
Average Correlation and Adaptive Shrinkage

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Outline

- Average Correlation
- Adaptive Shrinkage
- Back Test Setup
- Results
- Advantages

Average Correlation

- For each asset compute its average pairwise correlations to all other assets
- Pairwise correlation is average from Step 1

Sample Correlation Matrix (Artificial Data)						Average Correlation Matrix					
	iyр	spy	eem	tlт	gld		iyр	spy	eem	tlт	gld
iyр		0.72	0.65	0.1	0.25	iyр		0.42	0.43	0.28	0.32
spy	0.72		0.81	0.02	0.1	spy	0.42		0.42	0.27	0.31
eem	0.65	0.81		0.07	0.15	eem	0.43	0.42		0.28	0.32
tlт	0.1	0.02	0.07		0.35	tlт	0.28	0.27	0.28		0.17
gld	0.25	0.1	0.15	0.35		gld	0.32	0.31	0.32	0.17	
Average Correlation to All Other Assets											
	iyр	spy	eem	tlт	gld						
	0.43	0.413	0.42	0.135	0.213						

Adaptive Shrinkage Idea

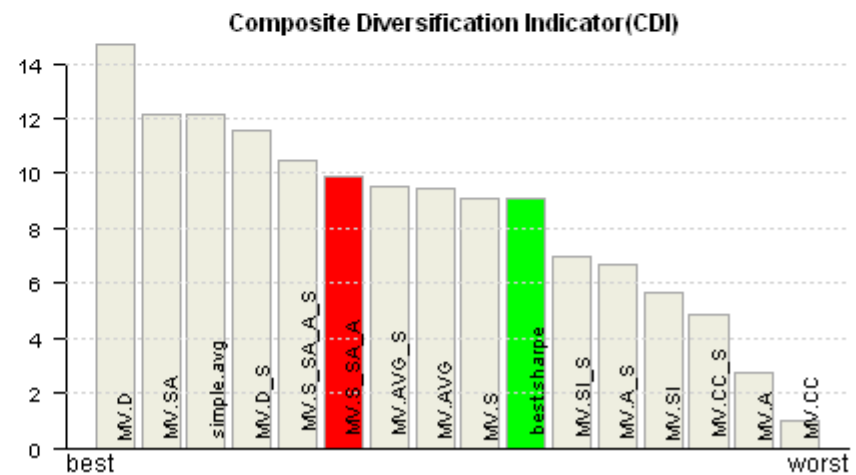
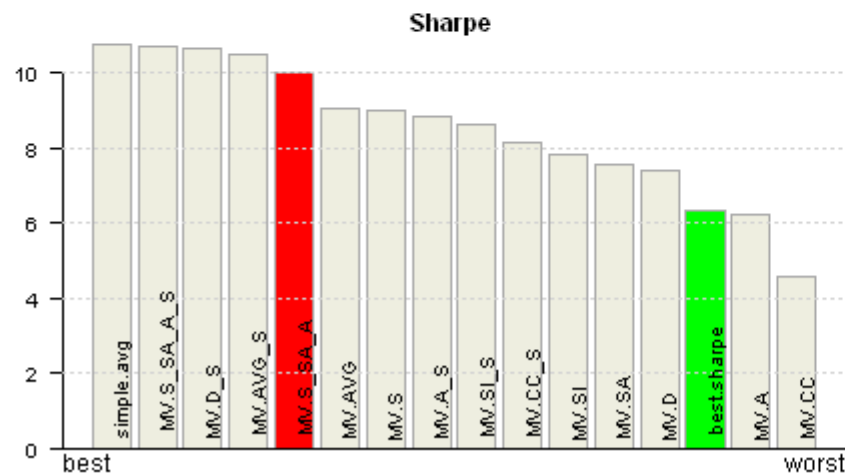
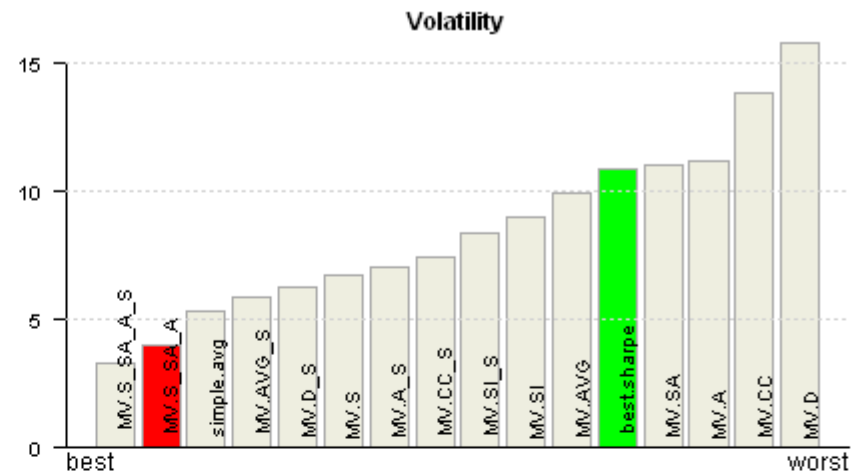
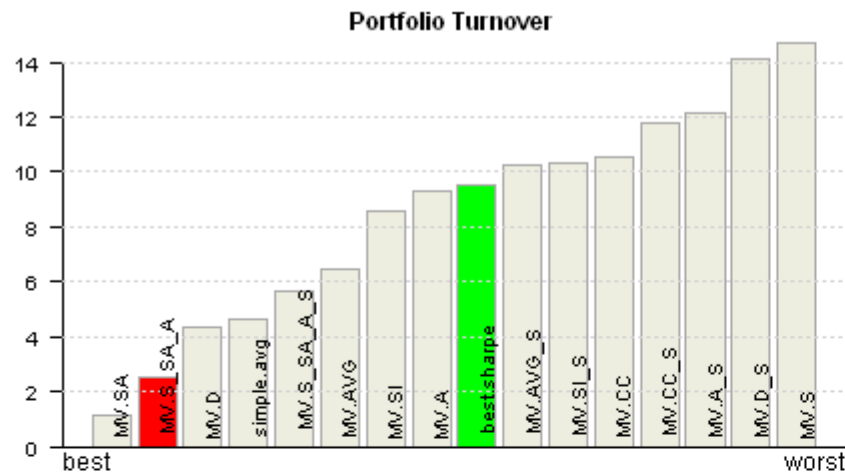
Given set of Shrinkage estimators, select one that produced best Sharpe ratio over one year look back period.

1. Performance was very close, resulting in lot's of unnecessary switching
2. Distribute weights equally across given estimators produced better metrics

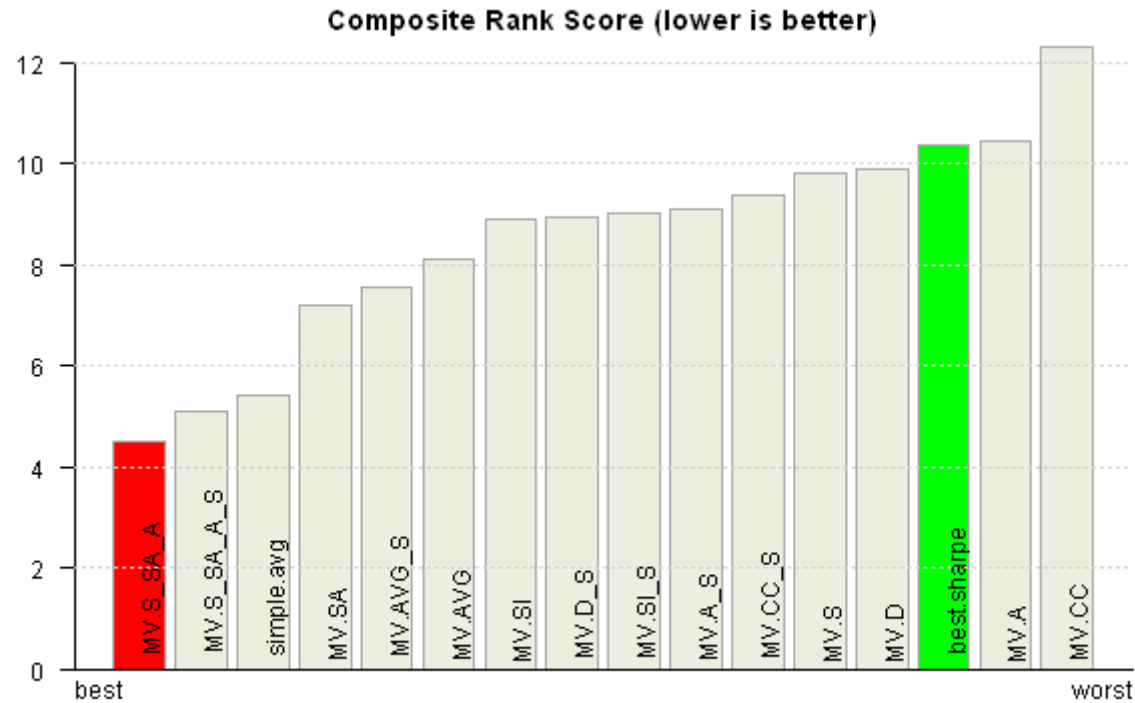
Data Sets and Design

- Futures / Forex, Stocks, ETFs data sets
- Monthly Re-Balancing, 60 day look back
- Various Shrinkage Approaches
 - Sample(S) / Sample Anchored(SA)
 - Diagonal(D) / Constant Correlation(CC)
 - Single Index (SI) / Average Correlation (A)
 - Aggregations of Estimators

Ranked Metrics Across All Data Sets



Composite Metrics



Our Shrinkage Recipe: Equally Weight Sample, Sample Anchored, and Average Correlation

The End

Please visit my blog at

www.systematicinvestor.wordpress.com

for more examples and ideas.

References

Download R Code at www.systematicportfolio.com/adaptive-shrinkage

- [Honey, I Shrunk the Sample Covariance Matrix \(Ledoit, Wolf, 2004\)](#)
- [Shrinkage the Covariance Matrix -Simpler is Better \(Datsnik, Benninga, 2007\)](#)
- [Adaptive Shrinkage \(Varadi, Kapler, 2013\)](#)
- [Average Correlation Shrinkage \(Varadi, Kapler, 2013\)](#)
- [Shrinkage: A Simple Composite Model Performs the Best \(Varadi, Kapler, 2013\)](#)