Europe Market Report

The Mid-Cap Effect in Europe

Utilizing the Non-Linear Size Factor in the Barra Europe Equity Model (EUE4)

December 2013

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Introduction

As described in our December 2012 Global Market Report, *The Mid-Cap Effect*, since the outbreak of the global financial crisis in 2008, global mid-cap stocks have been unique because they have provided a better risk-adjusted return than a combination of large and small-cap stocks.[1] Some have argued that recent global trends, such as low interest rates, decreasing risk aversion and the availability of cash for acquisitions, may have favored the outperformance of mid-cap stocks. [2]

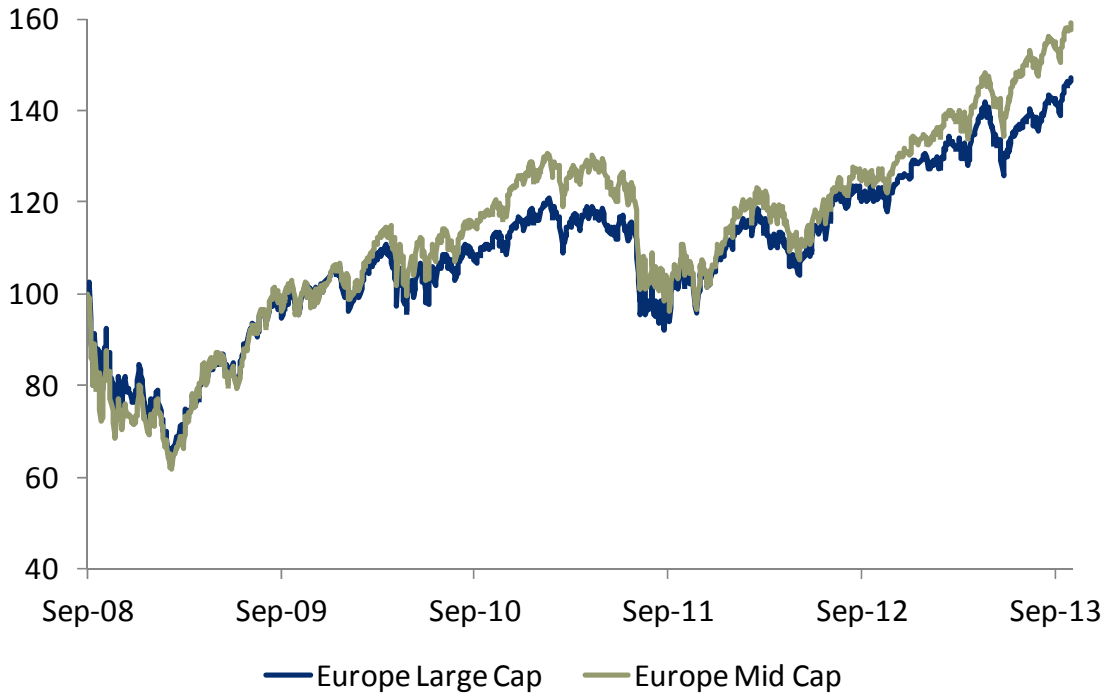
These trends have been present in Europe, although not as strongly as in global markets. As Figure 1 shows, from October 2008 to October 2013, mid-cap stocks in Europe have outperformed large caps by a cumulative 12 percent, which is lower than the 19 percent outperformance measured for the MSCI World Mid Cap Index. The outperformance for Europe was mainly concentrated in 2010 and in 2013.

If mid-cap stocks are viewed as a fairly distinct opportunity set, institutional investors should be equipped to monitor how this particular segment influences their portfolios' risk and return characteristics. In this Market Report, we show how the Barra Europe Equity Model (EUE4) achieves this by utilizing the Non-Linear Size factor.

[1] Menchero, J., Ruban, O., and Z. Nagy, The Mid Cap Effect, MSCI Global Market Report, December 2012.

[2] For example, see Mid Cap Stocks—Wall Street's Best Kept Secret, ING Investment Management White Paper, March 2010.

Figure 1: Performance of MSCI Europe Large Cap and MSCI Europe Mid Cap Indexes, Oct-2008 – Oct-2013, total returns in Euros.



The Non-Linear Size Factor

The Non-Linear Size factor helps capture the non-linearities in the payoff to the size of companies across the market-cap spectrum.[3] The more traditional Size factor has been present in all Barra equity models to account for distinct return and risk characteristics of small-cap stocks relative to large-cap stocks. The Non-Linear Size factor is constructed in such a way as to capture stock behavior that is related to the size of the companies, but not described by the Size factor: mid-cap stocks in Europe typically had a positive exposure to this factor.

The traditional Size factor of the Barra Equity Models captures the return difference between large cap and small-cap stocks.[4] Thus, the long-run negative performance of the Size factor reflects the well-known observation that historically, large-cap stocks tended to underperform small-cap stocks. While the Size factor captures an important source of risk, it may not tell the whole story.

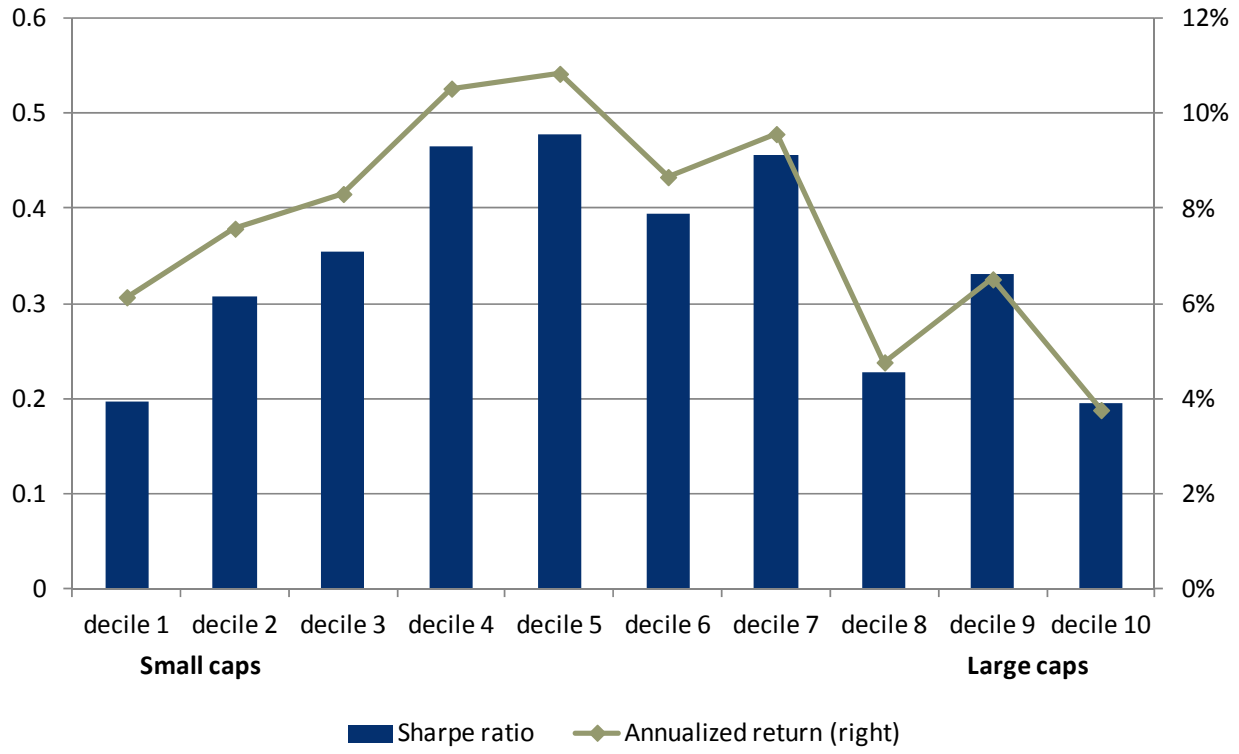
For instance, the non-linear relation between stock size and performance was clearly present in Europe since the outbreak of the financial crisis. To gain a more granular view of this dependency, we created ten equal-weighted decile portfolios based on the market capitalization of companies in the MSCI Europe IMI universe, the lowest decile containing the smallest stocks.[5] The portfolios were rebalanced monthly, and their performance during the period October 2008 – October 2013 is reported in Figure 2. We observe that during the time period considered here, both larger and smaller capitalization deciles tended to underperform deciles in the middle, both in absolute and risk-adjusted terms.

[3] Borda, L., Wang, J., and A. Morozov, The Barra Europe Equity Model (EUE4) Empirical Notes, April 2013.

[4] The only descriptor entering the definition of the exposure to the Size factor is the logarithm of the total market capitalization of the company.

[5] To control for country biases, we used the EUE4 Size factor exposure data to sort the stocks. Note that Size factor exposures are standardized on a country-relative basis in EUE4.

Figure 2: Annualized return and Sharpe ratio of equal weighted size decile portfolios, Oct 2008 – Oct 2013, local excess returns.



The construction of the Non-Linear Size factor ensures that stocks towards the middle of the market capitalization spectrum tend to have a positive exposure to this factor, while large and small-cap stocks tend to have a negative exposure.[6] Thus, the return to this factor represents the performance of a barbell factor portfolio that is long mid cap and short large and small-cap stocks, as discussed by Menchero (2010).[7]

The performance of this factor portfolio has been remarkable in Europe. As it is shown in Table 1, out of the 11 style factors of the model, the Non-Linear Size factor has had the second best risk-adjusted performance after Earnings Yield during the December 1994 – October 2013 period. Besides the important return, this was also due to the relatively low volatility of the factor.

[6] The descriptor of the EUE4 style factor is constructed in two steps. First the Size factor exposure is raised to the third power. The resulting cubed exposure is highly collinear with the original Size factor exposure. This collinearity is removed by orthogonalizing the cubed exposure to the Size exposure, resulting in the Non-linear Size factor exposure of the model. A more detailed description of the calculation of Non-linear Size factor exposure and the estimation of its return is given in the EUE4 Research Notes.

[7] Jose Menchero, The Characteristics of Factor Portfolios, The Journal of Performance Measurement, Fall 2010.

Table 1: Summary performance statistics for the style factors of the EUE4 model, Dec 1994 – Oct 2013.

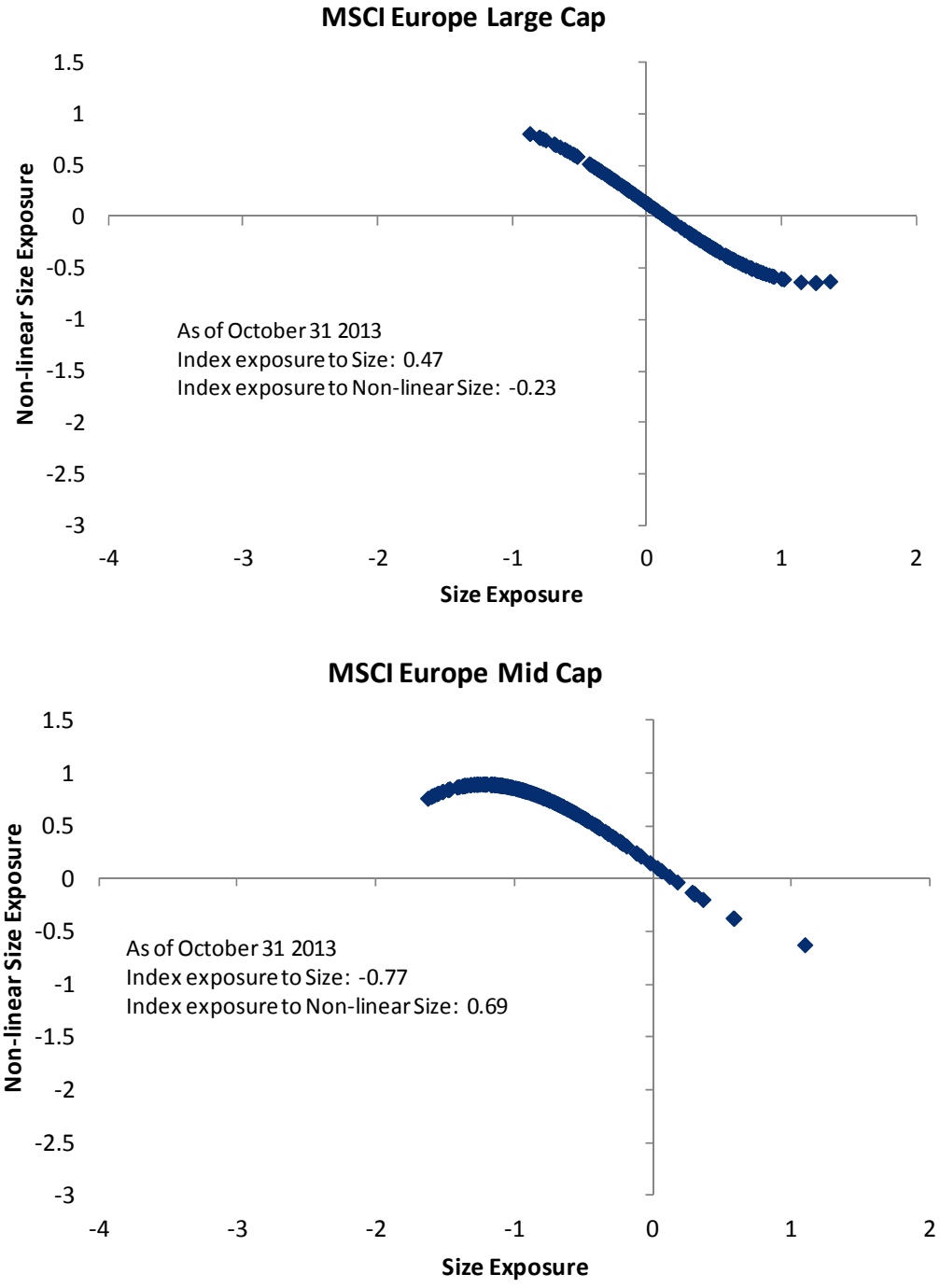
Style Factor	Annualized Return	Annualized Volatility	Sharpe Ratio
Earnings Yield	2.92	2.26	1.29
Non-linear Size	2.07	1.77	1.17
Momentum	4.92	4.27	1.15
Dividend Yield	1.58	1.70	0.93
Growth	0.66	1.25	0.53
Beta	1.34	5.02	0.27
Book-to-price	0.38	1.82	0.21
Liquidity	0.08	1.58	0.05
Size	-0.83	2.77	-0.30
Leverage	-1.26	1.54	-0.82
Residual Volatility	-2.99	3.54	-0.84

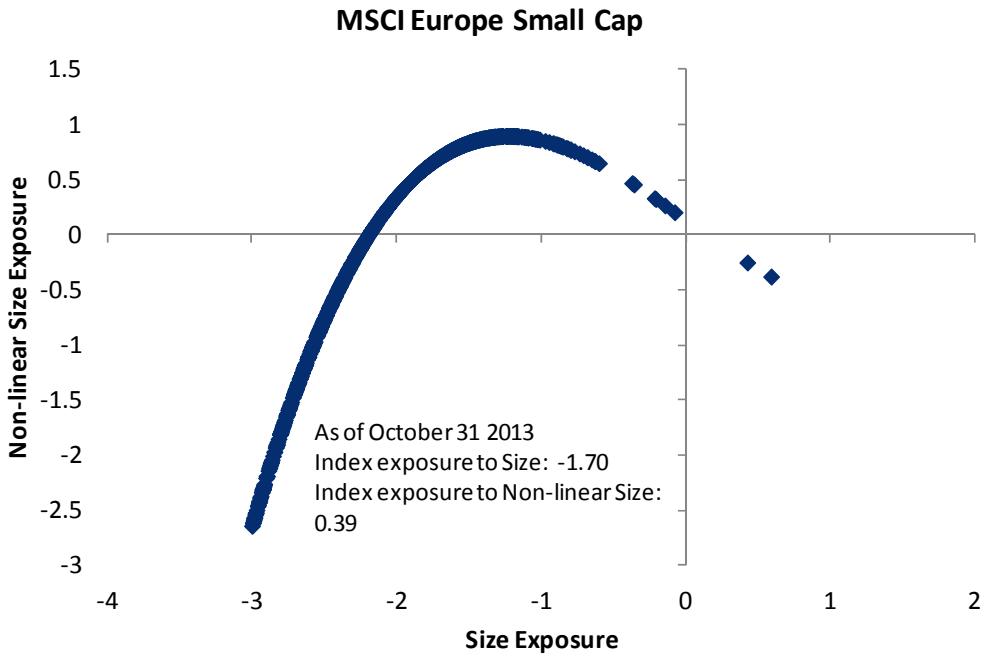
Exposures of Typical Benchmark Portfolios

To assess the relation of the Non-Linear Size factor to traditional, long-only, capitalization-weighted benchmarks, Figure 3 shows the exposures to the Size and Non-Linear Size factor for stocks in the MSCI Europe Large Cap, Mid Cap and Small Cap indices as of April 30, 2013. Note that in the Barra Europe Equity Model, both Non-Linear Size and Size exposures are standardized on a country-relative basis. This implies that depending on the distribution of the market capitalizations in each country, the typical Size and Non-Linear Size exposure of the large cap, mid cap and small cap segments can differ somewhat from country to country. This leads to some overlap between the exposures of the indices. Furthermore, to avoid excessive turnover, capitalization weighted indices are typically rebalanced only a few times a year, and during rebalancings, comfortable buffer zones are defined around size segment limits. Therefore, stocks that experienced large price movements are not instantly migrated to a different size segment. This can also lead to some overlap between exposures of the size segment indices.

Nevertheless, we see that large-cap stocks tended to have a positive exposure to Size and a negative exposure to Non-Linear Size on our study date. As we move into the mid-cap segment, stocks tended to have a positive exposure to Non-Linear Size and a negative exposure to Size on this date. Small-cap stocks spanned both positive and negative exposures to Non-Linear Size and had a negative exposure to Size on this date. Index level exposures confirm on this date that the combination of mildly negative Size exposure and a positive Non-Linear Size exposure picks up the performance associated with the mid cap segment.

Figure 3: Size and Non-Linear Size exposures of stocks in MSCI Europe size segments, EUE4 Model, 30 April 2013

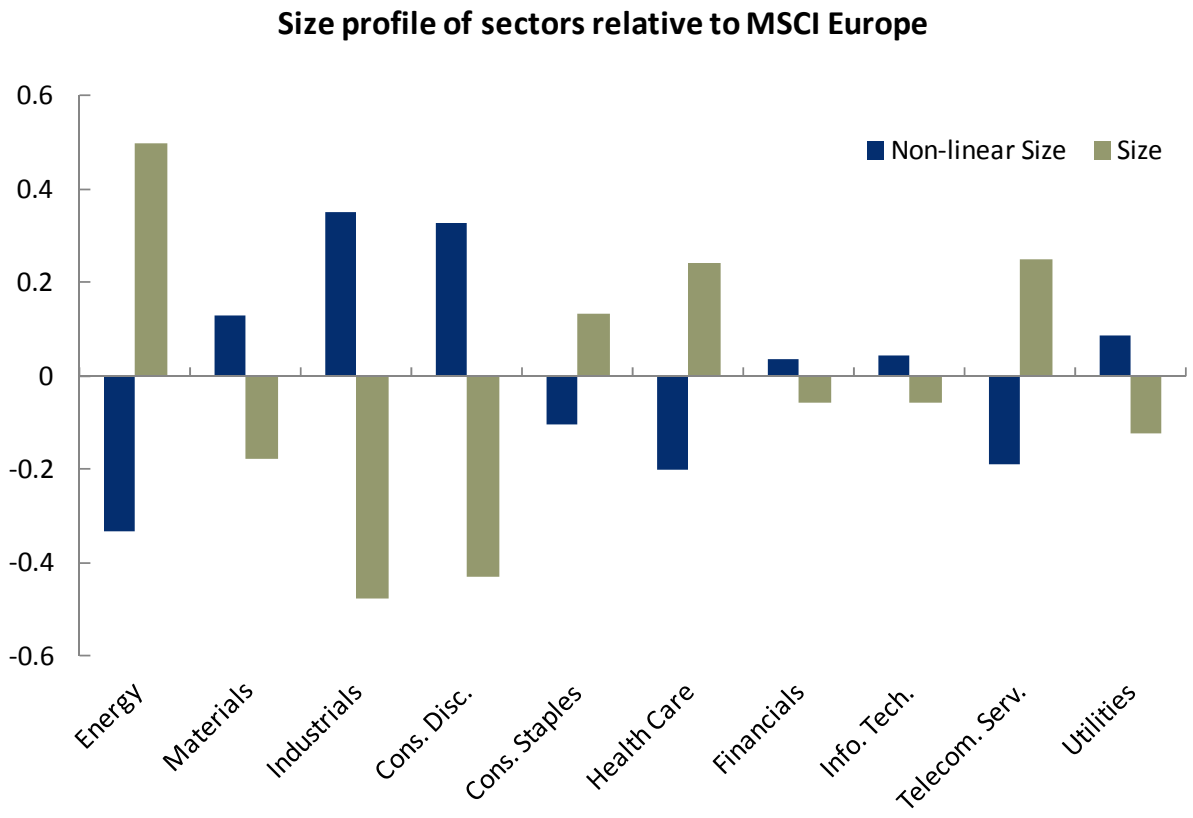




In Figure 4, we report the average active exposure of the ten GICS sector portfolios to the Size and Non-Linear Size factors. As a benchmark portfolio, we used the MSCI Europe index; the active exposures thus show to what extent the distribution of company sizes in certain sectors deviate from the distribution in the overall MSCI Europe benchmark portfolio. We have verified that these size profiles have been stable in Europe since 2008.

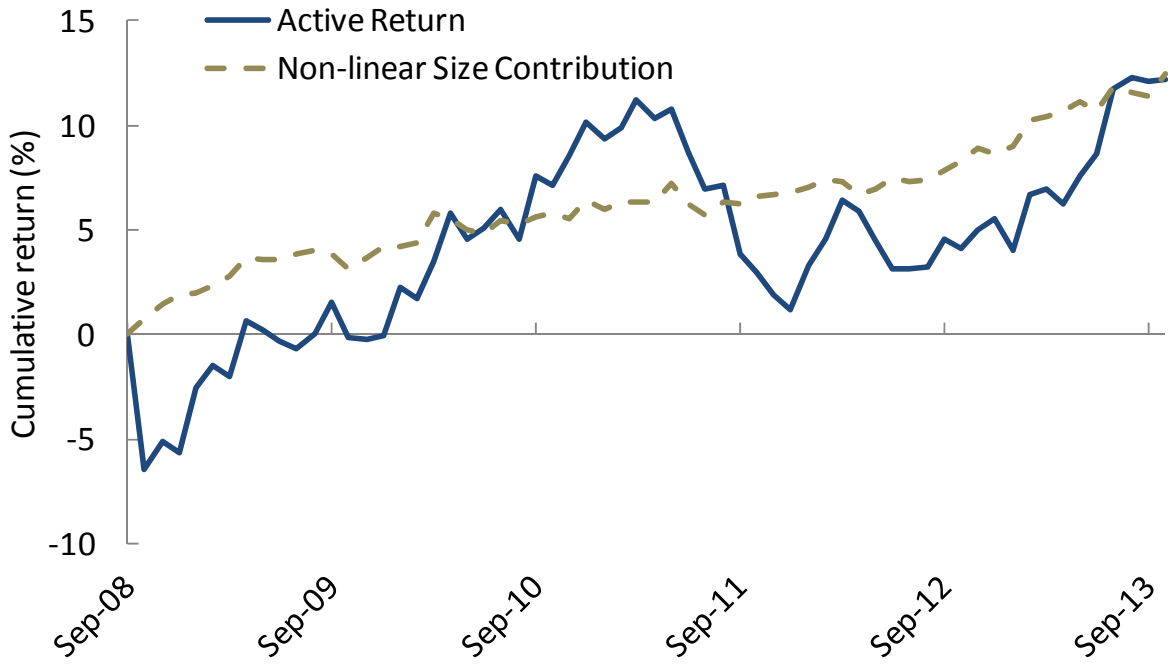
The active exposures in the Financials, Information Technology and Utilities sectors were small,with those sectors showing a size profile similar to the MSCI Europe universe. On the other hand, the Energy sector had a large positive exposure to the Size factor and a large negative exposure to the Non-Linear Size factor – indicating an above average concentration of large-cap stocks in that sector. Furthermore, the Industrials and Consumer Discretionary sectors had a large negative active exposure to the Size factor and a large positive exposure to the Non-Linear Size factor. This indicates that those sectors were dominated by mid-cap companies.

Figure 4: Average active exposures of MSCI Europe sectors relative to the MSCI Europe index, Jan 2008 – Oct 2013, EUE4 model.



Finally, we show the Non-Linear Size factor had an important contribution to the outperformance of the MSCI Europe Mid Cap index presented earlier in Figure 1. As noted previously, European mid-cap stocks have outperformed large cap stocks by 12 percent during the October 2008 – October 2013 period. The Non-Linear Size factor contributed consistently to this outperformance, with around 12 percent cumulatively, as shown in Figure 5.

Figure 5: Contribution of the Non-Linear Size factor to the active return of MSCI Europe Mid Cap Index relative to MSCI Europe Large Cap Index, Oct 2008 – Oct 2013.



Conclusion

In this report, we described the Non-Linear Size factor in the latest Barra Europe Equity Model, and showed its relevance in the behavior of European portfolios. By design, this factor aims to capture risk and return characteristics of stocks towards the middle range of the market capitalization spectrum, net of other systematic factors. Accordingly, in Europe, mid-cap stocks tended to have a positive exposure to the Non-Linear Size factor and a relatively small negative exposure to the Size factor. We have also shown that the Non-Linear Size factor has contributed significantly to the outperformance of European mid-cap stocks over large caps since the global financial crisis.

Thus, by monitoring the exposure to the Non-Linear Size factor in combination with the exposure to the more traditional Size factor, institutional investors can evaluate more precisely how the distribution of stock sizes in their portfolios could affect their portfolios' risk and return.

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[1] *As of September 30, 2012, as published by eVestment, Lipper and Bloomberg on January 31, 2013*

Apr 2013