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Investment:
Managing Tracking Error With Greater Certainty

By: Alfred Sum, Harry Marmer & Chris Guthrie

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INVESTMENT

Managing Tracking Error With Greater Certainty

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Tracking error is important for investors as it provides a tool to measure the active risk of their portfolios where risk is defined as the variability or standard deviation of the manager's value added or excess returns relative to an appropriate benchmark. An investor can then assess how much value added was generated relative to the risk taken. This ratio is known as the information ratio (IR).

In the Canadian equity manager universe, there is little evidence that tracking error is proactively managed or controlled. For example, during the dot-com bubble, the large cap median manager's tracking more than doubled to 13 per cent while during the global financial crisis it increased more than 150 per cent. Failure to manage and control tracking error risk increases an investor's uncertainty with respect to their manager's expected value added.

Employing An Optimizer

In the U.S. equity market, managers who control tracking error typically employ an optimizer to manage this risk. However, a large volume of academic research suggests that ex-post (or trailing) tracking error often significantly exceeds the ex-ante (or estimated) tracking error as forecasted by the risk model. This under-estimation has practical consequences not only for money managers, but for investors as well for it increases their uncertainty with respect to both the portfolio's expected value added and the potential for underperformance.

To test the use of an optimizer in managing tracking error risk in Canada, we employed the S&P Clarifi risk model and optimizer with target annualized tracking errors of two per cent, three per cent, and five per cent versus the S&P/TSX Composite Total Return Index from January 2003 to December 2013.

Results for the optimization test are shown in *Table 1*.

All of the optimization tests have higher realized tracking errors than the target tracking error used in the optimizer. The test with a target tracking error of five per cent has the best annualized return, but also has the highest realized tracking error at above six per cent, yielding an information ratio of 1.0. The test with a target tracking error of two per cent has a relatively lower annualized return compared to the other tests. The optimal test, based on the highest information ratio, employed a three per cent tracking error target. Therefore, we compare this optimization test with a tracking error of three per cent to the multi-strategy allocation test.

Employing A Multi-strategy Process

We propose an alternative approach to managing tracking error risk in a Canadian equity portfolio that is both intuitively appealing and more effective than employing an optimizer. More specifically, we control tracking error by employing a multi-strategy process, systematically managing the allocation between two distinct investment strategies: a large cap (LC) strategy and a small-mid cap (SMID) strategy.

Each strategy has a defined role within the portfolio and is actively managed with unique stock selection processes. The LC strategy has a relatively lower expected tracking error and excess return and acts as a risk budget anchor for the overall portfolio. The SMID strategy has a higher expected excess return along with a higher tracking error. Both strategies have an information ratio of 1.1 and are designed to be orthogonal (to have active returns which are complementary).

For the multi-strategy allocation test, the allocation between LC and SMID strategies was fixed to 65 per cent and 35 per cent respectively in order to obtain a realized tracking error of three per cent. The large cap universe was defined as the largest 50 stocks in the testing universe by float-adjusted market capitalization and the remainder considered the small-mid cap universe. Both the LC and

Table 1
Results Of Optimization Tests With Various Tracking Error Targets

	Optimization Test			S&P/TSX COMP TRI
Target Tracking Error	5%	3%	2%	
Annualized Return	16.1%	14.2%	12.4%	9.6%
Annualized Risk	15.8%	14.5%	14.0%	13.6%
Return/Risk	1.02%	0.98%	0.88%	0.70%
Excess Return	6.5%	4.6%	2.8%	
Realized Tracking Error	6.3%	3.7%	2.6%	
Information Ratio	1.0	1.2	1.1	
Turnover	116%	117%	115%	

Table 2
Performance Comparison Between The Optimization Test And Asset Allocation Test

	Optimization Test	Multi-Strategy Allocation Test	S&P/TSX COMP TRI
Target Tracking Error	3%	3%	
Annualized Return	14.2%	14.5%	9.6%
Annualized Risk	14.5%	14.3%	13.6%
Return/Risk	0.98%	1.01%	0.70%
Excess Return	4.6%	4.9%	0.0%
Realized Tracking Error	3.7%	2.9%	
Information Ratio	1.2	1.7	
Turnover	117%	99%	

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Exhibit 1

Rolling 12 Months Market Cap Comparison

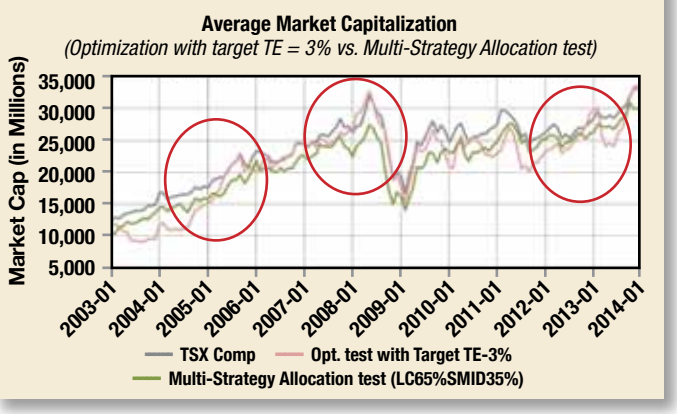
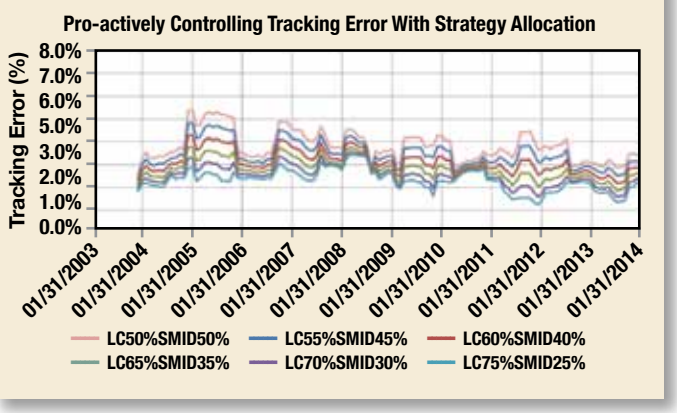


Exhibit 2

Rolling Tracking Error with Various Allocations to LC and SMID Strategies



SMID strategies were constrained to a maximum active weight of +/-2 per cent relative to the benchmark.

In comparing the optimizer to the multi-strategy approach, we analyzed the expected and realized tracking errors, the realized information ratio, and the rolling time-series of the portfolio attributes such as market capitalization and active share, to determine the stability and consistency of the portfolio attributes are over time. A summary of the results is shown in *Table 2*. It shows the comparison between the optimization test and the multi-strategy allocation test. The annualized returns of both tests are similar, but the tracking error of the multi-strategy allocation test is significantly lower, delivering a superior information ratio of 1.7 versus 1.2. The information ratio of the multi-strategy allocation test is also better than the two individual strategies, shown in *Table 1*, due to the risk-diversification benefit between the two strategies.

Examining the rolling tracking error of the two tests reveals that the tracking error from the optimization test is not stable as it exceeds four per cent on three separate occasions. On the other hand, the tracking error of the multi-strategy allocation test remained within two to four per cent over all rolling 12-month periods.

Looking at the market capitalization time series in *Exhibit 1*, the multi-strategy allocation test is consistently below the S&P/TSX Composite Index due to its higher allocation to the small-mid cap universe while the market cap of the optimization test oscillates both over and under the TSX's market cap line. This provides a view inside the optimizer's mechanics as it moves toward large cap stocks in an effort to reduce the tracking error (2004-05, 2008, 2011-13).

Additional Advantages

In addition to a superior information ratio and stable fundamental attributes over time, as shown above, using a multi-strategy process to control tracking error provides an opportunity for the portfolio manager to proactively manage this risk. More specifically, to proactively control tracking error, the portfolio manager adjusts the allocation between the two strategies. If the tracking error of the portfolio is too low, the portfolio manager reduces the allocation of the LC strategy and increases the weight of the SMID strategy and vice versa. The information ratio will stay at a similar level.

As shown in *Exhibit 2*, the time series of the rolling tracking error with different combinations of strategy allocations are stable in all levels over time. Managing tracking error has become an approximately linear process within a certain strategy allocation range.

Tracking error is a key risk measure in the assessment of active investment management performance. In the active Canadian equity landscape, there is no evidence that tracking error has been proactively managed or controlled. Using an intuitive multi-strategy allocation process that manages tracking error with greater certainty provides for superior risk-adjusted returns and consistent attributes over time. BPM

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The complete white paper can be found at www.bpm-magazine.com