

Research & Product Development

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Combo Strategy for Hedging Russell 3000 Index

Following an earlier article about hedging Russell 1000 Index with a combination of S&P Index futures at CME Group, we have received some inquiries about the Russell 3000 Index – would a similar strategy work? The answer is resoundingly positive – a combination of S&P 500, S&P MidCap 400 and S&P SmallCap 600 tracks the Russell 3000 Index well enough to be given some serious considerations.

Construction of Hedging Strategy – while the three S&P Indexes combine to possess only half as many constituents as the Russell 3000, the performance need not be dramatically different. In fact, the correlation table in Exhibit 1 shows that a combination of the three indexes, suitably weight, ought to produce a good approximation.

While the S&P 500 is already highly correlated with the Russell 3000, we will show later that the tracking error might still be significant. However, the tracking error will be much lower with the addition of the two other indexes.

Exhibit 1

Correlation matrix of daily price return performance amongst the indexes, data sampled from January 2, 2003 – March 31, 2008.

	Russell 3000	S&P 500	S&P MidCap 400	S&P Small Cap 600	Russell 2000
Russell 3000	1.000	0.996	0.951	0.919	0.919
S&P 500	0.996	1.000	0.926	0.889	0.887
S&P MidCap 400	0.951	0.926	1.000	0.959	0.956
S&P SmallCap 600	0.919	0.889	0.959	1.000	0.989
Russell 2000	0.919	0.887	0.956	0.989	1.000

If a practitioner runs a multiple regression with the three S&P Indexes against the Russell 3000 daily returns, the regression coefficients will be the best statistical hedge ratios for the combination strategy. Using the same daily returns data as those in Exhibit 1, we derived the following hedge ratios.

Exhibit 2

Sample hedge ratio, based on multiple regression using data sampled from January 2, 2003 – March 31, 2008.

S&P 500	S&P MidCap 400	S&P SmallCap 600
0.823	0.114	0.063

In plain English, for each dollar in the Russell 3000 Index, put \$0.823 in the S&P 500 Index, \$0.114 in S&P MidCap 400 Index and \$0.063 in S&P SmallCap 600 Index. Even using this static strategy, the correlation against Russell 3000 Index during the same period was 0.9996, an improvement over the corresponding number between S&P 500 and Russell 3000 Indexes.

Tracking Error – more important than the correlation, however, would be the tracking error between the hedging portfolio and the target. Exhibit 3 shows the average as well as the dispersion of the monthly tracking error, measured in basis points for the possible strategies. Notice that the introduction of the S&P MidCap 400 Index (MID) by itself already leads to significant reduction of the tracking error.

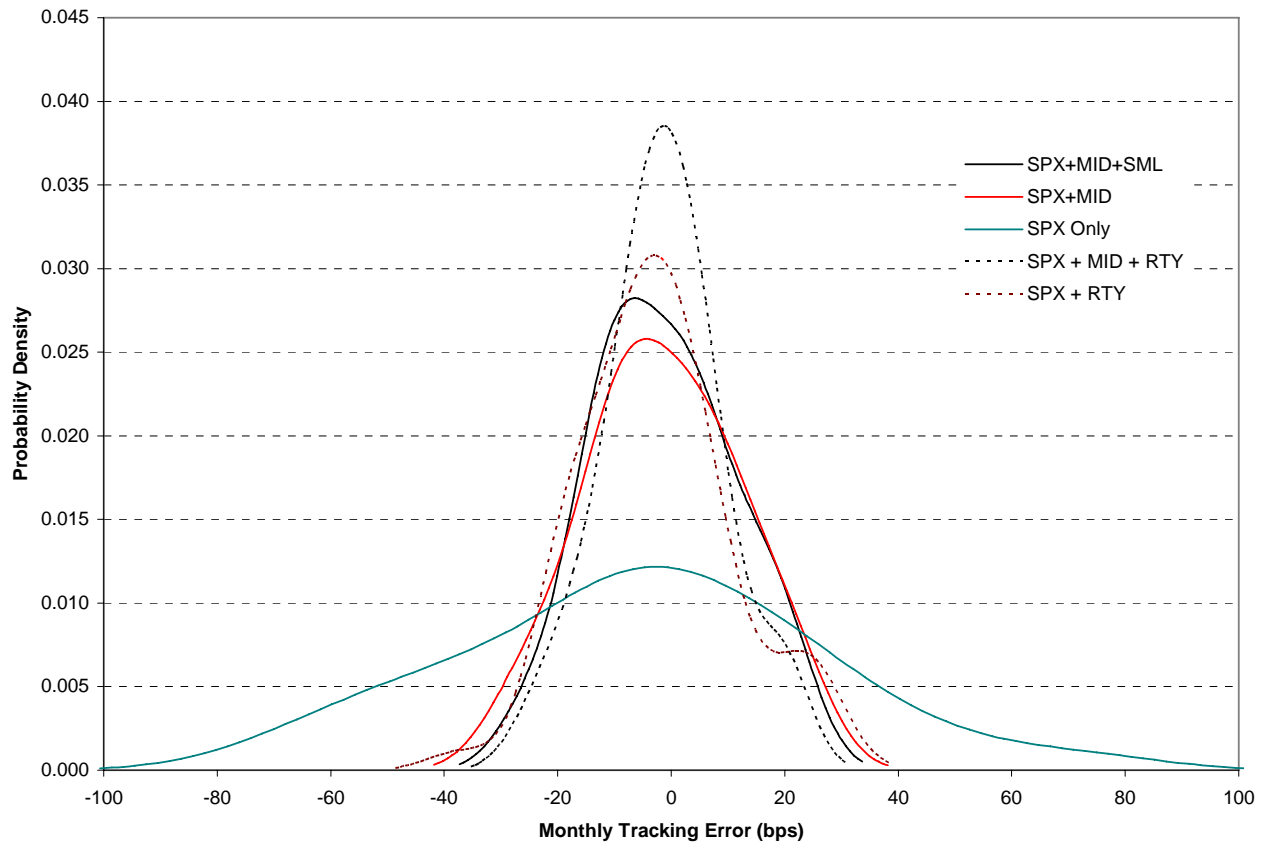
Exhibit 3

Monthly total returns tracking error, measured in basis points, between the hedging strategies and Russell 3000 Index, sampled from January 2, 2003 – March 31, 2008.

	SPX / MID / SML	SPX / MID	SPX Only	SPX / MID / RTY	SPX / RTY
Ave	-1.27	-1.40	-5.34	-1.3	-2.6
Std Dev	12.17	13.33	31.89	10.40	13.33

Exhibit 4

Estimated distribution of the monthly total returns tracking error, measured in basis points, between the hedging strategies and Russell 3000 index, sampled from January 2, 2003 – March 31, 2008.



The addition of either S&P SmallCap 600 (SML) or Russell 2000 (RTY) Indexes would introduce some marginal improvement. Likewise, a combination of S&P 500 and Russell 2000 Indexes would show similar results.

We estimated¹ the probability distribution of the monthly tracking error for the five possible strategies. The results, shown in Exhibit 4, clearly suggest that the combination approach meaningfully reduced the tracking error to within a manageable range.

Liquidity Considerations – while the hedge ratio of the S&P SmallCap 600 Index is small, it still adds to be a sizeable position when applied to a large portfolio. As of this writing, the market for E-mini S&P SmallCap 600 Index futures is still developing and might not have enough liquidity to support a multi-million dollar position. Using the Russell 2000 in place of the S&P SmallCap 600 would work. However, market participants can suitably redistribute its weight into the S&P 500

and S&P MidCap 400 futures to capture the bulk of the tracking improvement, as evidenced in Exhibits 3 and 4.

Of course, the total tracking error of the futures portfolio versus the Russell 3000 Index should include the tracking error of futures to their respective indexes. However, given the non-existence of liquidity in the Russell 3000 Index futures, the trade-off of tracking error for liquidity remains very compelling.

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¹ We employed standard kernel density estimation techniques with Gaussian kernel. The unsmoothed histogram is also available upon request.