Bulletproofing An Index-Benchmarked Portfolio

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Index Benchmarking

» Portfolio management problem:

- Benchmarking portfolio to an index is a common problem

  A common approach is to track an index with a smaller number of positions in order to minimize transaction costs.

- Traditionally, more focus has been on the return;
- Second-moment-based risk measures such as Unexpected Loss (Standard Deviation) are also used;
- Less consideration is given to higher-moment, e.g., Tail Risk measures, that are important for credit portfolios.

» Some Possible Approaches:

- Principal Component Analysis;
- Formal Optimization;
- Greek based.

An Illustration

» **A Global Bond Index specifically constructed for this exercise**

- 100 positions;
- Equal weights and maturities;
- Different in other parameters.

» **Possible "Candidates" for the Active Portfolio**

- **Random (or No-Thought) method**

  we randomly choose 50 positions from the Index portfolio.

- **50 Largest Risk Contribution positions (or Riskiest) method**

  the active portfolio is constructed using positions that are 50 largest Risk Contributions to the Unexpected Loss of the Index portfolio.

- **Conditionally-random (or Mimicking-the-Composition) method**

  1. Positions are clustered based on return and risk characteristics of the index (e.g., ES and RC or TRC).
  2. Choose a number of positions from each cluster.

An Illustration

	Index	Active Portfolio		Relative Risk
Expected Loss	48.2 bp	Random	83.2 bp	35.0 bp
		Largest RC	83.9 bp	35.7 bp
		Conditional	45.2 bp	-3.0 bp
Expected Spread	107.6 bp	Random	162.5 bp	54.9 bp
		Largest RC	166.4 bp	58.8 bp
		Conditional	110.3 bp	2.7 bp
Unexpected Loss	266.3 bp	Random	407.8 bp	146.6 bp
		Largest RC	417.2 bp	155.3 bp
		Conditional	279.7 bp	62.0 bp
Capital	1522.9 bp	Random	2255.9 bp	782.4 bp
		Largest RC	2329.0 bp	844.3 bp
		Conditional	1625.6 bp	327.0 bp

Summary

- **Benchmarking to an index is a common problem.**
- **Portfolio needs to be evaluated along both return and risk dimensions to assess its closeness to the benchmark.**
- **A practical approach mimics the benchmark's composition by approximating the distributions along relevant return and risk parameters.**