MSCI Barra

PRODUCT INSIGHTS

Applications of Factor Indices

| October 2009

Introduction

Risk factors such as Value, Momentum, Volatility, and Leverage represent important sources of risk and performance in equity portfolios. These risk factors play a central role in many equity investment processes, ranging from monitoring and controlling portfolio factor exposures to actively tilting portfolios to certain factors.

To support asset managers in their portfolio construction and risk management activities, MSCI Barra has created a series of investable indices designed to reflect the return of Barra risk model factors. The MSCI Factor Indices are long/short indices with 100% net exposure to equities and maximum leverage of 200%. They are constructed through optimization, aiming to achieve constant high exposure to a target factor, minimum tracking error, and very low active exposure to all other factors relative to the respective standard MSCI index.

The MSCI Factor Indices currently cover the Momentum, Volatility, Leverage, Value, and Earnings Yield factors from the Barra Europe Equity Model and the Barra US Equity Model. The MSCI Factor Indices could potentially be extended to cover a wider range of factors and regions/models in the future. In this document, we present a number of case studies that illustrate potential practical applications of factor indices in the portfolio construction and risk management process.

Potential Portfolio Construction Applications

Case Study 1: Capturing daily movements in the momentum factor

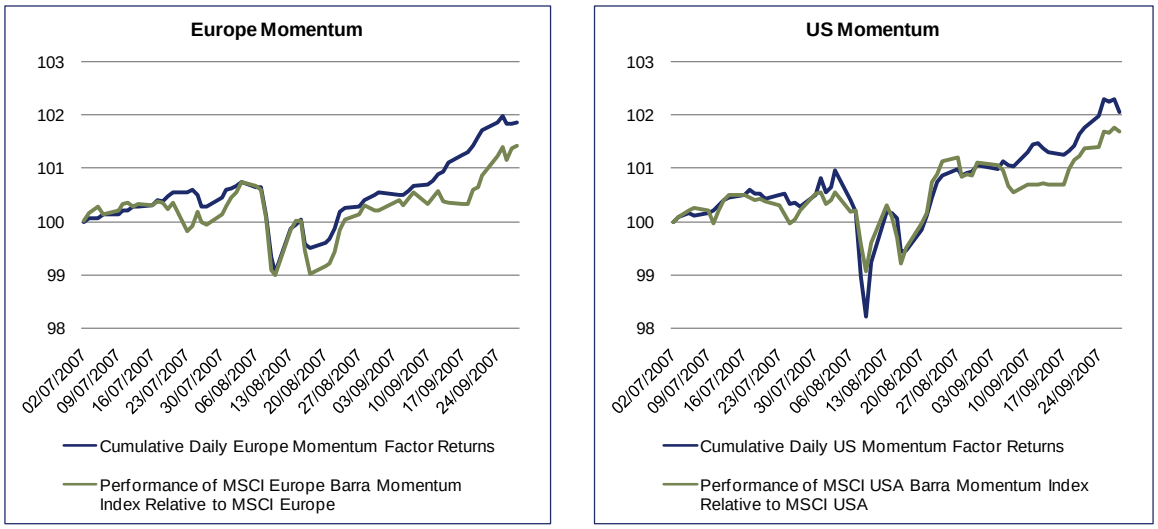
An important design objective of the MSCI Factor Indices is to reflect both the return of the target Barra risk factor as well as the market return, while being reasonably investable and replicable. This is a major challenge because a completely unconstrained portfolio that tries to fully replicate the return of the pure Barra risk factors would be impossible to implement in practice. This portfolio would consist of thousands of long and short positions in all stocks present in the Barra risk model estimation universe, including many illiquid small capitalization stocks. Furthermore, it would incur high turnover with most security weights changing at each monthly update of the underlying Barra risk model.

In order to strike a balance between factor tracking and index investability and replicability, various constraints are imposed on the factor indices, including number of constituents, monthly turnover, trade limit, shorting cost, etc. Investors wanting to use the factor indices to gain exposure to the return on certain Barra risk factors may ask: With so many constraints, can the MSCI Factor Indices still effectively reflect the target Barra factors? This question is particularly relevant for periods with volatile factor return movements. In this case study, we examine the behavior of the MSCI Europe Barra Momentum Index and MSCI USA Barra Momentum Index during August 2007, when several Barra risk factors, including the Momentum factor, experienced significant daily movements during the so-called “Quant Meltdown” week of August 6, 2007.

Exhibit 1 plots the cumulative daily Barra Momentum factor returns between July and September 2007, together with the performance of the MSCI Europe Barra Momentum and MSCI USA Barra Momentum Indices. In both Europe and the US, the MSCI Momentum factor indices moved closely with the Momentum factor returns in this period. More impressively, they captured the volatile daily movements of the Momentum factor during the week of August 6, 2007 very well. For example, the Europe Momentum factor returned -0.5% and -1% on August 8 and August 9, 2007, which were respectively three standard deviations and six standard deviations extreme

factor moves. These movements and the subsequent recovery were well captured by the MSCI Europe Barra Momentum Index. We performed the same experiment for the Value and Earnings Yield factors for the week of August 6, 2007 and observed similar results.

Exhibit 1: Performance of MSCI Europe Barra Momentum and MSCI USA Barra Momentum Indices during the August 2007 "Quant Meltdown"



Case Study 2: Alternative ways of capturing the value risk premium

A simple way of capturing the value risk premium is to build a portfolio with stocks that have low prices relative to their fundamentals. In fact, most traditional value indices are constructed by screening stocks based on certain valuation ratios, with a country-neutral approach. Such value indices tend to have high exposure to the Value factor and neutral exposure to country or regional factors; however, they also often have significant overweight and underweight positions in industries, as well as significant exposure to other style factors. For example, as of July 2009 the MSCI Europe Value Index overweighs the Financials sector by 16.4% and underweighs the Consumer Staples sector by 8.6%, relative to the MSCI Europe Index.

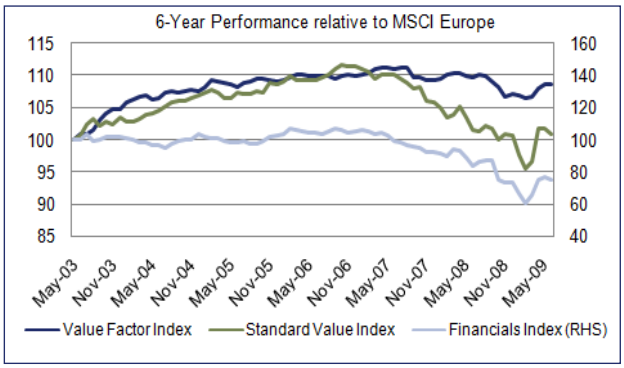
The MSCI Value factor indices represent an alternative way to capture the pure value risk premium, while being neutral in both country and industry allocation relative to the market. This is realized by a portfolio optimization process that targets high exposure to the Value factor and explicitly controls the active exposure to all other country, industry, and style factors.

Recent empirical evidence suggests that country factors are no longer the dominant factors accounting for the variation in security returns, due to the increasing globalization of business activities and capital markets. Industry factors have become increasingly important determinants of security returns. The "dot com" bubble in 1998-2001 and the recent crisis in the financial sector illustrate that individual industries can perform very differently from the broad market and even drive the market over certain periods.

Due to sizable overweighting or underweighting in certain industries, the risk and performance of a traditional value index can be driven by unintentional bets on industries during periods where these industries perform very differently from the market. This is illustrated by comparing the performance of the MSCI Europe Value Index ("Value index") and the MSCI Europe Barra Value Index ("Value factor index"), relative to the MSCI Europe Index. Exhibit 2 shows that from mid 2003 to mid 2007, the Value index performed in line with the Value factor index. However, as the subprime crisis began to spread, the financial sector started to significantly underperform the

market from the second half of 2007, which dragged down the performance of the Value index that had a sizable overweight in Financials. The impact of the financial sector on the Value index is further illustrated by the recovery of the sector in the last few months, where the relative performance of the Value index has improved in tandem with the financial sector.

Exhibit 2: Performance of MSCI Europe Value Index and MSCI Europe Barra Value Index Relative to MSCI Europe Index



	MSCI Europe Barra Value Index	MSCI Europe Value Index
Return	6.51%	5.61%
Volatility	16.1%	18.0%
Sharpe Ratio	0.403	0.312
Outperformance (to MSCI Europe)	1.48%	0.59%
Tracking error (to MSCI Europe)	1.71%	3.75%
Information Ratio	0.867	0.157

Note: Annualized statistics for period May 2003 to June 2009

In comparison, the performance of the Value factor index relative to the market has not been impacted by the underperformance of financials over the last two year, owing to its industry-neutral approach. In the market turmoil between July 2007 and February 2009, the Value factor index outperformed the Value index by around 10%. For the six years ending June 2009, as reported in Exhibit 2, the Value factor index outperformed the MSCI Europe Index by an annualized 1.48%, with a low tracking error of 1.71%, while the Value index outperformed the MSCI Europe Index by only 0.59%, with higher tracking error at 3.75% and higher volatility at 18%.

This case study demonstrates that the Value factor index may be a more natural choice than the traditional value index for investors wanting to capture a purer value premium without any active views on countries or industries. On the other hand, traditional value indices remain good benchmarks for value asset managers who view the active exposure of their value portfolios to countries, industries, or other style factors as a natural consequence of their investment processes.

Potential Risk Management Applications

Case Study 3: Reducing volatility exposure in a small cap portfolio

Small cap stocks tend to be more volatile than larger and more established companies. For instance, when we examine the MSCI Europe Small Cap Index through the lens of the Barra Europe Equity Model (EUE2), Exhibit 3 shows that this index has significant exposure to the Volatility factor in the range of 0.4 to 0.6 standard deviations. A small cap portfolio manager may not want such high volatility exposure. One way to reduce volatility exposure may be to simply sell the most volatile stocks. However, this could be problematic as it may conflict with the fundamental process used to select these stocks and lead to costly portfolio rebalancing. A potential alternative is to place an overlay on top of the small cap portfolio, with an instrument that tries to replicate a short position in the Volatility factor. In this case study, we will demonstrate how the MSCI Europe Barra Low Volatility Index can potentially be used in such a hedging process.

The MSCI Low Volatility factor indices combine a short position in the Barra Volatility factor with a 100% net equity exposure to the chosen market (e.g., the MSCI Europe Index). A manager who needs a hedging instrument with a short position in the Volatility factor can take a long position in the MSCI Low Volatility factor index and then short the MSCI Europe Index to take out the market exposure. In Exhibit 4, the performance of the MSCI Europe Barra Low Volatility Index relative to the MSCI Europe Index shows that such an instrument returned a cumulative 13.6% in the two years ending June 2009, which was comparable to the performance of shorting the Barra Volatility factor. As a reminder, the MSCI Low Volatility factor indices aim to replicate the return of a short position in the Volatility factor. Thus, when the Volatility factor consistently underperformed in the two years ending June 2009, the MSCI Europe Barra Low Volatility Index outperformed the MSCI Europe Index, reflecting its short position in the Volatility factor.

Exhibit 3: Volatility Exposure of MSCI Europe Small Cap Index

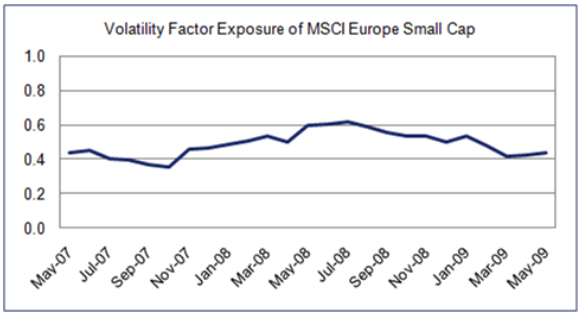
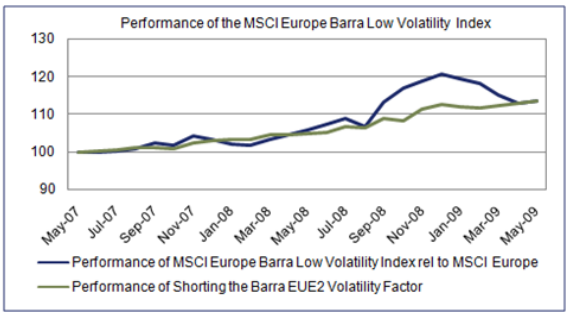
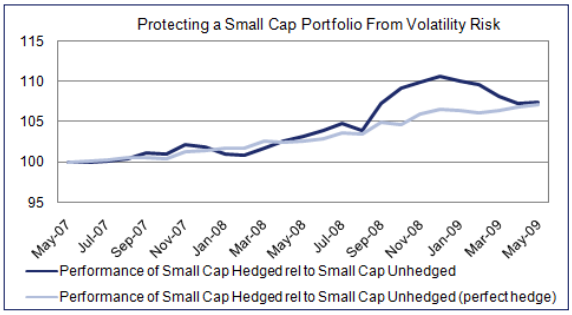


Exhibit 4: MSCI Europe Barra Low Volatility Index and Volatility Factor



Suppose the portfolio manager used this hedging instrument to completely eliminate the Volatility factor exposure of the MSCI Europe Small Cap Index at each month-end, by adjusting the position in the instrument to match the Volatility factor exposure of the small cap portfolio. It is important to note that such hedging would not be a "perfect hedge" as the hedging instrument would not perfectly replicate the returns on the Volatility factor. A perfect hedge would be an instrument that fully replicates the Volatility factor returns on a daily basis, but this cannot be implemented in practice as we previously explained. Nevertheless, it is interesting to compare the performance of the hypothetical perfect hedge with the imperfect hedge that employs the MSCI Europe Barra Low Volatility Index.

Exhibit 5: Hedging the Volatility Exposure of a Small Cap Portfolio: Perfect and Imperfect Hedge



	MSCI Europe Small Cap Index	Small Cap Index Imperfect Hedge	Small Cap Index Perfect Hedge
Return	-27.8%	-24.80%	-24.41%
Volatility	28.7%	26.9%	28.4%
Sharpe Ratio	-0.969	-0.921	-0.861
Outperformance (to Small Cap)	0.00%	3.02%	3.42%
Tracking error (to Small Cap)	0.00%	3.16%	1.48%
Information Ratio	NA	0.957	2.307

Annualized statistics for period June 2007 to June 2009. No transaction cost assumptions included.

Exhibit 5 illustrates that by using the MSCI Europe Barra Low Volatility Index to remove the Volatility factor exposure of the MSCI Europe Small Cap Index, the hedged small cap portfolio would have outperformed the unhedged portfolio by an annualized 3.02%. This is in comparison to an outperformance of 3.42% by the hypothetical perfect hedge. The chart also shows that even

though the imperfect hedge deviated from the perfect hedge for a few months between the end of 2008 and early 2009, its overall performance was broadly in line with the hypothetical perfect hedge, making it an efficient hedging tool in this case study.

Case Study 4: Reducing leverage exposure in a financials portfolio

Excessive use of leverage by financial institutions is often mentioned as one of the contributing factors in the recent financial crisis. Companies with high leverage tend to underperform the market during financial crises as investors become more risk averse and avoid the risk associated with high leverage. Some asset managers may want to control the risk that is associated with high leverage by reducing their portfolios' exposure to the Leverage factor. Here we look at a case study that uses the MSCI Low Leverage factor indices to reduce the leverage exposure of a financials portfolio.

As shown in Exhibit 6, the MSCI Europe Financials Index had significant exposure to the Leverage factor, ranging between 0.8 to 0.9 standard deviations in recent years. Not surprisingly, the Leverage factor has experienced consistent underperformance over the past two years. As a result, the MSCI Europe Barra Low Leverage Index outperformed the market, as represented by the MSCI Europe Financials Index, by more than 10%, reflecting the performance of shorting the Leverage factor, as illustrated in Exhibit 7.

Exhibit 6: Leverage Exposure of MSCI Europe Financials Index

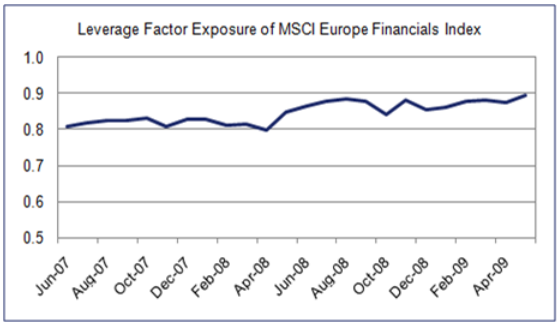
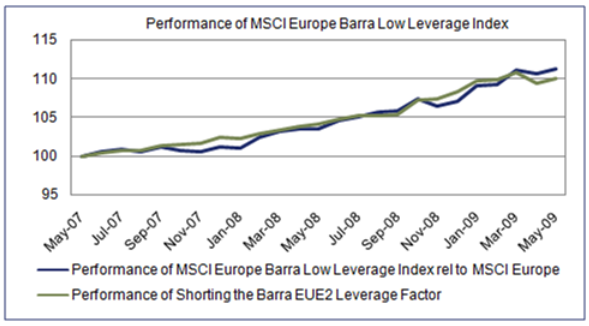
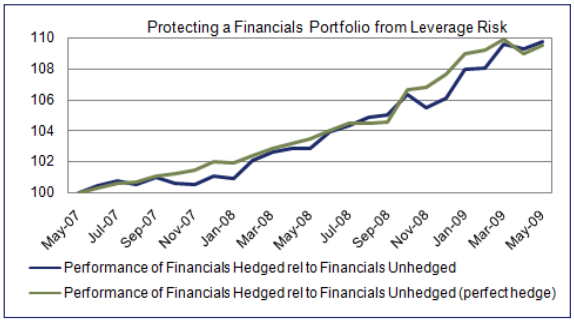


Exhibit 7: MSCI Europe Barra Low Leverage Index and Leverage Factor



We can eliminate exposure to the Leverage factor by placing an overlay on top of the Financials portfolio. The overlay is an instrument that combines a long position in the MSCI Europe Barra Low Leverage Index with a short position in the MSCI Europe Financials Index to obtain a net short position in the Leverage factor. Exhibit 8 shows that such a hedged financial portfolio would have outperformed the unhedged portfolio by an impressive 4.4% annually in the two years ending June 2009. In addition, the performance of the hedge closely tracked that of the hypothetical perfect hedge over the whole period.

Exhibit 8: Hedging the Leverage Exposure of a Financials Portfolio: Perfect and Imperfect Hedge



	MSCI Europe Financials	Financials with Imperfect Hedge	Financials with Perfect Hedge
Return	-38.3%	-33.92%	-34.25%
Volatility	38.2%	38.0%	37.3%
Sharpe Ratio	-1.003	-0.893	-0.919
Outperformance (to Financials)	0.00%	4.40%	4.07%
Tracking error (to Financials)	0.00%	1.99%	1.65%
Information Ratio	NA	2.216	2.465

Annualized statistics for period June 2007 to June 2009. No transaction cost assumptions included

Conclusion

The recently launched MSCI Factor Indices have interesting applications in various parts of the investment process. They can be efficient tools for capturing perceived premia associated with risk factors. They distinguish themselves from traditional methods of capturing risk premia by achieving high exposure to the target risk factor while controlling all other sources of active risk. Furthermore, their application as hedging instruments may appeal to portfolio managers or risk managers who want to control or reduce undesirable portfolio factor exposures without changing their investment processes and without rebalancing the underlying portfolios.

References

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