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RESEARCH AND PRODUCT DEVELOPMENT

Revisiting Combination Strategies for Hedging the Russell 1000 Index

- Analyzing the robustness of the hedge ratios
- Hedging strategies for style indexes

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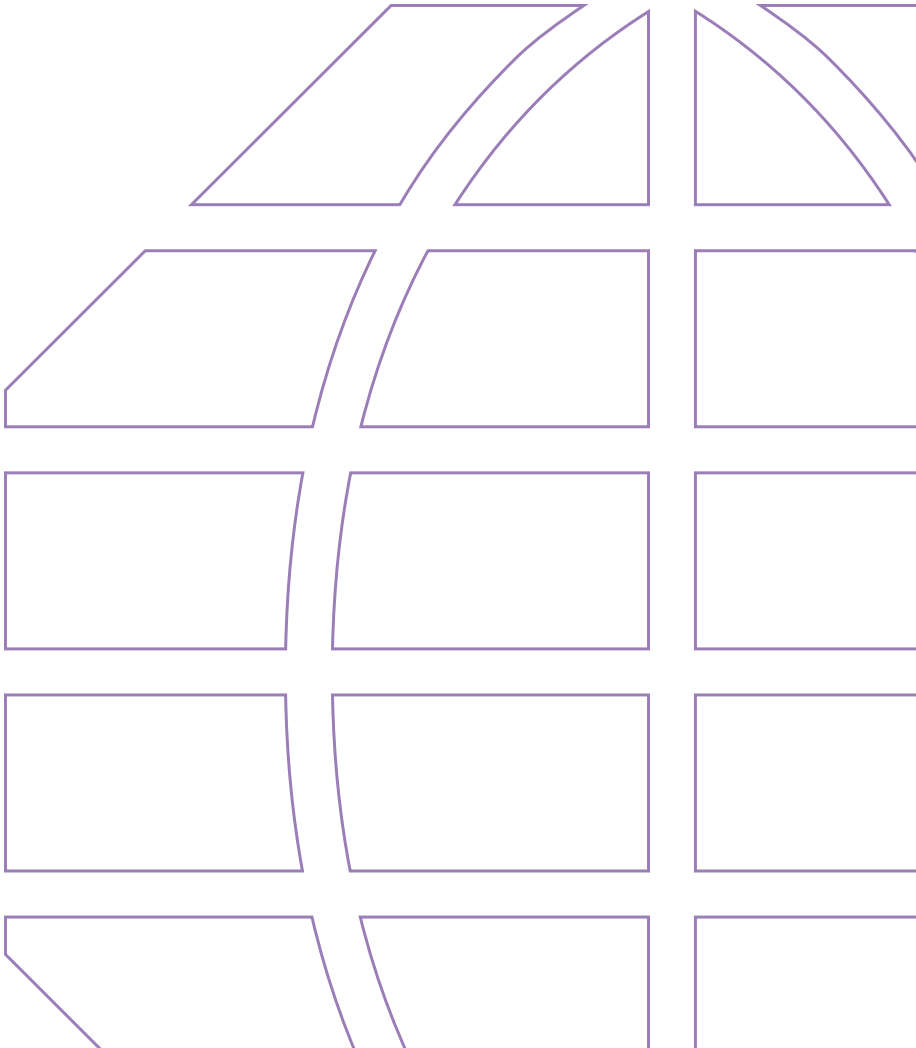


This strategy paper examines the robustness of the hedge ratios for the combination S&P 500/S&P MidCap 400 futures hedge of the Russell 1000 in the face of changing market conditions over time. We also look at possible combinations that could be used to hedge broad-based style indexes.

We have received some very interesting questions following the publication of our "Hedging the Russell 1000 Index" strategy paper, in which we presented a way to use a combination of S&P 500 and S&P MidCap 400 index futures as a viable hedge for the Russell 1000 Index. In this follow-up paper, we will address two sets of questions generated by the first article. The first set is around the robustness of the combination: I.e., does the hedge ratio fluctuate over time? How well do the hedges work "out-of-sample?" The second set concerns how to extend the concept to cover "style indexes." Are there ways to use a basket of liquid index futures as a proxy for the style sub-indexes of, say, the Russell 1000 Index?

Dynamic Hedging of Russell 1000 Index

In the first paper, we demonstrated the concept of using a combination of the S&P 500 and S&P MidCap 400 indexes to approximate the Russell 1000 Index. Specifically, we used a single set of hedge ratios throughout our five-year data sample. In response to several questions regarding the robustness of the hedge ratios, we reconfigured the tracking error calculation to allow the hedge ratios to be estimated based on recent history, as would inevitably be attempted in real-life applications.

To put the analysis in the same context, we repeated the experiment with the two possible strategies presented – a simple strategy using the S&P 500 Index only and a combo strategy using a weighted combination of the two S&P indexes. For each of the 15 calendar quarters from 2005 through the third quarter of 2008, we derived the hedge ratios based on the two years of index returns data immediately preceding the quarter. The resulting hedge ratios were then deployed for the strategies in the quarter. Again, we examined the monthly tracking error based on the two strategies.

The results were very encouraging. While the hedge ratios fluctuated as expected, the dispersion of the hedge ratios was reasonably small, indicating that the hedge ratios were fairly robust and did not overly depend on the sampling period.

The averages of the dynamically re-estimated hedge ratios are easily within the proximity of those determined with the full data samples. Exhibit 1 shows the summary statistics of the hedge ratios.

EXHIBIT 1:
Statistics of dynamic hedge ratios (HRs) for the simple and combo hedging strategies of the Russell 1000 Index, based on multiple regressions using a series of two-year data sets from January 1, 2003 – June 30, 2008. Full sample hedging ratios are based on multiple regressions using full data sets from January 1, 2003 – September 30, 2005, and January 1, 2005 – September 30, 2008.

		Simple Strategy	Combo Strategy	
		S&P 500	S&P 500	S&P MidCap 400
Dynamic HR	**Avg.**	0.9976	0.8926	0.0967
	Std. Dev.	0.0052	0.0033	0.0040
HR based on Full Sample	**2003 - Q3 2008**	0.9922	0.8919	0.1014
	2005 - Q3 2008	0.9937	0.8876	0.1056

Source: CME Group.

Turning to the actual tracking performance, the dynamically re-estimated hedge ratios appeared to be as desirable as that estimated with the static hedge ratios under the full data sample. The differences between the tracking performance[1] statistics are not particularly discernable in relation to the size of the sample. The statistical summary of the tracking errors is shown in Exhibit 2.

EXHIBIT 2:
"Out-of-sample" performance tracking error, measured in basis points (bps), between the hedging strategies and the Russell 1000 Index, sampled from January 1, 2005 – September 30, 2008. Full sample performance tracking error is also sampled from January 1, 2005 – September 30, 2008.

Simple Strategy (S&P 500)			
	Static	**Dynamic**	**Change**
Avg.	2.31	2.12	-8.23 %
Std. Dev.	22.48	22.36	-0.53 %
Combo Strategy (S&P 500 + S&P MidCap 400)			
	Static	**Dynamic**	**Change**
Avg.	-0.16	0.08	-150 %
Std. Dev.	13.45	13.63	1.34 %

The combination strategy appears to be fairly robust. The hedge ratio and the tracking performance do not appear to be overly dependent on the sampling period. The magnitude of the hedge ratios remained fairly stable over time.

Combo Strategies for Hedging Style Indexes

The other set of questions we have received concern a combination strategy for hedging style indexes. In the index futures space, much of the attention has been paid to the broad, balance indexes. We picked the Russell 1000 Value and Growth Indexes as examples to demonstrate.

Construction of Hedging Strategies

To construct hedging strategies for these indexes, we have at our disposal several highly liquid CME Group index futures, including index futures based on the S&P 500 Index, NASDAQ-100 Index, S&P MidCap 400 Index, and the Dow Jones Industrial Average.

As a baseline for comparison, one could use the CME Group S&P 500 futures as the default strategy. Indeed, by adjusting for the "beta" of the style portfolio, this strategy could very well capture the market direction risk.

Close inspection of the S&P 500 Index shows that the index is comprised of stocks that are more aligned to either "growth" or "value" orientations. As such, we might think of the index as an amalgam of growth and value stocks. To hedge the style indexes more effectively, we need to attenuate the weights of the growth stocks and accentuate those of the value stocks, or vice versa. This is where the other liquid index futures come in.

For example, the NASDAQ-100 Index comprises the 100 largest, non-financial stocks listed at NASDAQ. Historically, this index has been regarded as more heavily represented by "growth stocks." Thus, by deploying the NASDAQ-100 Index futures with either positive or negative weights in conjunction with the S&P 500 futures, we are effectively tuning the style representation of the overall portfolio of the index futures.

By the same token, the S&P MidCap 400 Index and Dow Jones Industrial Average contracts can be viewed as companion pieces that are useful in tuning the style/market cap representation of the overall futures basket strategy.

An analysis of the hedge ratios over the last two years of data shows the hedge ratios to be fairly robust over time, with minimal dispersion.

Statistically Optimal Strategies

As with any hedging discussion, we need to define the criteria against which (relative) effectiveness is judged. We choose the average, the dispersion and the kurtosis of the monthly tracking error[2] between the target index and the index basket. Tracking error with lower standard deviation and lower kurtosis indicates that the portfolio performance has a lower probability to deviate widely from the benchmark and is likely to have fewer extreme deviations in distressed situations.

Using the S&P 500-only strategy (hereafter referred to as SPX) as a benchmark, analysis shows that several combinations offer more contained tracking errors. In Exhibit 3, for each of the style indexes, we list the tracking performance of the top three strategies along with their hedge ratios (HRs).

The analysis confirms what we anticipated in the previous section, that the combination of long SPX and short NASDAQ-100 Index (hereafter referred to as NDX) positions provides a significant reduction of the tracking error for the Value Index. Likewise, a combination of long SPX and NDX does the same trick for the Growth Index. We can gain some additional performance by introducing the S&P MidCap 400 Index (hereafter referred to as MID) to the mix.

EXHIBIT 3:
Monthly total returns tracking error, measured in basis points, between the hedging strategies and Russell style indexes, sampled from January 2, 2003 – June 30, 2008. Includes sample hedge ratios, based on multiple regressions using the same data set.

Russell 1000 Value	SPX/MID/NDX	SPX/NDX	SPX/NDX/ INDU	SPX
Avg.	7.08	11.52	11.25	9.43
Std. Dev.	58.71	61.18	62.79	82.33
Kurtosis	0.16	-0.15	0.24	-0.20
HR 1	1.1297	1.2384	1.4343	0.9918
HR 2	0.1283	-0.1998	-0.2127	-
HR 3	-0.2186	-	-0.1933	-

Russell 1000 Growth	SPX/MID/NDX	SPX/NDX	SPX/NDX/ INDU	SPX
Avg.	-4.12	-1.88	-1.76	0.53
Std. Dev.	60.59	61.77	63.01	92.11
Kurtosis	-0.08	0.29	0.43	1.01
HR 1	0.6552	0.7101	0.6261	0.9949
HR 2	0.0649	0.2308	0.2363	-
HR 3	0.2222	-	0.0829	-

What about the Dow Jones Industrial Average?

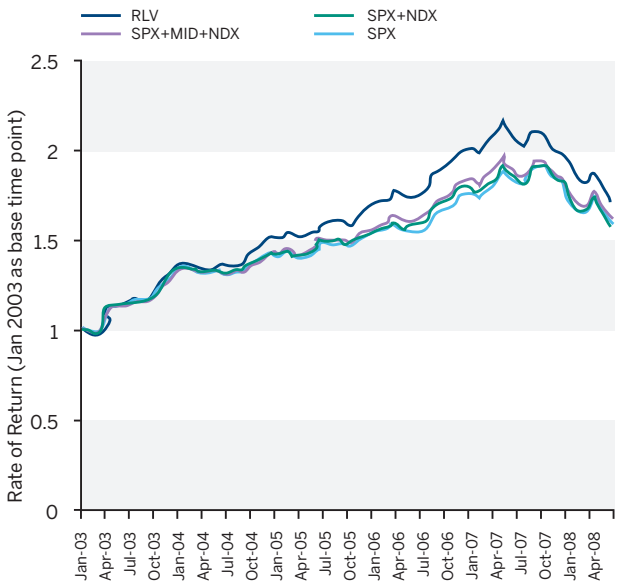
Including the Dow Jones Industrial Average Index (INDU) in the combination also tightens the tracking error distribution vs. the benchmark SPX-only strategy. Given the concentration of the Index in only 30 blue chips, however, it could be more susceptible to idiosyncratic shocks of any one constituent stock. Indeed, the tracking performance underscores that tendency.

Tail Behavior

The reduction of the tail heaviness for the Growth Index hedging strategy is also worth mentioning. Kurtosis for each of the combo strategies shows marked improvement over the SPX-only strategy. In other words, the combo strategies performed much better than the benchmark simple strategy when there is significant decoupling of various sectors in the market.

Exhibit 4 shows the longer-term performance of strategies, with the portfolios rebalanced at the end of every month.

Exhibit 4:
Estimated portfolio performance of the three combinations of indexes tracking Russell 1000 Value (RLV) Index performance (February 1, 2003 - June 30, 2008).



Estimated portfolio performance of the three combinations of indexes tracking Russell 1000 Growth (RLG) Index performance (February 1, 2003 - June 30, 2008).

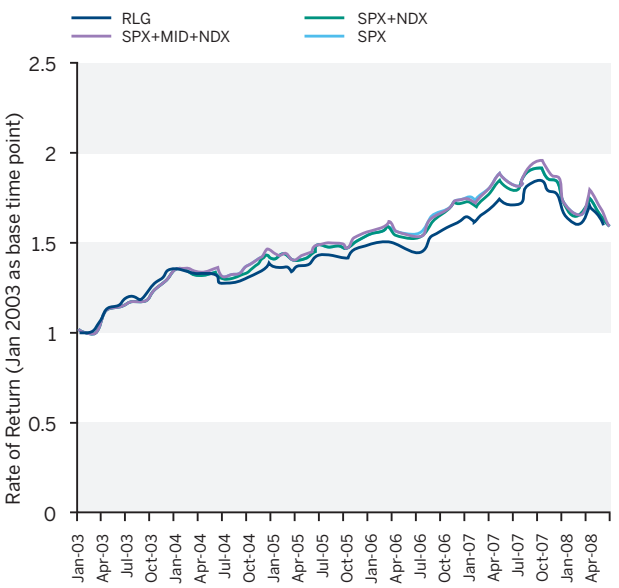
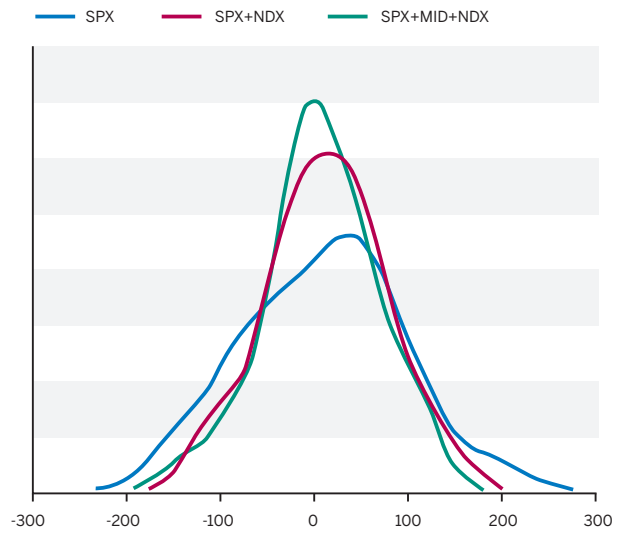
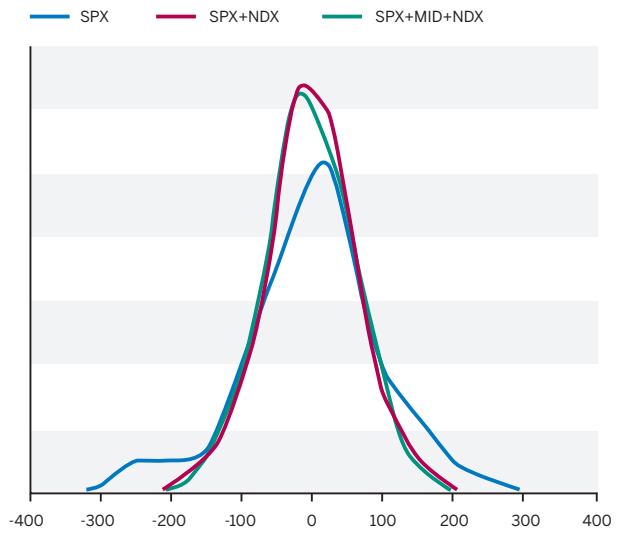


Exhibit 5 shows the estimated probability density functions of the tracking errors.

Exhibit 5:
Estimated distribution of the monthly total returns tracking error between the two hedging strategies and the Russell 1000 Value Index (February 1, 2003 – June 30, 2008).



Estimated distribution of the monthly total returns tracking error between the two hedging strategies and the Russell 1000 Growth Index (February 1, 2003 – June 30, 2008).



Conclusion

Compared to the combo strategy for hedging the Russell 1000 Index, the tracking error for a portfolio of indexes futures versus the style sub-indexes is decidedly more variable. This is to be expected – if the tracking error were negligible, the style indexes would have been redundant constructs.

In a pinch, however, the combination strategy is still viable for hedging purposes, and certainly represents an improvement from using the broad-based S&P 500 Index futures-only strategy.

Also of note, we have attempted to check the robustness by employing the dynamic hedge ratios, as we did in the previous section. Our findings are very similar to what we found for the Russell 1000 strategy. Specifically, we found the hedge ratios and tracking errors to be stable and have similar magnitudes to our full sample case. In particular, the dynamic re-hedging appears to provide a marginal improvement for hedging the Value index.

For more information on CME Group Equities, please visit **www.cmegroup.com/equities**.

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1 We still define tracking error as Russell 1000 performance less performance of the replication strategy. Dividend accruals are accumulated at month's end.

2 As with the previous study, we examine the theoretical maximum tracking performance, i.e., assuming that the futures themselves track the underlying index performance. We do so for the purpose of expositional clarity. In reality, the tracking error of the futures portfolio will be impacted by the individual futures tracking as well.

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