The Volatility Factor: How do Exposures Change over Time?

Barra Insight: Using Barra Models to Understand the Investment Environment

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How does your portfolio's sensitivity to shifts in risk aversion change over time?

This article examines how stock exposures to the Volatility factor, as defined in the Barra Global Equity Model (GEM2)[1], change over time. We show how the exposure to the Volatility factor of some sectors and regions have evolved over time. Exposures to the Volatility factor can change significantly, reflecting market events that affect the relative riskiness of a country, region or sector.

In a previous article, "The Volatility Factor and Risk Aversion," presented in the Q1 2012 newsletter, we explained how returns to the Volatility factor can provide a measure of investors' risk appetite. This analysis was extended in "Is Your Portfolio Positioned for Shifts in Risk Aversion?" in the Q2 2012 newsletter. We showed how specific groups of stocks, like countries or industries, are exposed to the Barra Volatility factor. This exercise identified the stocks more likely to be impacted by a shift in risk aversion as of the end of Q2 2012. In this final paper in the series, we demonstrate how the exposure to the Volatility factor of some of these sectors and regions has evolved over time. Exposures to the Volatility factor can change significantly, reflecting market events that affect the relative riskiness of a country, region or sector. This illustrates how Barra models react to market events, giving investors the ability to measure and quantify changes in the risk profile of their portfolio.

[1] The Barra Global Equity Model (GEM2) is a global multi-factor risk model used by fund managers to help construct and manage global equity portfolios.

Market Review

Many equity markets recovered the losses of the first half of the year thanks to the rally that started in early June of 2012. Generalized optimism about the progress of the European rescue packages and a third round of quantitative easing in the USA can partly explain the positive performance of some equities since June.

Figure 1 shows the daily returns and 20-day daily realized volatility (standard deviation of daily returns) of the MSCI ACWI IMI Index, which includes global large-, mid- and small-cap stocks. It shows how the sharp increase in volatility that started in August of 2011 was followed by a sustained decline. By February of 2012, realized volatility had returned to pre-crisis levels observed in the first half of 2011, and have remained relatively stable since then.

Figure 1: MSCI ACWI IMI Index: Daily returns and 20-day daily volatility

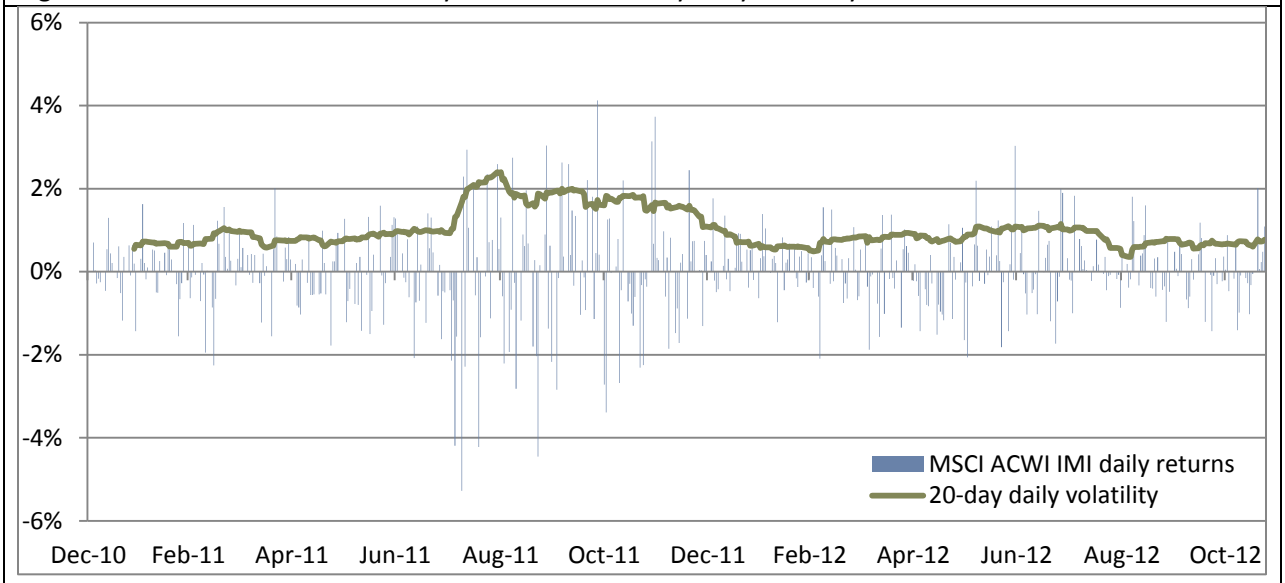
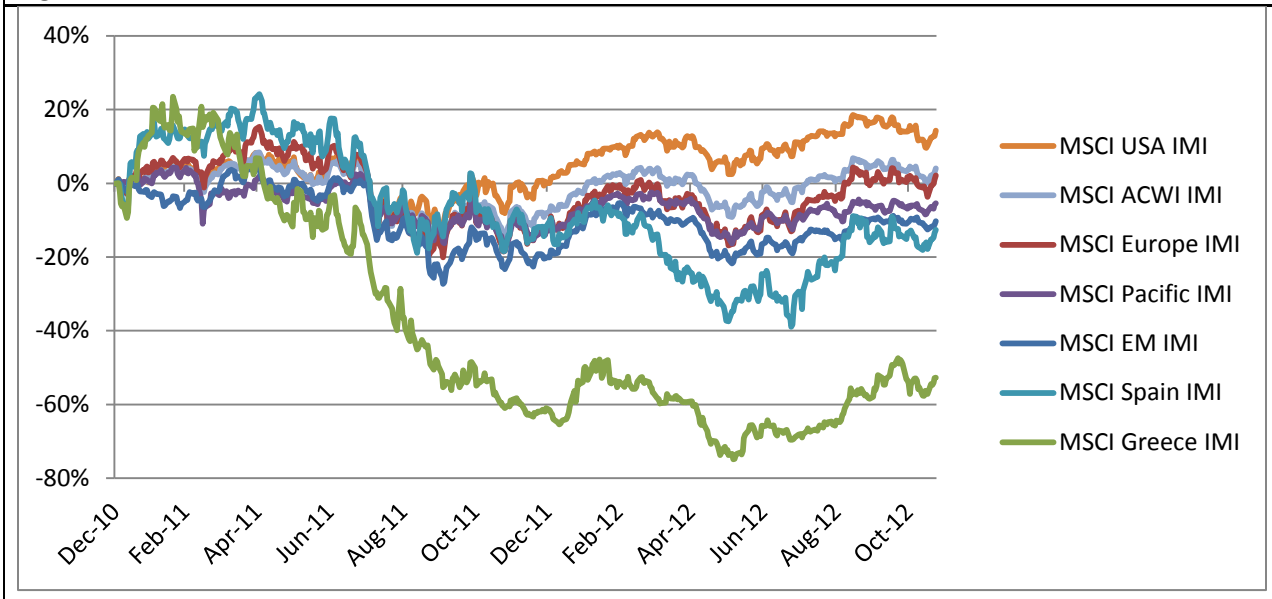


Figure 2 shows the cumulative returns of seven MSCI Indices. The MSCI ACWI IMI index posted a cumulative return of more than 14 percent between early June and November 23, 2012. The MSCI Europe IMI index increased more than 22 percent in the same period, with Spain rallying more than 39 percent and Greece increasing by more than 70 percent. These gains were enough to offset the losses observed in the first half of 2012, and led most equity indices into positive territory for the year.

Figure 2: MSCI IMI Indices: Total return in USD

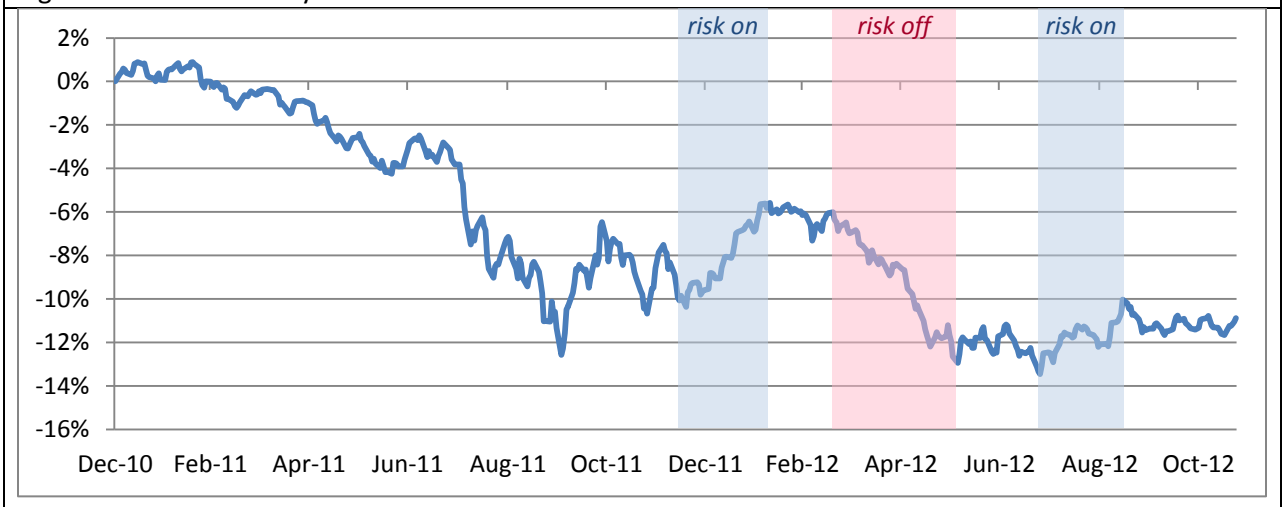


How is my portfolio affected by changes in risk appetite?

In the first article of this series (The Volatility Factor and Risk Aversion, March 2012) we explained how returns to the Volatility factor could be used as an indicator for investors' risk appetite. The logic is as follows: the performance of the Volatility factor mirrors that of a long/short portfolio that holds high-volatility stocks long and low-volatility stocks short. By definition, an increase in risk aversion reduces the appetite for risky stocks. This could prompt investors to rebalance their portfolio, reducing their holdings of risky (or more volatile) stocks. These relatively risky stocks could underperform other less risky stocks, resulting in a negative return to the Volatility factor. The opposite could also be true: a decrease in risk aversion could increase demand for riskier stocks (relative to less risky ones), resulting in a positive return to the Volatility factor. Thus, one could potentially interpret the performance of the GEM2 Volatility factor as an indicator of risk aversion.

Figure 3 illustrates how the Volatility factor returns mirrored the perceived *risk on/risk off* shift that occurred in 2011 and 2012 to date. A *risk on* period of increased risk appetite during late 2011 and early 2012 pushed returns to the Volatility factor five percent higher. However, risky stocks started losing traction in mid-March 2012 and a *risk off* market environment took over again, resulting in a 7 percent drop in the Volatility factor by June. Risk appetite increased again, with the Volatility factor returning around 4 percent while equities rallied.

Figure 3: GEM2 Volatility factor returns



From a global perspective, returns to the GEM2 Volatility factor can be very useful in understanding general market behavior and trends in risk aversion. However, as explained in the second article in the series (Is Your Portfolio Positioned for Shifts in Risk Aversion, July 2012), for information specific to how a portfolio, region or sector might be affected by shifts in risk aversion (as measured by the Volatility factor), we need to study the *exposures* to the Volatility factor instead. For example, having a view on the *risk on*/*risk off* environment and knowing how it affects the Volatility factor returns does not mean a portfolio is positioned for those shifts in risk aversion. To position a portfolio to shifts in risk appetite, the manager must monitor and (if necessary) change the *exposure* of the portfolio to the Volatility factor.

An analysis of the exposure of a portfolio to the Volatility factor can be used to understand how the portfolio is positioned for changes in risk aversion. As we have explained in the two previous articles, Barra risk models help understand which stocks (or groups of stocks, like regions or sectors) contribute the most to the risk aversion positioning of a portfolio. However, one element that we have not addressed is how much these exposures change over time, reflecting market events that can modify the risk profile of stocks and portfolios.

In the second article of this series we also identified, with the help of a heat map as of the end of Q2 2012, the sectors and regions that were more exposed to the Volatility factor, and thus more sensitive to shifts in investor's risk appetite within equities.

One of the conclusions from this heat map analysis was that, perhaps as expected, the Eurozone was the region most positively exposed to the Volatility factor, with Asia Pacific being the most negatively exposed region. This exposure, however, responds to recent market developments -- namely the fears about a breakdown of the Eurozone that dominated the headlines in the late 2011 and early 2012. Figure 4 shows the last 10 years of monthly exposures to the Volatility factor for both the Eurozone and the Asia Pacific region.

The rate at which exposures change in response to market events can be high. For example, in May 2011 the Volatility exposures of these two regions were both near zero. Just three months later, in August 2011, there was a difference of around 0.50 between these two regions, with Asia Pacific having an

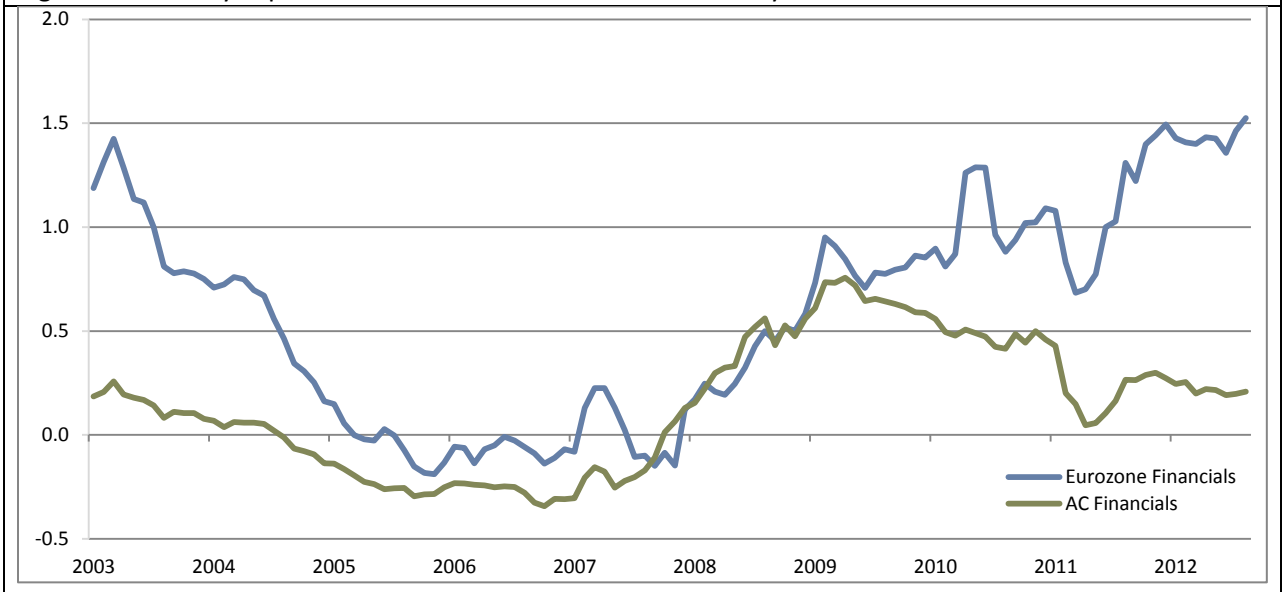
exposure of -0.27 versus +0.23 in the Eurozone. This divergence illustrates how the exposures responded to the shocks to the European economy that took place in the summer of 2011.

Figure 4: Volatility Exposures: Eurozone vs Asia Pacific

Another highlight from the heat map analysis was the cluster of very high exposures to the Volatility factor in Eurozone Financials, illustrating the precarious situation of some financial institutions in the monetary union. Figure 5 compares the last 10 years of monthly exposures to the Volatility factor of the Financial Sector, both globally and in the Eurozone. Note the decreasing and negative exposures shown by these two sectors during the boom years of late 2004 to late 2006, followed by a turnaround in early 2007. Both sectors moved more or less in tandem for the next 24 months, until the exposure of Global Financials peaked in early 2009 (0.73 in April 2009). It has gradually decreased since then, down to 0.20 by the end of September 2012.

Eurozone Financials, however, diverged from global financials in early 2009, remaining highly exposed to the Volatility factor and, after a short period of relief in early 2011, rebounding to record highs: 1.52 by the end of September 2012. This figure indicates that, on average, the exposure to the Volatility factor of Eurozone Financials is 1.52 standard deviations higher than the average, making this regional sector the most exposed to shifts in risk aversion.

Figure 5: Volatility Exposures: Eurozone Financials vs All Country Financials



Conclusion

We explained how Barra factors—in particular, the Volatility factor in Barra Global Equity Model (GEM2)—can be used to understand how a portfolio expresses a view on risk aversion. We first analyzed the returns of the Volatility factor and explained its conceptual link to risk aversion. This is useful to explain how the exposure of a portfolio to the Volatility factor expresses whether the portfolio is positioned for an increase or decrease in risk aversion.

We then showed how exposures to the Volatility factor change over time, reflecting market events that affect the relative riskiness of stocks, as measured by the descriptors of the Volatility factor. Through two time series charts of the long term evolution of the Volatility exposure of a set of portfolios, we show how market events can have a large impact on the exposure of a portfolio, effectively changing the positioning of the portfolio to shifts in risk aversion. This illustrates how Barra models can be used to measure, quantify and monitor the impact of shifts in risk appetite on portfolios, making sure that they accurately reflect your views on risk aversion.

NOTE: *This analysis concentrated on the Volatility factor returns, the link with risk aversion, and time series of exposures across sectors and regions. However, the exposure to a single factor (in this case GEM2's Volatility factor) is only a partial view of the risk profile of a portfolio. For an accurate representation of the risk profile of a portfolio, all other factors must be taken into account.*

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[1] *As of June 30, 2011, based on eVestment, Lipper and Bloomberg data*.