

## Introduction

Understanding the different factors that drive international stock returns has long been one of the central themes in global investing. Various studies have postulated that global stock prices are driven by a global equity market factor, country factors, industry factors, as well as style factors such as size and value. The implications for investors are clear; a better understanding of these factors would provide valuable information on top-down investing and, in particular, would help in formulating equity allocation strategies.

Much research work has been carried out to identify and quantify the factor returns embedded in international stock prices. In this Research Bulletin we demonstrate how this may be carried out using the new and enhanced Barra Global Equity Model (GEM2).<sup>1</sup> GEM2 can be used to support global, top-down asset allocation based on a factor approach.

In the rest of this Research Bulletin, we look at the evolution of the importance of different factor groups over time and highlight implications this may have on global investing. An example involves comparing country versus industry allocations in developed versus emerging markets. Country allocation is shown to potentially provide more opportunities for generating active returns in emerging markets while industry rotation potentially offers more possibility for outperformance in developed markets.

## Measuring the Importance of Different Factors in GEM2

The new GEM2 model is based on weekly cross-sectional regressions of excess stock returns on various factors as shown by<sup>2</sup>

$$r_i = g_{world} + X_{country,i}g_{country} + X_{industry,i}g_{industry} + X_{style,i}g_{style} + \varepsilon_i$$

where  $r_i$  denotes excess returns, and the X's and g's represent the factor exposures and factor returns respectively. Unlike the previous version of the model, GEM, in which country factors receive preferential treatment, in GEM2 all factors are treated equally. This change is important because it allows us to compare the relative importance of other groups of factors to country factors.

The model specifies that all stocks within the same industry contain a common factor in their returns, which may be termed as the pure industry factor return ( $g_{industry}$ ). This return is pure because all other effects – including country and style and other industries – have been taken out through this multivariate regression. Likewise,  $g_{country}$  and  $g_{style}$  represent the pure country and style bets. The regression therefore attributes the excess returns of a given security to various factors, which provides a platform for us to obtain pure measures of country and industry effects.

A measure of the relative importance of country versus industry factors is the average effect of each group of factors from a global perspective. These mean factor return estimates may be viewed as a measure of the opportunities for outperforming the global factor with systematic country or industry tilts. To aggregate these effects across countries, a number of researchers have used the mean absolute deviation (MAD) from the index return as defined by using the coefficient estimates associated with the factors (e.g. Rouwenhorst (1999); Cavaglia, Brightman and Aked (2000))<sup>3</sup>:

$$MAD_i = \sum_i w_{i-1}^i |\hat{g}_i^i|$$

<sup>1</sup> A full description of the model may be found in: Menchero, Jose, Andrei Morozov and Peter Shepard (2008), "The Barra Global Equity Model (GEM2)", *MSCI Barra Model Insights* (September).

<sup>2</sup> This paper uses GEM2 historical data which may be subject to change before its release in early 2009.

<sup>3</sup> Cavaglia, Stefano, Christopher Brightman and Michael Aked (2000). "The Increasing Importance of Industry Factors", *Financial Analysis Journal*, Vol. 56 No. 5 (Sep/Oct), pp.41-53. Rouwenhorst, Geert (1999). "European Equity Markets and the EMU". *Financial Analysts Journal*, Vol. 55 No. 3 (May/Jun), pp.57-64.

where the superscript  $i$  represents the  $i$ th country or industry while the subscript  $t$  denotes time. The weights  $w^i_t$  are based on market capitalization while the estimates  $\hat{g}$  are the industry or country factor returns. As an example, the MAD score for the country effect is computed as the average of the factor returns associated with the 55 country factors, weighted according to market capitalization. Extending to different points in time, this creates a time series of MAD scores that reflect the evolution of a group of factors, such as country factors. Note that this statistic is a weighted average of absolute factor returns, and is thus conceptually different from cross-sectional volatility (CSV), which is computed as the weighted standard deviation of individual stock returns.<sup>4</sup> Cross-sectional volatility is intended to capture the dispersion in stock returns while the statistic here is a measure of country or industry effects.

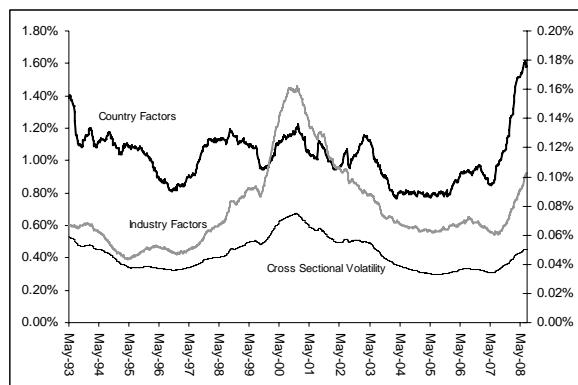
Using this statistic, we could obtain measures of the country and sector effects for the global universe. This is shown in Figure 1, where the MADs (52-week moving averages) for these two effects are plotted together with cross-sectional volatility. Focusing first on the industry effect, we see an obvious increase from around 1997 to mid-2000, which coincided with the internet boom. Since that peak, the sector effect had declined almost as quickly, and was almost back to its 1997 level by about 2005. The country effect, in comparison, was relatively more stable and, prior to 2007, it appeared to be on a slight downward trend. However, there was a sharp increase from mid-2007, which was related to the increased volatility in global markets due to the subprime crisis.

Figure 1 also shows that cross-sectional volatility, which is a gauge of the opportunities to generate active returns through stock selection, appears to have significant comovement with the industry effect. In particular, both rose sharply in the late 1990s during the internet boom and declined thereafter. The internet bubble therefore contributed significantly to enlarging the opportunity set for generating active returns at both the industry level and stock level, but to a much lesser extent at the country level. On the other hand, the recent subprime crisis has caused all three measures to rise sharply, indicating that the outperformance potential along all three fronts has risen.

Figure 2 compares the relative importance of country and sector effects by taking the ratio of the respective MADs. It shows that from 1995-2000, the country effect became less important relative to the sector effect, which was to a large extent due to the bull run in IT stocks.

However, since 2000 the trend has been reversed, although the rise in the relative importance of the country effect from that point has been noticeably more gradual. So while it may be true that the country effect is weakening due to globalization over the very long run, in the short to middle term its impact could still strengthen according to market conditions.

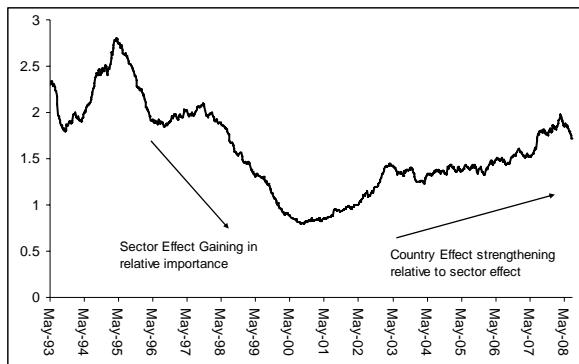
**Figure 1: Comparing Country and Industry Effects for Global Universe (1993-2008)**



Note: 52-week moving averages for country and industry MADs as well as for cross-sectional volatility.

<sup>4</sup> Nielsen, Frank (2006). "Dynamic Volatility and its Implications for Portfolio Management", *MSCI Barra Horizon*.

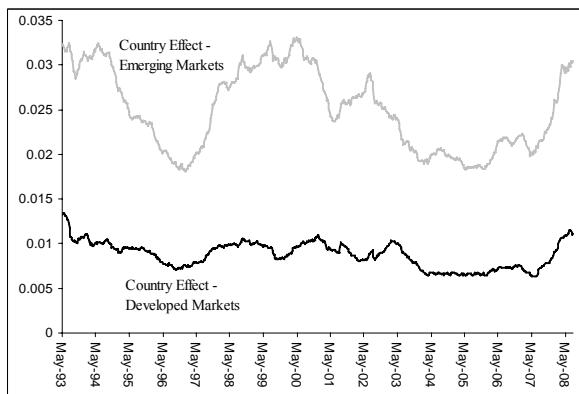
**Figure 2: Ratio of Country versus Sector Effects: Global Universe (1993-2008)**



Note: Ratio of 52-week moving averages for country and industry MADs.

The next question is whether there is any significant difference between developed and emerging markets. To investigate this, the country effect is computed separately for these two categories. The results are shown in Figure 3, which clearly indicates that country differences have been much more important in emerging markets as compared to their developed counterparts.

**Figure 3: Comparing Country Effects for Developed and Emerging Markets**

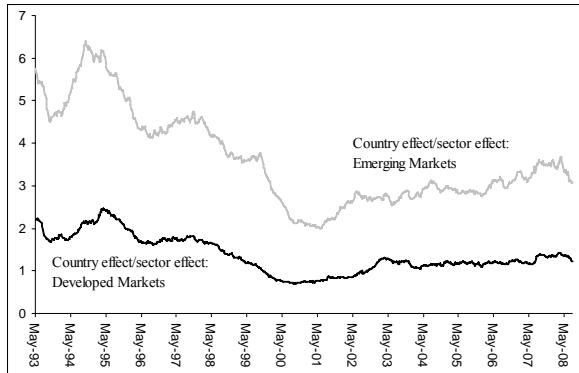


Note: 52-week moving averages for country MADs.

The country MAD for emerging markets is often twice as large, and sometimes even three times larger than that for the developed stock markets. In addition, the country effect for developed markets also has been much more stable. This is particularly pronounced during periods of crisis; for instance, the Asian Currency Crisis in the late 1990s caused the country effect in emerging markets to rise sharply. Even for the recent subprime crisis which originated in the US – a developed market – the rise in the country effect was much more striking for the emerging markets than their developed counterparts.

To bring the analysis a step further, the relative importance of country and industry effects will be extended separately to emerging and developed countries. Figure 4 compares the ratios of the country and sector MADs for the emerging and developed markets respectively. It shows that the country effect was much more important in the emerging markets, although the gap with the developed markets narrowed during the bull run in the second half of the 1990s. There has also been significant comovement in both series, though again the one for the developed markets has been clearly more stable.

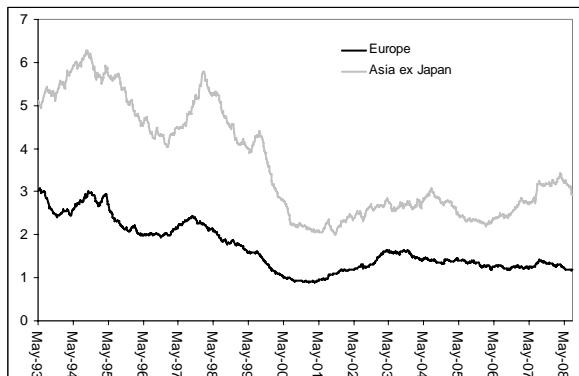
**Figure 4: Relative Importance of Country versus Sector: Developed and Emerging Markets**



Note: Ratio of 52-week moving averages for country and industry MADs.

It is also of interest to examine across regions for any differences in the relative importance of the country effect. Just as in comparing between developed and emerging markets in Figure 4, Figure 5 plots the ratios of the country to industry MADs, in this case for Europe and the Asia ex Japan region. The country effect seems much more important than the industry effect for Asia than for Europe. This difference was particularly pronounced during the Asian currency crisis in 1997-98. In general, the ratio for Asia was about twice as high as that for Europe, and has also been considerably more volatile.

**Figure 5: Relative Importance of Country versus Sector: Europe and Asia Ex Japan**



Note: The countries covered under the two regions here correspond respectively to those in the MSCI AC Europe and MSCI AC Asia ex Japan Indices.

The differences highlighted above have important investment implications. Country allocation is likely to provide more opportunities for managers to generate active returns in emerging markets than in developed ones. Similarly, greater emphasis on a sector rotation strategy probably offers more potential for outperformance in Europe, while on the other hand a stronger focus on country allocation is expected to provide greater investment opportunities in the Asia ex Japan region. In addition, the relative emphasis on country allocation versus sector rotation may be made to vary across time for a given universe. In this case, it would pay to commit more resources to sector rotation if the relative importance of the country effect falls relative to the industry effect and vice versa.

## Conclusion

Using the GEM2 model, we show how the country and industry effects can be measured across time. The advantage of using the model for this purpose is its ability to generate pure factor returns, which captures the impact of a factor by netting out the influences of all others. In addition, the broad coverage of the GEM2 model – which includes 55 country factors, 8 style factors and 34 industry factors – mitigates the possibility of biased estimates due to

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omitted variables. The removal of the country-first approach in the GEM2 model, which now assigns equal importance to all variables, also facilitates the comparison of country to other factors.

By comparing the measures for the country and industry effects, we are also able to track their relative importance over time and across various country groups or regions, which has implications for a global investor's equity allocation policies. This is particularly important since the two effects may change significantly over short periods, particularly for emerging markets. Information on this may therefore enable the global equity investor to adjust equity allocation rules to best capture the current opportunities in stock markets worldwide.

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