The Volatility Factor and Risk Aversion

Barra Investment Insight: Using Barra Models to Understand the Investment Environment

Israel Solares-Moya

February 2012

This article examines how Barra factors can be used to better understand the market environment. We analyze the 2011 equity markets and observe the performance of some Barra factors during market events. We also investigate relationships between the returns to the Barra Volatility[1] factor and the levels of implied volatility, as measured by the CBOE Volatility Index (VIX). The factors that we focus on are defined in the Barra Global Equity Model (GEM2), a global multi-factor risk model used by fund managers to help construct and manage global equity portfolios. Our analysis shows that:

- As investors risk aversion levels change, this is reflected in the performance of the Barra Volatility factor. For example, when the Volatility factor performs poorly (generates negative returns), this is consistent with an increase in risk aversion as investors bid up the prices of relatively low-risk (volatility) stocks.
- For the analysis period there seems to be a negative relationship between the CBOE Volatility Index (VIX) and performance of the Volatility factor.
- There is an interesting relationship between the returns to the Volatility factor, the level of implied market volatility and risk-aversion.

In the first half of 2011, global equity markets were relatively stable and exhibited relatively low volatility. Chart 1 shows daily returns to the MSCI ACWI Index, a global equity index consisting of developed and emerging market countries, and its rolling 20-day realized daily volatility for 2011. We mark two events on this chart: the first is the Japan earthquake in March; the second is the U.S. debt ceiling agreement in August. We observed that realized volatility was relatively stable and around 1% (as measured by the 20-day daily standard deviation of returns) until August 2011, but increased sharply after the US debt ceiling agreement.

[1] Intuitively, the returns of the Volatility factor can be replicated with a long/short portfolio that holds risky assets long and relatively less risky assets short, while being neutral to all other factors.

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

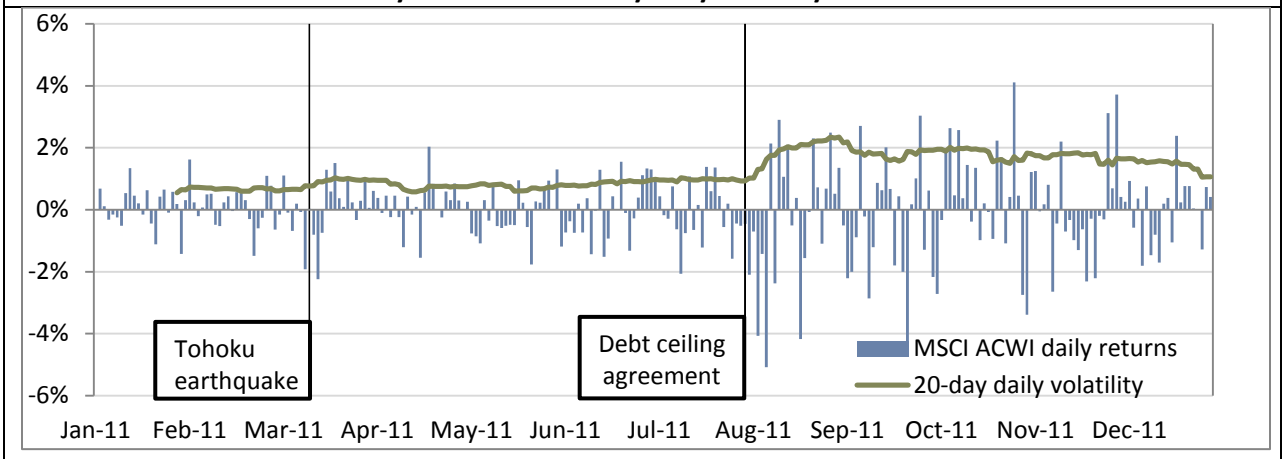
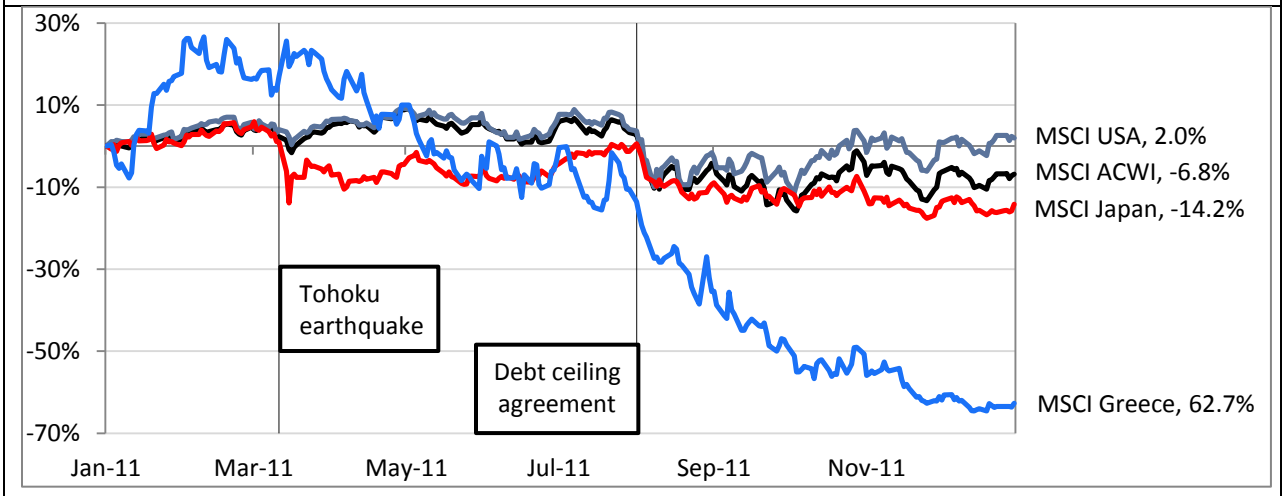


Chart 2 presents returns to four MSCI indices in 2011. We see that while the Japan earthquake had a negative and persistent impact on Japanese equity markets, its impact on global markets was short-lived. After a brief period of negative returns in the global markets, stability resumed during the second quarter of 2011. However, the second half of 2011 saw a drastic increase in volatility, which started in the days before the announcement of the US debt ceiling agreement on August 1, followed by the European debt crisis during Q3 and Q4.

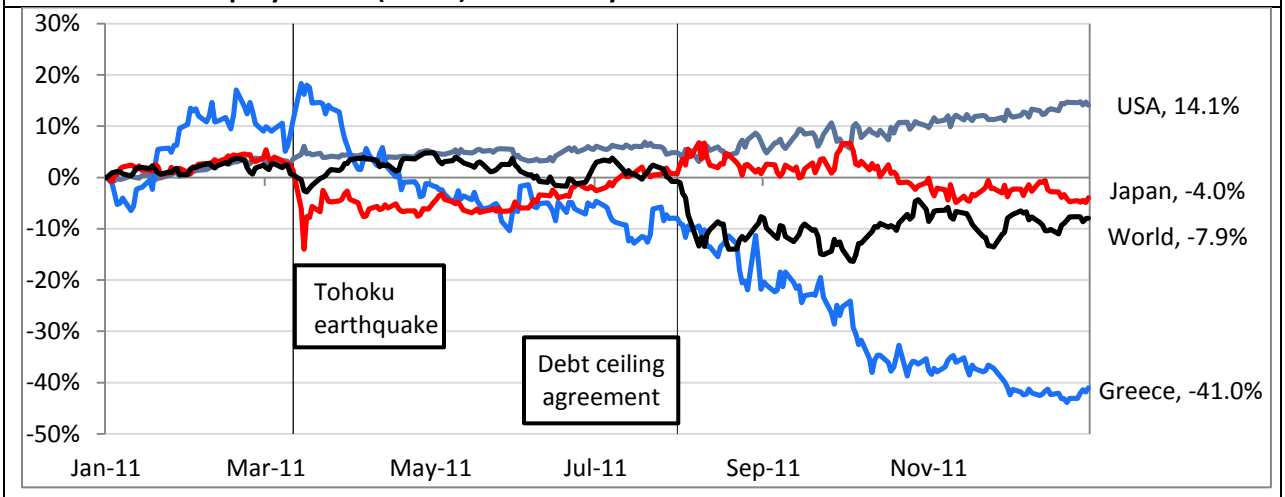
Chart 2: MSCI Indices: Total return in USD



As shown in Chart 3, the Barra GEM2 model provides insight into these large market returns. The chart shows cumulative daily returns to GEM2's World Equity and market factors. The World Equity factor captures the cap-weighted return of global equities, while the market factors capture the return to the local markets, net of other factors like industries and styles. We see that the Tohoku earthquake had a noticeable negative impact on the Japan Market factor, but did not have a persistent effect on other market factors during 2011. This illustrates how Barra factors can be used to characterize a shock as local (i.e. only captured by a local market factor) or global (i.e. when it propagates to the World Equity

factor).

Chart 3. Global Equity Model (GEM2): Select daily factor returns



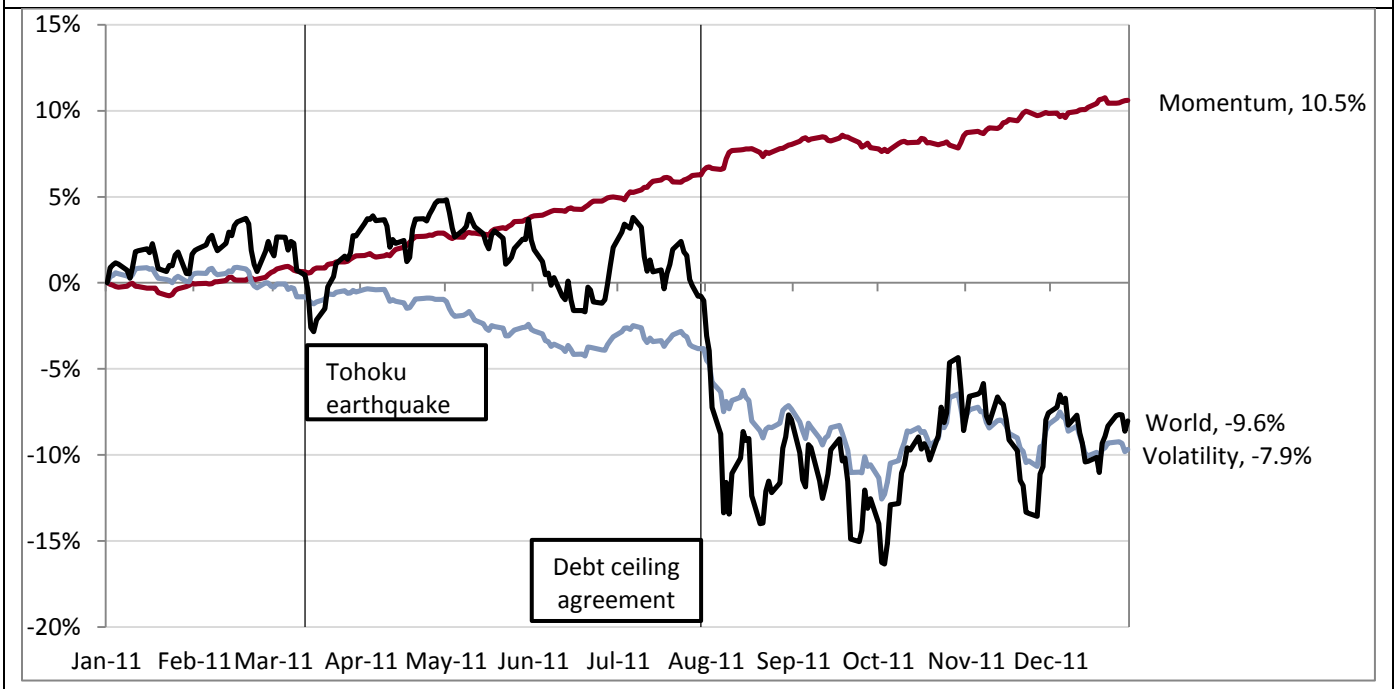
Looking at the returns to the Barra World Equity factor, we see that the debt crisis shocks that started in Q3 2011 were of a global nature, affecting equities across the globe. These shocks include the US debt ceiling agreement in August, followed by increased concerns about the financial health of Greece and Italy in the last quarter of the year.

Other factors in GEM2 can provide additional insight into these market movements. For example, the style indices in GEM2 capture the risks associated with holding stocks that have outperformed the market (through the Momentum factor) or relatively more volatile stocks (through the Volatility factor).

Chart 4 shows cumulative time series of returns to a group of Barra factor style indices over 2011. Note how from August 1, 2011 (the date of the debt ceiling agreement announcement), the Volatility factor showed a marked increase in volatility and strong negative performance, and moved almost in lockstep with the World Equity factor.

Conversely, the Barra Momentum factor exhibited strong, steady positive performance, had a cumulative return of 10.5% with a standard deviation of 1.8%, resulting in a Sharpe Ratio of 5.7. The performance of the Momentum factor will mirror that of a long/short portfolio that holds recent outperforming stocks long and recent underperforming stocks short, net of other factors.

Chart 4. Global Equity Model (GEM2): Select cumulative factor returns



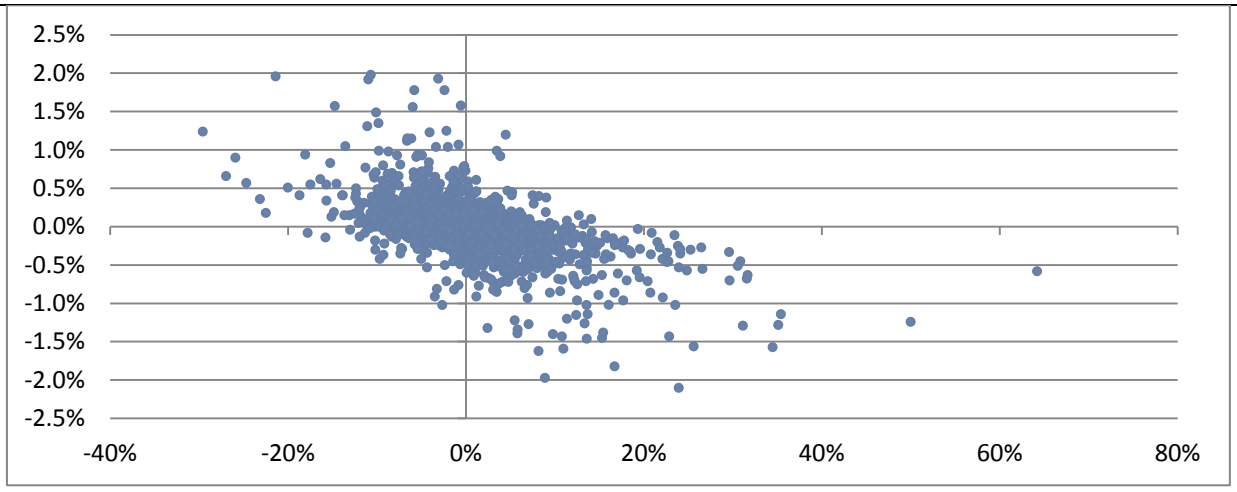
Is The Volatility Factor a Proxy for Risk Aversion?

Taking a closer look at the returns of the Volatility factor yields interesting results. Intuitively, one would expect that the performance of the Volatility factor will mirror that of a long/short portfolio that holds high-risk stocks long and low-risk stocks short. By definition, an increase in risk aversion reduces the appetite for risky assets. This could prompt investors to rebalance their portfolio, reducing their holdings of risky assets. Thus, these relatively risky assets could underperform other less risky assets, resulting in a negative return of 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 of the Volatility factor. Thus, one could potentially interpret the performance of the Volatility factor as an alternative indicator of risk aversion.

We compare the returns of the Volatility factor with a common gauge of risk aversion and investor sentiment: the CBOE Volatility Index (VIX)[2]. Chart 5 shows a scatter plot of daily % change in the VIX (x-axis) vs the daily return to the Volatility factor (y-axis) in 2011. The Volatility factor shows a negative correlation with the changes in VIX; this means that when VIX increased, the Volatility factor tended to have a negative return:

[2] The VIX data used in this analysis is publicly available in http://www.cboe.com/micro/VIX/historical.aspx

Chart 5. Daily % change in VIX levels (x-axis) vs daily Volatility factor returns (y-axis). 31-Dec-2004 to 31-Dec-2011.



The Volatility factor demonstrated a significant, negative correlation with VIX, which could be explained by the mechanics of risk aversion detailed above. In fact, we can replicate the long-term movements of the VIX:

Chart 6. Cumulative changes in VIX (left-hand axis) vs cumulative return of the Volatility factor (right-hand axis)

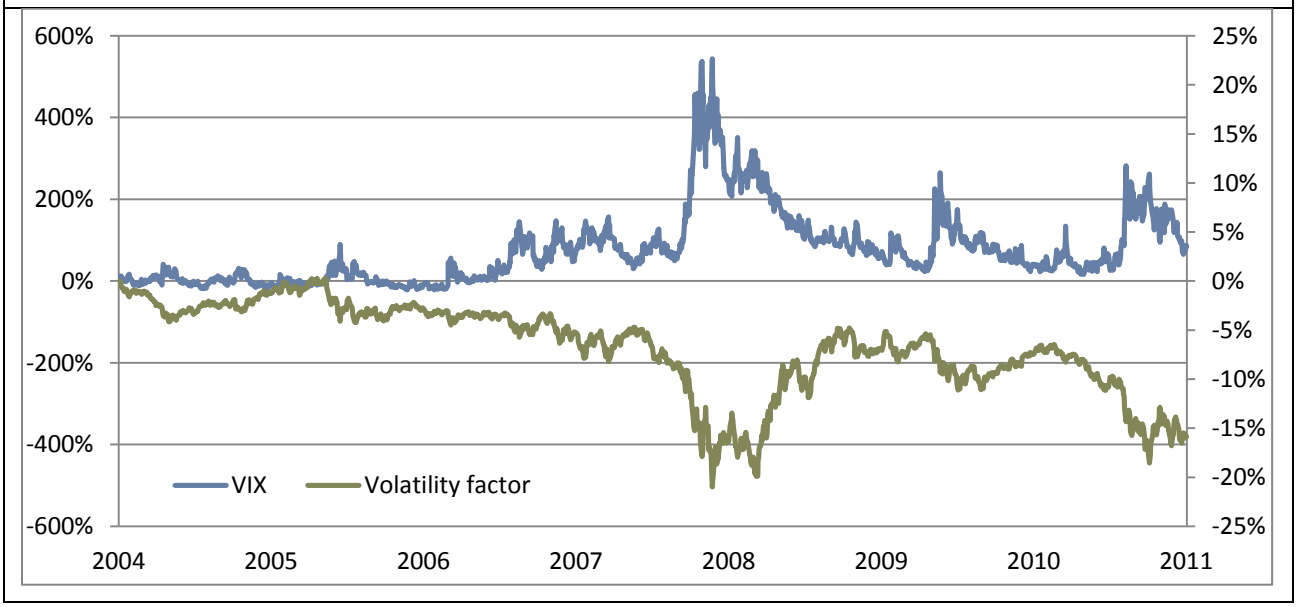


Chart 6 illustrates how Barra factors can potentially help interpret the market environment – something especially useful during turbulent times.

In future notes, we will extend this initial analysis in three ways:

1. We will examine the relationship between VIX and our Volatility factor over a longer period of time.

2. To understand which components of the equity markets (sectors, regions) can be hit the most by changes in risk aversion, we will analyze the historical exposure of different regions and sectors to the Volatility factor, and how these change over time.
3. We will also replicate the analysis with our new-generation models, including the Barra Global Equity Model (GEM3), and the Barra US Equity Model (USE4) -a model built specifically for US portfolios that uses the latest advances in risk methodology. These new models break down the Volatility factor into two components: Beta and Residual Volatility, adding more transparency to the drivers of change in market sentiment.

Peter Zangari also contributed to this article.

Client Service Information is Available 24 Hours a Day

clientservice@msci.com

Americas

Americas	1.888.588.4567 (toll free)
Atlanta	+ 1.404.551.3212
Boston	+ 1.617.532.0920
Chicago	+ 1.312.675.0545
Montreal	+ 1.514.847.7506
Monterrey	+ 52.81.1253.4020
New York	+ 1.212.804.3901
San Francisco	+ 1.415.836.8800
Sao Paulo	+ 55.11.3706.1360
Stamford	+1.203.325.5630
Toronto	+ 1.416.628.1007

Europe, Middle East & Africa

Amsterdam	+ 31.20.462.1382
Cape Town	+ 27.21.673.0100
Frankfurt	+ 49.69.133.859.00
Geneva	+ 41.22.817.9777
London	+ 44.20.7618.2222
Madrid	+ 34.91.700.7275
Milan	+ 39.02.5849.0415
Paris	0800.91.59.17 (toll free)
Zurich	+ 41.44.220.9300

Asia Pacific

China North	10800.852.1032 (toll free)
China South	10800.152.1032 (toll free)
Hong Kong	+ 852.2844.9333
Seoul	+827.0768.88984
Singapore	800.852.3749 (toll free)
Sydney	+ 61.2.9033.9333
Tokyo	+ 81.3.5226.8222

Notice and Disclaimer

About MSCI

MSCI Inc. is a leading provider of investment decision support tools to investors globally, including asset managers, banks, hedge funds and pension funds. MSCI products and services include indices, portfolio risk and performance analytics, and governance tools.

The company's flagship product offerings are: the MSCI indices with approximately USD 7 trillion estimated to be benchmarked to them on a worldwide basis[1]; Barra multi-asset class factor models, portfolio risk and performance analytics; RiskMetrics multi-asset class market and credit risk analytics; MSCI ESG (environmental, social and governance) Research screening, analysis and ratings; ISS governance research and outsourced proxy voting and reporting services; FEA valuation models and risk management software for the energy and commodities markets; and CFRA forensic accounting risk research, legal/regulatory risk assessment, and due-diligence. MSCI is headquartered in New York, with research and commercial offices around the world.

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