulated, or stressed or data
3. Option to categorize performance measures that target a specific assessment facet
4. Transform performance measures to a scale of 0-1 and assign base and direction.
5. Assign weights (e.g., equally with categories)
6. Estimate Explainability Index as:
 - a. arithmetic (EI) $\sum_{k=1}^K W_k \overline{m}_k$
 - b. geometric (gEI) $\prod_{k=1}^K \overline{m}_k^{W_k}$
 - c. distribution shifts (dEI) $1 - (1 - EI) \times (1 - d_H)$ where is the Hellinger Distant
7. Estimate Risk of Target (RoT) as percentage difference of the EIs for Asset/Portfolio and Benchmark/Target

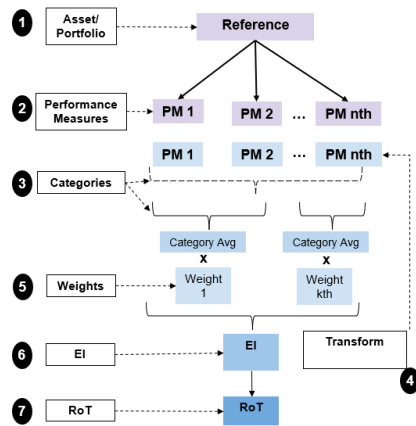


Figure 1: Framework

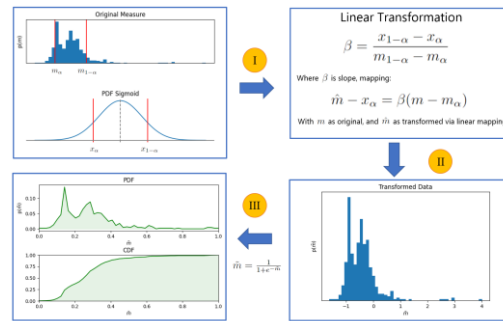


Figure 2: Performance Measure Transformation (Step 4 of the framework)

RoT Efficient Frontier

- The standard efficient frontier is a 2 dimensional approach to evaluating risk and reward
- A 2D approach could lead to taking undesirable risk
- Plotting the RoT as a color scale improves understanding in higher dimensional hidden risk
- RoT allows us to identify key behavioral differences in behavior that using the efficient frontier standalone would have yield identical behaviors
- By adjusting the weights of each category to the user's preferences, it is possible to tailor the user desired risk level

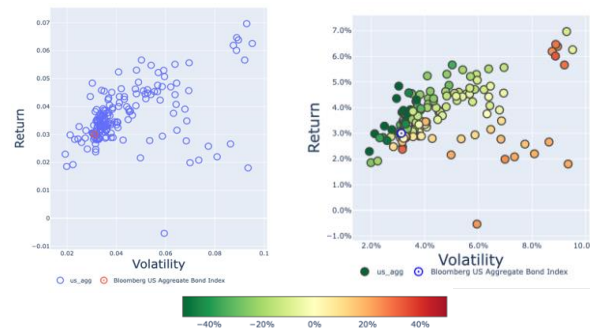


Figure 3: US Aggregate Mutual Fund Market Efficient Frontier

Results

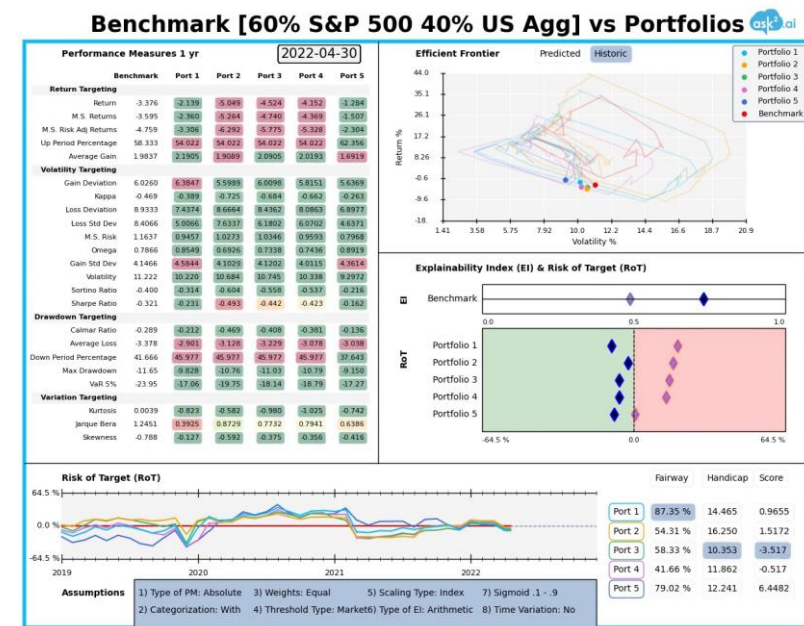


Figure 4: RoT Portfolio Comparison

Conclusion

- EI and RoT is a unify process to capture nuances in a simple and explainable manner
- Compare asset/portfolios in an uniform manner at a point in time
- Extend to construct multi-objective asset allocation profiles and portfolios

