



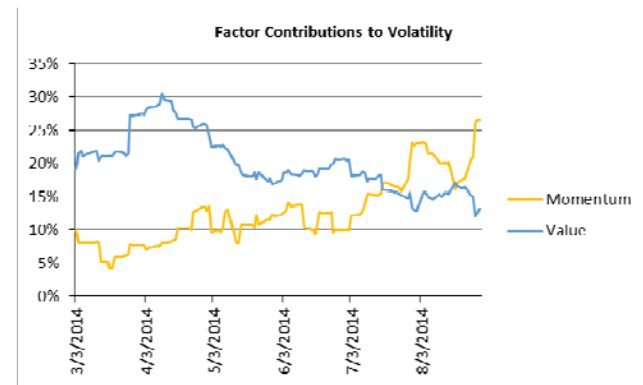
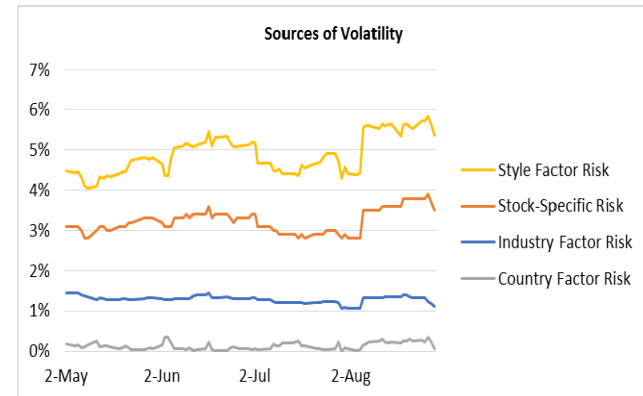
The Power of Portfolio Construction – A Case Study

September 12, 2014



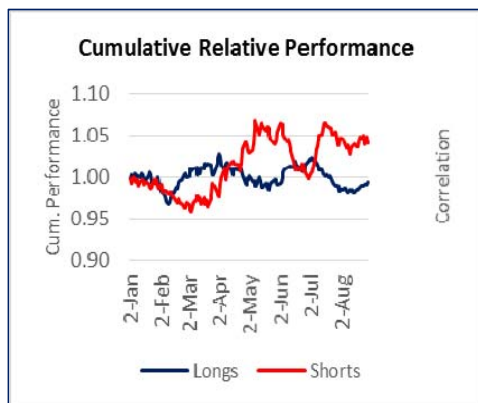
The Portfolio

- Roughly Dollar-Neutral at the Sector and Total Portfolio Levels.
- Approximately 125 securities long and short; approximately equal Dollar-Weighted.
- Stock-specific risk is important, but small compared to similar portfolios.
- Style Factor Risk is dominant.
 - Strongly biased toward the Value and Momentum Factors.
 - On any given day, the portfolio tends to under-perform or out-perform across most sectors depending upon style factor behavior.
 - At this point, it is unknown whether the strong exposure to style is a residual, or by design.
- Predominantly small and midcap securities.



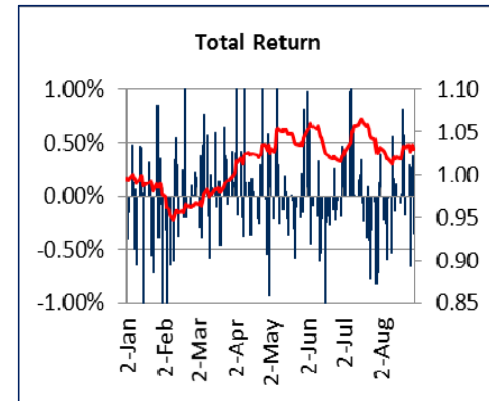
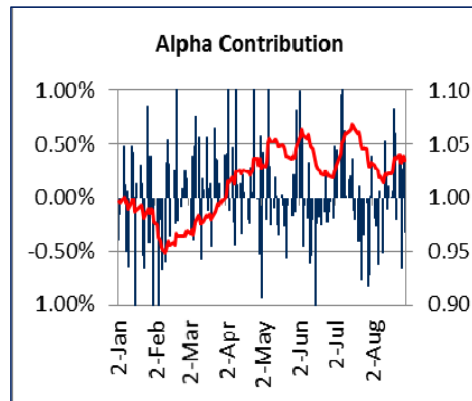
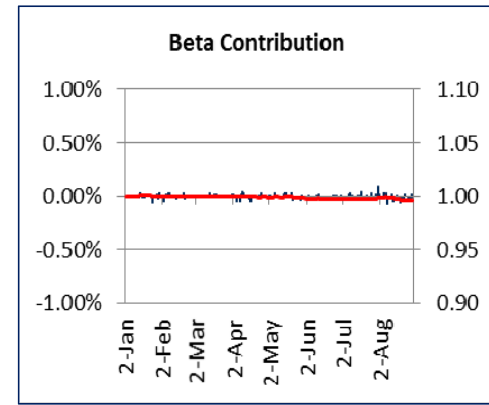
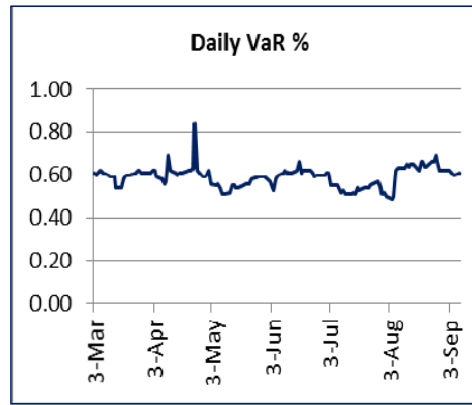
Risk and Return – Longs vs Shorts

- An examination of longs and shorts reveals that Short returns are both higher and more volatile than Long returns.
- Clearly, there is an element of portfolio construction that is causing a difference in behavior between the longs and the shorts.
- The implication is that they may not be effective hedges against each other.



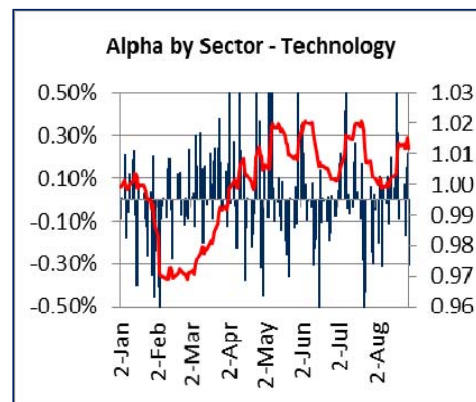
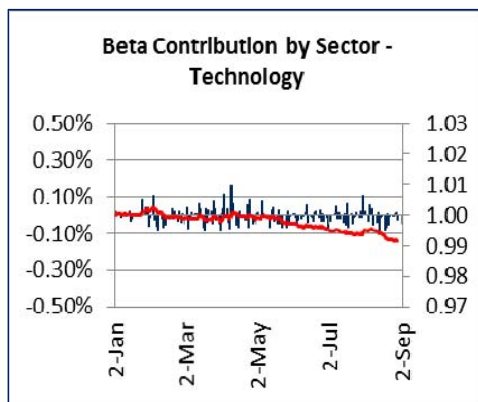
Portfolio Risk and Return Characteristics

- Predicted VaR (Value at Risk) for this portfolio is generally about 60 basis points per day. If results are normally distributed, this estimate should be exceeded approximately 1 out of 20 days.
- Similar market-neutral portfolios have a predicted daily VaR of 40-50 basis points per day.
- At a market level view, Beta does not seem relevant as “Alpha” (results after neutralizing beta effects) appears to be the source of volatility.



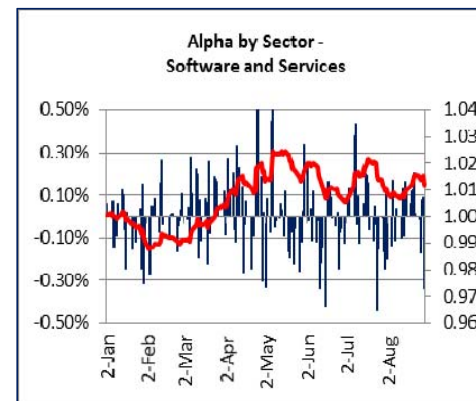
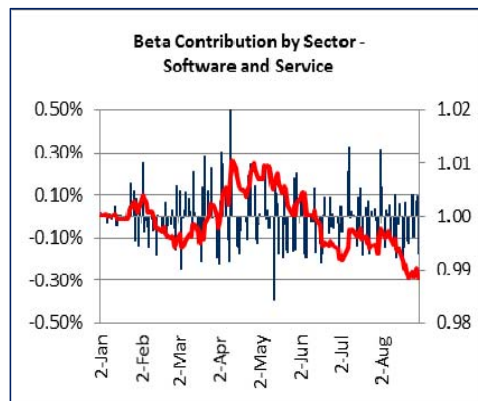
Alpha and Beta – Technology Sector

- Taking it down to the Sector level, the source of “Alpha” volatility appears to be Technology.
- No other Sector comes close to producing this much volatility.
- Beta does appear to be a small “leak”, but it is still “Alpha” that is dominant as a source of volatility on a daily and cumulative basis.



Alpha and Beta – Software and Services Industry Group

- Finally, analysis at the industry group level indicates there is a significant volatility component to Beta from Software and Services.
- “Alpha” is still volatile, but nearly matched by Beta.



Technology Industry Groups

- Technology has the largest net Beta of any sector in the portfolio, but it still seems fairly modest.
- Within Technology though, the Alpha model is almost exclusively short Software and Services, and almost exclusively long both Hardware and Semiconductors.
- Are the Hardware and Semiconductors owned only because they are assumed to partially hedge the desired short positions in Software?

	Average Net Beta			
	Software and Services	Hardware	Semiconductors	Information Technology
Jan-14	-0.04	0.01	0.01	-0.03
Feb-14	-0.11	0.02	0.03	-0.06
Mar-14	-0.12	0.04	0.02	-0.05
Apr-14	-0.13	0.05	0.02	-0.06
May-14	-0.16	0.05	0.05	-0.06
Jun-14	-0.16	0.04	0.06	-0.06
Jul-14	-0.16	0.04	0.07	-0.05
Aug-14	-0.17	0.04	0.06	-0.07

- Correlations within Technology indicate that the Industry Groups are too uncorrelated to balance the risks of each other.
- This is a fairly obvious source of risk in the portfolio.
- Is it intended?
- Do these bets add value?

	Correlations within Technology		
	Software and Services	Semiconductors and Equipment	Hardware
Software and Services	1.00	0.66	0.48
Semiconductors and Equipment	0.66	1.00	0.46
Hardware	0.48	0.46	1.00



Time for a Test

Hypothesis:

- This portfolio can be reconstructed to reduce predicted volatility by 20%-30% using simple risk optimization techniques.
- This can be accomplished without compromising the nature of the Alpha model or overall investment returns.

Methodology:

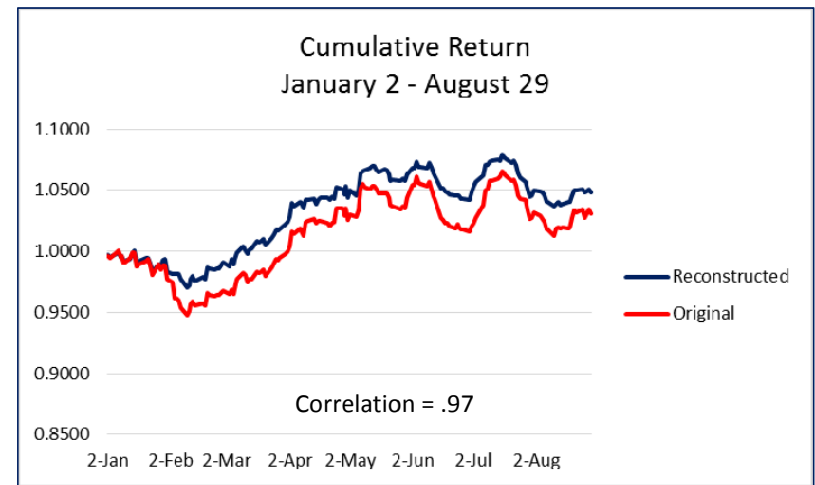
- Use only historic portfolio holdings (with one exception).
- Pick a simple methodology out of sample (do not test different methods searching for the best results).
- All securities held long must still be held long.
- All securities held short must still be held short.
- Constrain the model from making a significant change to the Software and Services allocation.
- Allow the model to utilize a Software and Services ETF.
- Rebalance only when securities enter or leave the portfolio.
- Make no attempt to minimize volatility from Style Factors.



Results

- For this (brief) period, returns are enhanced rather than similar or diminished.
- Volatility has been significantly reduced.
- The Sharpe ratio is dramatically improved.
- The nature of the Alpha Model has been preserved; the reconstructed portfolio has a correlation of .97 to the original portfolio.

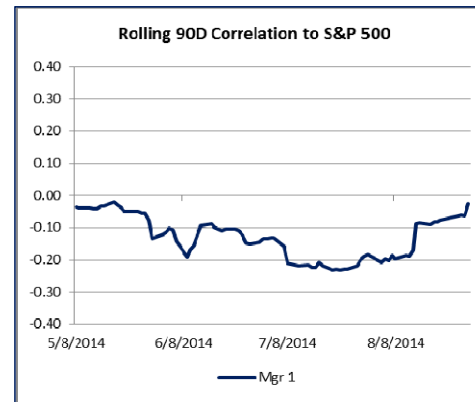
August 29, 2014	Original Portfolio	Reconstructed Portfolio
YTD Return	3.1%	4.8%
Ann. Std. Deviation	7.8%	6.0%
Ann. Sharpe	0.6	1.2
SPX Correlation	(0.04)	0.07
Beta	(0.03)	0.04
Alpha	2.0%	2.6%
Skewness	0.25	0.09
Batting Average	49%	50%
Max Drawdown	-5.3%	-3.9%



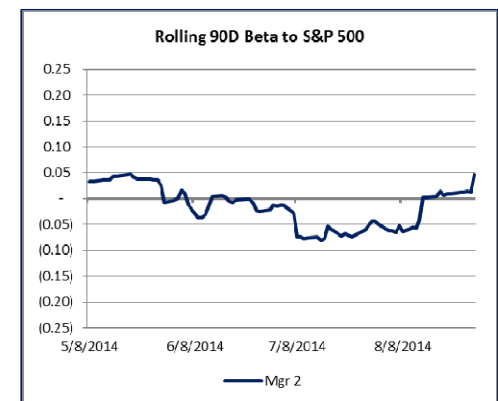
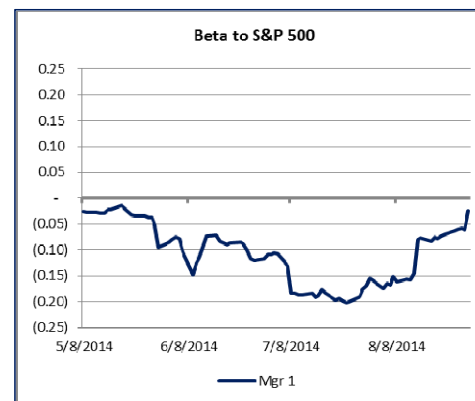
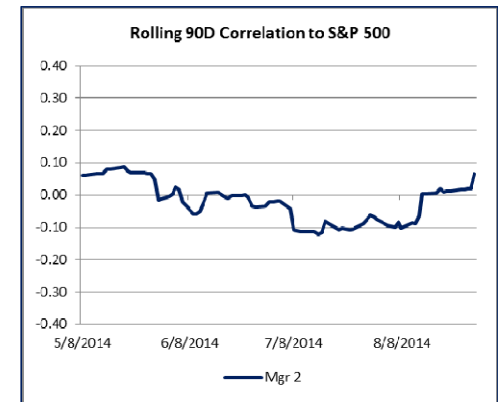
Results

- The reconstructed portfolio has a more neutral correlation; centered around zero to the S&P 500.
- The reconstructed portfolio has a narrower range of Beta to the S&P 500, and is centered around zero.
- Given that the original portfolio is dollar-neutral, the persistent negative beta indicates that securities held short have been higher beta than securities held long.

Original Portfolio



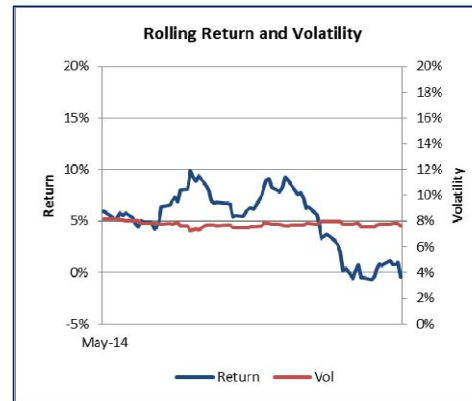
Reconstructed Portfolio



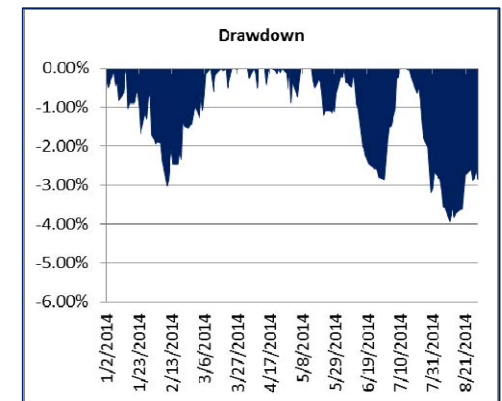
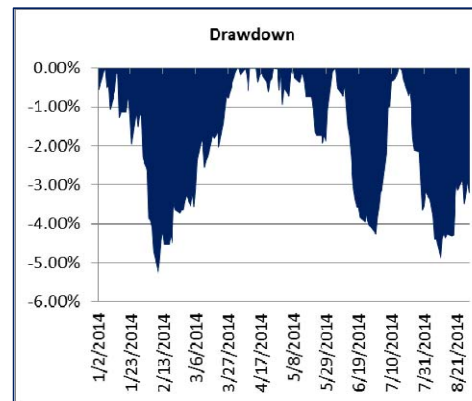
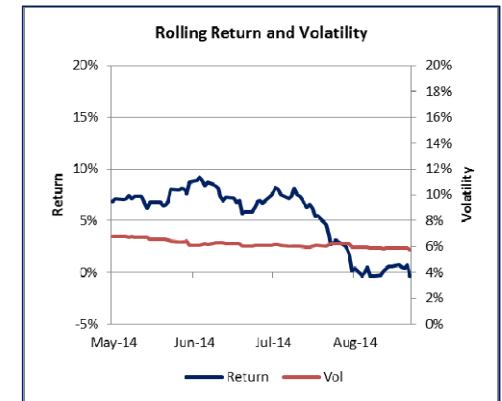
Results

- The reconstructed portfolio has about 25% lower realized volatility while maintaining similar, yet smoother returns.
- Volatility and lack of direction in Style Factors has caused both portfolios to suffer a period of weak performance.
- Drawdowns for the reconstructed portfolio are reduced significantly.

Original Portfolio



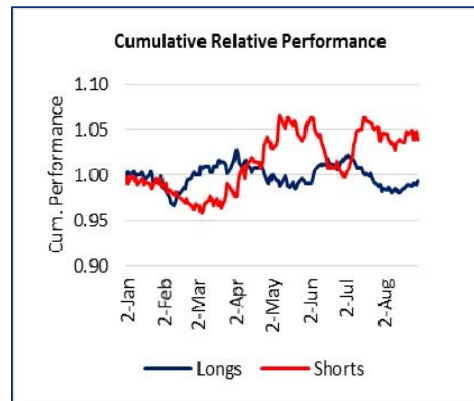
Reconstructed Portfolio



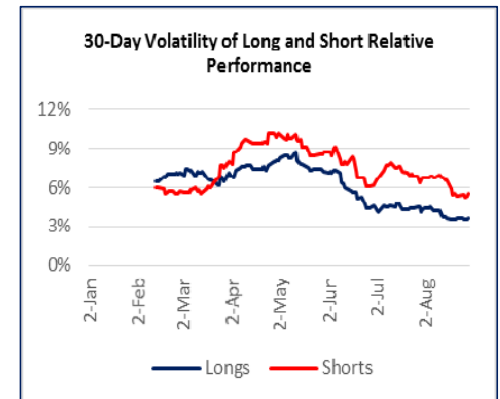
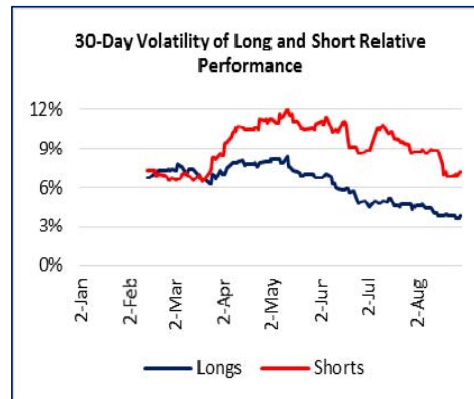
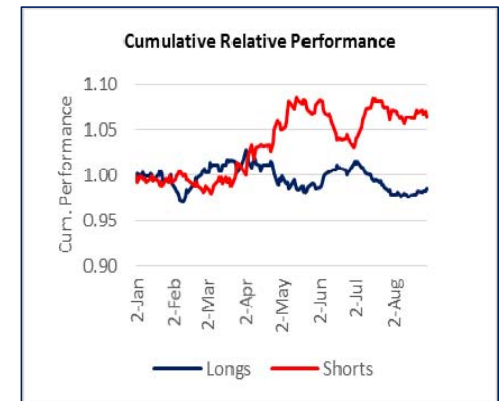
Results

- Long returns are barely changed, while Short returns have improved.
- Short volatility is lower, and the gap between Long volatility and Short volatility has decreased.
- The persistence of a gap suggests further improvement is possible through industry-specific hedging or using ETFs.

Original Portfolio



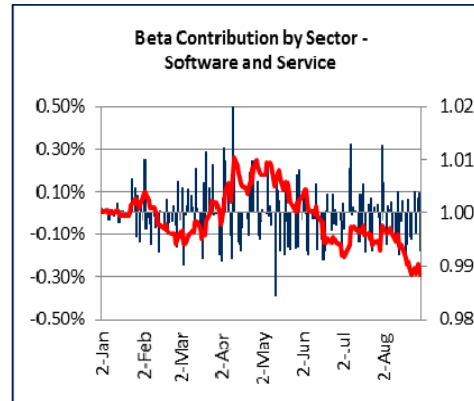
Reconstructed Portfolio



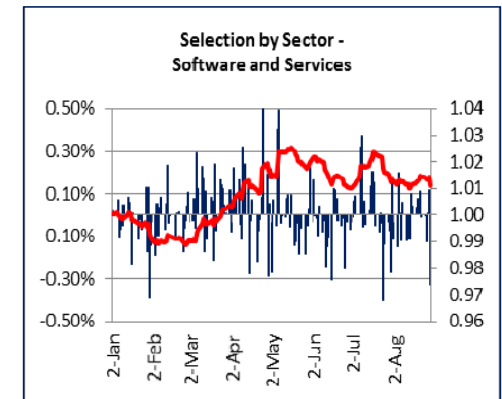
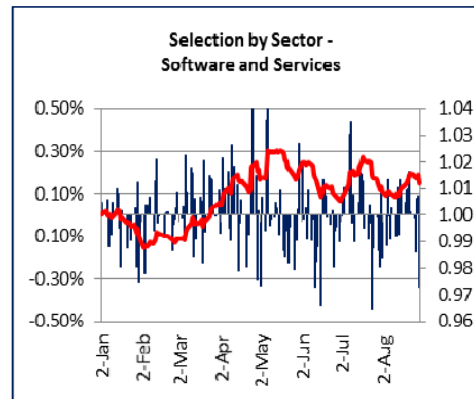
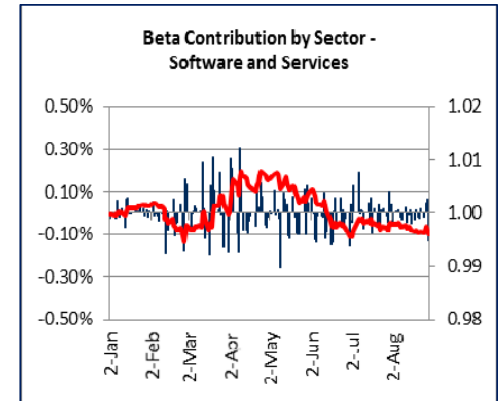
Results

- The volatility impact of Software and Services Beta has been greatly reduced.
- The volatility of “Alpha” is slightly reduced while cumulative returns are little changed.

Original Portfolio



Reconstructed Portfolio



Conclusions and Next Steps

- A modestly more sophisticated approach to portfolio construction can have a significantly positive effect on returns (maybe), volatility (for sure) and Sharpe ratios.
- Technology is not alone in being uncorrelated below the surface. Financials, Energy, Consumer Discretionary and Healthcare all have at least one industry group that behaves very differently from the others. Consider these carefully when seeking to neutralize within sectors.
- Suggestions:
 - Evaluate your alpha model and its relationship to how you construct your portfolio.
 - Does your alpha model suggest that some “signals” are better than others?
 - Do you have to own (or short) particular industry groups that lack signal strength simply to achieve neutrality?
 - If the answer to either question is “yes”, then consider using ETFs as your hedge instrument.
 - If the answer to both questions is “no”, then you are correct to “equal-weight” your holdings, but they should be “risk-weighted”, not dollar-weighted.



Subsequent Events

- After discussing the results with the portfolio manager, he is enthusiastic about the opportunity to reduce volatility without sacrificing alpha.
- He does not believe his alpha model has signal strength in predicting industry performance within sectors and he would like to eliminate the volatility created by poor hedges within sectors.
- It is clear that the strong exposure to the Value Style Factor is a residual of his alpha model; “optimizing” to minimize exposure to this factor is difficult given his approach to security selection.
- The exposure to the Momentum Factor is partly by design, but can be reduced to manageable levels in order to avoid over-exposure.
- New Next Steps
 - Seek a further reduction in portfolio “noise” by making a series of ETFs available to the optimizer and relaxing the constraint that limits allocation changes to the Software and Services industry group.
 - Evaluate the impact on Alpha, Volatility and consistency with the underlying nature of the Alpha Model.

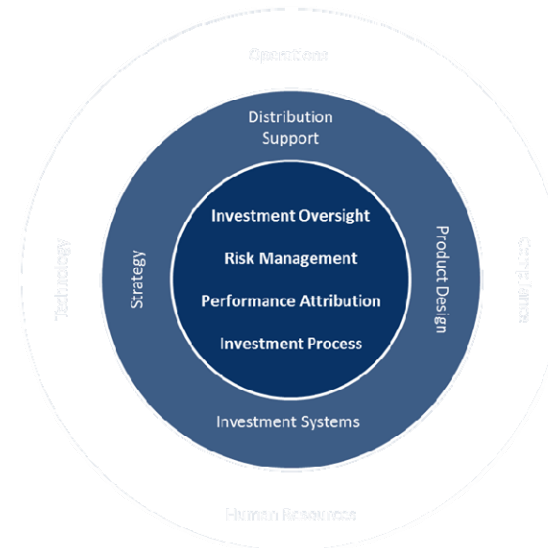


Thanks for Reading!



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