

Research & Product Development

February 25, 2008

Page 1 of 2

Hedging the Russell 1000 Index

Synthetic replication of benchmark indexes has never been easier. But with respect to indexes that are served by less liquid derivative markets, synthetic replication may boil down to the two less than satisfactory choices. Market participants may attempt to utilize an illiquid derivative based directly upon the index of interest. Or, he/she may attempt to replicate the index with the use of (more liquid) futures on a different index, accepting the inevitable tracking error. There is no "right" solution to this dilemma. But our analysis demonstrates that the latter solution may be quite serviceable in the context of the Russell 1000 index.

We choose to highlight the Russell 1000 index in this analysis insofar as substantial monies are benchmarked or indexed to the Russell 1000. Further, it is evident that liquidity in Russell 1000 futures contract is rather thin. Fortunately, market participants may rely upon the vastly superior liquidity in S&P 500 and S&P MidCap 400 ("MidCap") futures to replicate the performance of the Russell 1000.

Index Overlap - Significant overlap between the index constituents is apparent. As of this writing, some 498 of the S&P 500 constituents are also included in the Russell 1000 totaling approximately 87.5% of the Russell 1000 by weight. Some 273 of MidCap constituents are included in the Russell 1000 index accounting for 6.4% of the Russell 1000 by weight. Thus, only 6.1% of the Russell 1000 by weight was not represented in the two S&P indexes. This incomplete coverage, however, does not suggest that the combination of S&P indexes does not track the Russell 1000. Indeed, correlations between daily price returns of the three indexes are high.

Correlation (1/2/02 – 2/15/08)

	Russell	S&P 500	MidCap
Russell	1.0000	0.9988	0.9376
S&P 500		1.0000	0.9229
MidCap			1.0000

The 0.9988 correlation between the Russell and the S&P 500 might have been anticipated noting the 87.5% overlap. Correlation between the Russell and the MidCap indexes is lower at 0.9376. However, the MidCap can still play a vital role in the replication of the Russell 1000.

Simple Hedge – The appropriate hedge ratio (HR) to replicate the Russell 1000 using S&P 500 futures was calculated at 0.9927 over the 61-½ months of our study. *I.e.*, for each dollar of exposure in the Russell 1000, devote \$0.9927 on S&P 500. This result is attributed to the fact that the S&P 500 (13.56%) is slightly more volatile than the Russell 1000 (13.48%), resulting in a hedge ratio that is less than 1.0. We assume that the residual \$0.73 is invested at the Fed Funds rate. Monthly tracking errors associated with this strategy averaged 5 basis points (bps) with a standard deviation of 18 bps. We define tracking error as Russell 1000 performance less performance of the replication strategy. Dividend accruals are accumulated at month's end.

Combo Hedge - Can practitioners improve upon this simple strategy? Using a combination of the S&P 500 and MidCap indexes reduced monthly tracking error to 2.73 bps with a standard deviation of 10.02 bps. This resulted from a strategy of putting \$0.8948 on the S&P 500 and \$0.0968 on the MidCap, the residual \$0.0084 invested in money market instruments. These hedge ratios are reminiscent of the constituent weights discussed above.

Monthly Tracking Error (Jan-03 thru Jan-08)

	S&P 500	S&P 500 + MidCap	Chg
Average	5.18	2.73	-47%
Standard Deviation	18.46	10.02	-46%

Thus, inclusion of the MidCap 400 reduces the tracking error substantially. The following graph (see next page) depicts the distribution of monthly tracking errors. (The distribution "tail" for the combo approach is much reduced suggesting it works better per "distressed" conditions. (Sample kurtosis for the two strategies equals 0.1368 and -0.3799, respectively, with the normal distribution base lined at zero. The width of the middle 95% of the distribution shrinks from 73 bps to 37 bps.)

Conclusions – Our calculations focus on tracking error at the index level only. Absent from our analysis is consideration of the tracking error of futures against the respective indexes. However, it is relatively easy to ascertain the efficacy of the actual hedging strategies, which may be represented by the sum total of tracking errors and execution cost.

Research & Product Development

February 25, 2008

Page 2 of 2

Hedging the Russell 1000 Index, cont.

The two strategies boil down to the following considerations. Using only S&P 500 futures, the strategy may be impacted by a 3 basis point per month disadvantage on average. However, S&P 500 futures are extraordinarily liquid. S&P MidCap 400 enjoy less liquidity than S&P 500 futures. But that liquidity remains far superior to that in the Russell 1000. Further, tracking errors between S&P index futures and the underlying indexes are mitigated by CME Group's application of monthly fair value settlement procedures.

Use of Russell 1000 futures directly implies a (theoretical) 3 basis point per month advantage. Still, market participants must account for tracking error of the futures contract, as well as the coping with the scant liquidity associated with Russell 1000 futures.

Please contact Richard Co, Director, Research & Product Development, CME Group at 312-930-3227 or richard.co@cmegroup.com if you should require additional information.

2007 Average Daily Contract Volumes

CME Group E-mini S&P 500 Futures	CME Group E-mini S&P MidCap 400Futures	Russell 1000 Futures (All Variations)
1.65 Million	29 Thousand	588

Monthly Tracking Errors (Jan-02 thru Jan-08)

