

# Axioma Insight

## Quarterly Risk Review

### Global Developed Markets Edition

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For this issue we are tracking a few additional benchmarks and benchmark derivatives. In addition, for many regional benchmarks we are calculating risk in both the local currency and US dollars. Due to currency effects, these estimates can be quite different, as Table 1 illustrates. Most benchmarks saw their risk increase since the end of the third quarter, and risk estimates were substantially higher across the board than they were a year ago. For many of the benchmarks we track, however, risk peaked in October or November, and declined by the end of the year.

PIIGS, FTSE Europe, FTSE Eurobloc and the SP-ASX 200 denominated in USD showed the highest risk, joined by the Russell 2000. Among the European indexes, PIIGS and FTSE Eurobloc also appeared quite risky even in their home currency, whereas the non-Eurobloc indexes exhibited some of the lowest risk when denominated in EUR. Risk estimates in USD for many of these developed markets are also substantially higher than predicted risk in the same currency for the FTSE Emerging index, indicating the ongoing fragility of the markets. The SP-ASX 200 denominated in AUD, with one of the lowest risk estimates, stood in sharp contrast to the high risk of the same stocks in USD.

The death of Kim Jong Il in December, although big news in Asia and globally, did not seem to have any meaningful impact on risk forecasts for the Asia Pacific region, Japan or in emerging markets.

## Fourth-quarter highlights:

- Stock correlations eased at year end and agreement among Axioma's four risk model variants increased, perhaps pointing to better times ahead for managers focused on individual stock selection.
- Benchmark risk continued to rise at the end of 2011. Eurobloc markets, especially PIIGS, led the pack in predicted risk, in both local and USD terms. Japan and Australia (in local currencies) had the lowest risk, joined by non-Eurobloc euro-denominated benchmarks (Table 1).
- While not in complete agreement, risk forecasts from Axioma's four model variants moved closer to each other at the end of 2011 (Figure 4).
- A low volatility strategy would have been the best single-factor strategy for 2011 (Figure 8).
- We have added a new report to help investors determine what is driving the change in risk from one period to the next. This allows you to understand the impact of changes in portfolio composition, volatility and correlation. See figure 7 for more detail.
- A decomposition of our statistical model showed that interest-rate and volatility-related variables were among those most highly correlated with our statistical factors (Table 2).
- Asset-asset correlations reached a new high in 2011, although they retreated somewhat by the end of the year. Currency correlations were at or near record highs (Figures 10 and 13).

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**Table 1. Comparison of Selected Benchmark Predicted Volatilities, Medium-Horizon Fundamental Model<sup>i</sup>**

	Benchmark Predicted Volatility (%)			Change Vs.	
	Most Recent (30 Dec 2011)	Quarter Ago (30 Sep 2011)	Year Ago++ (31 Dec 2010)	Quarter Ago	Year Ago
<b>North America</b>					
Russell 1000	24.4	23.7	16.8	0.7	7.6
Russell 2000	31.2	29.4	21.6	1.8	9.5
FTSE North America	24.6	23.3	15.9	1.3	8.6
<b>Europe</b>					
FTSE 350					
GBP	23.8	23.4	16.6	0.4	7.2
USD	28.0	27.2	14.4	0.8	13.6
FTSE Eurobloc					
EUR	29.8	27.9	17.0	1.9	12.9
USD	36.5	34.6	23.1	1.8	13.4
FTSE Europe					
EUR	25.3	24.5	15.9	0.8	9.4
USD	31.1	30.1	21.1	1.0	10.0
FTSE Developed Europe					
EUR	25.1	24.4	15.8	0.6	9.2
USD	30.9	30.1	21.1	0.8	9.7
Non-Eurobloc*					
EUR	23.0	23.0	16.0	0.1	7.1
USD	27.8	27.3	20.1	0.5	7.7
Non-Eurobloc Developed**					
EUR	22.4	22.7	15.8	-0.3	6.7
USD	27.1	27.0	20.0	0.1	7.2
PIIGS***					
EUR	30.9	29.0	20.5	1.9	10.3
USD	37.9	36.2	26.8	1.6	11.1
<b>Asia-Pacific</b>					
FTSE Asia Pacific	24.2	21.7	13.9	2.5	10.3
Asia Pacific ex-Japan****	28.6	25.2	16.3	3.3	12.2
SP-ASX 200					
AUD	21.5	19.5	14.2	1.9	7.3
USD	34.5	32.3	22.6		
Japan+					
JPY	20.3	21.2	16.4	-0.9	3.9
USD	23.6	21.1	13.8	2.5	9.9
FTSE Developed	26.6	25.3	16.2	1.4	10.4
FTSE Emerging	28.1	25.0	17.8	3.1	10.3
FTSE-All World	26.6	25.0	16.4	1.5	10.2

All figures based on Medium-Horizon Fundamental risk model

\* FTSE Europe minus FTSE Eurobloc

\*\*FTSE Developed Europe minus FTSE Eurobloc

\*\*\*Portugal, Italy, Ireland, Greece and Spain from FTSE Eurobloc

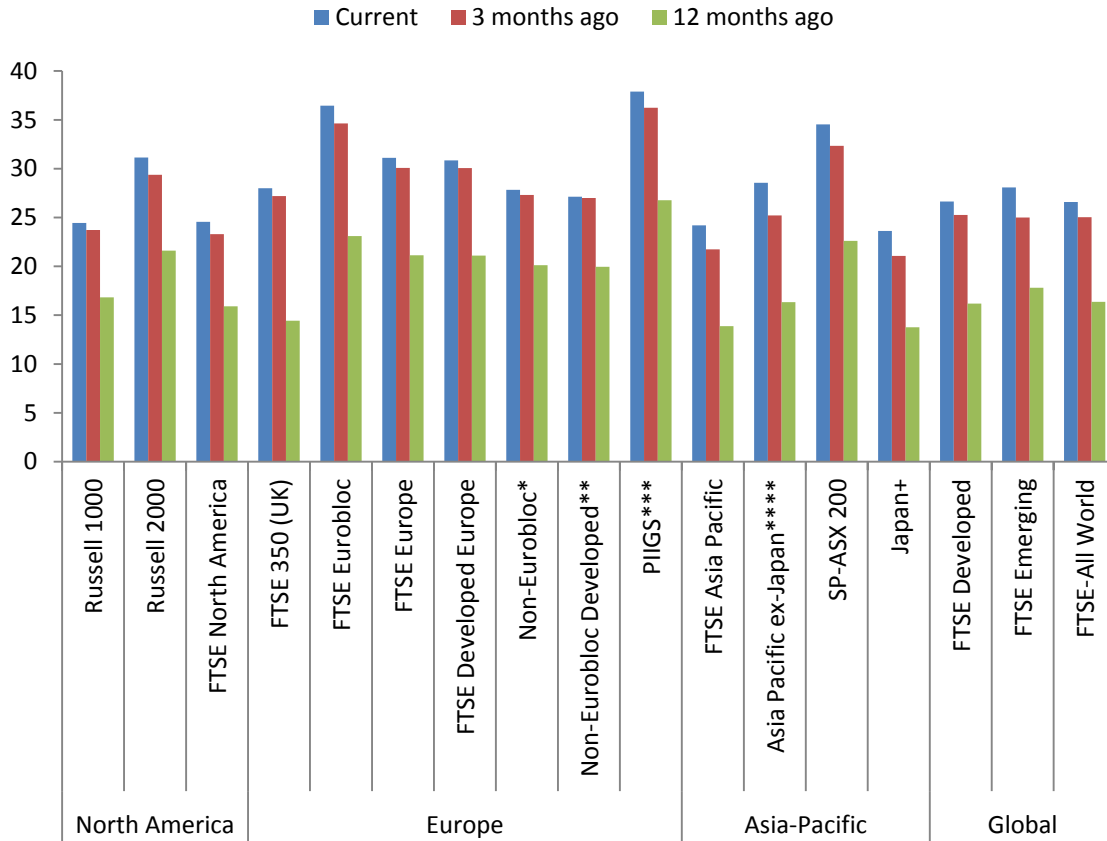
\*\*\*\*FTSE Asia Pacific using Asia Pacific Ex-Japan Risk Model

+Russell Developed minus Russell Developed ex-Japan.

++ 30 December for Japan

Source: FTSE, Frank Russell, Standard & Poor's, Axioma Inc. All figures in USD unless otherwise noted.

**Figure 1. Risk Forecasts (in USD) for Eurobloc and PIIGS Were By Far the Highest**



\* FTSE Europe minus FTSE Eurobloc

\*\*FTSE Developed Europe minus FTSE Eurobloc

\*\*\*Portugal, Italy, Ireland, Greece and Spain from FTSE Eurobloc

\*\*\*\*FTSE Asia Pacific using Asia Pacific Ex-Japan Risk Model

+Russell Developed minus Russell Developed ex-Japan.

++ 30 December for Japan

Source: FTSE, Frank Russell, Standard & Poor's, Axioma Inc. All figures in USD unless otherwise noted.

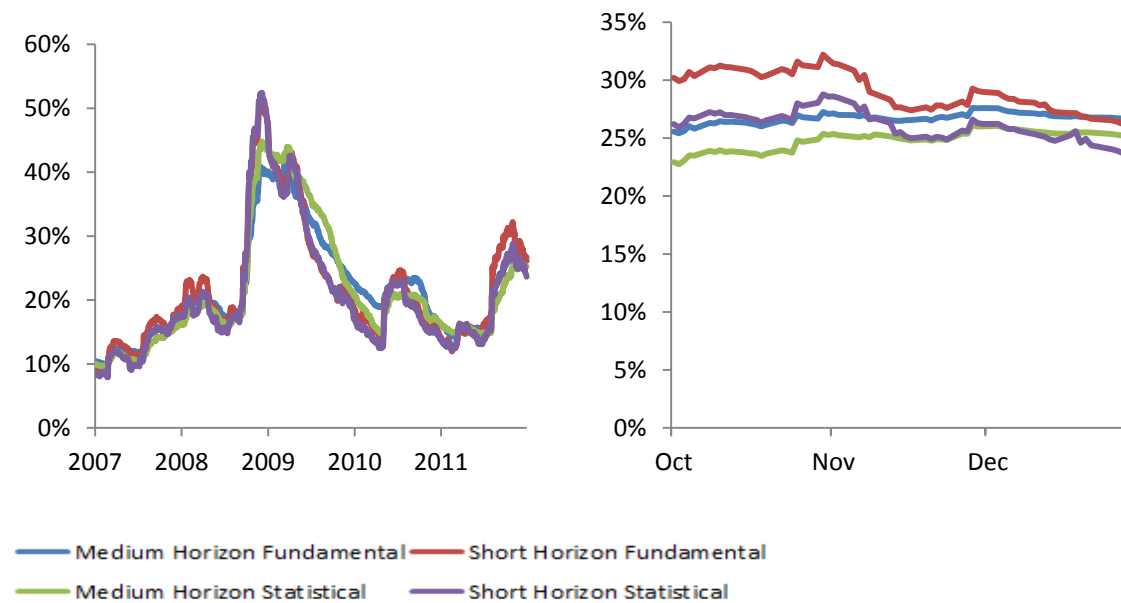
Based on Medium Horizon Fundamental Model for each country/region.

See Endnotes for a description of how the non-standard benchmarks are constructed.

# Focus on Global Developed Markets

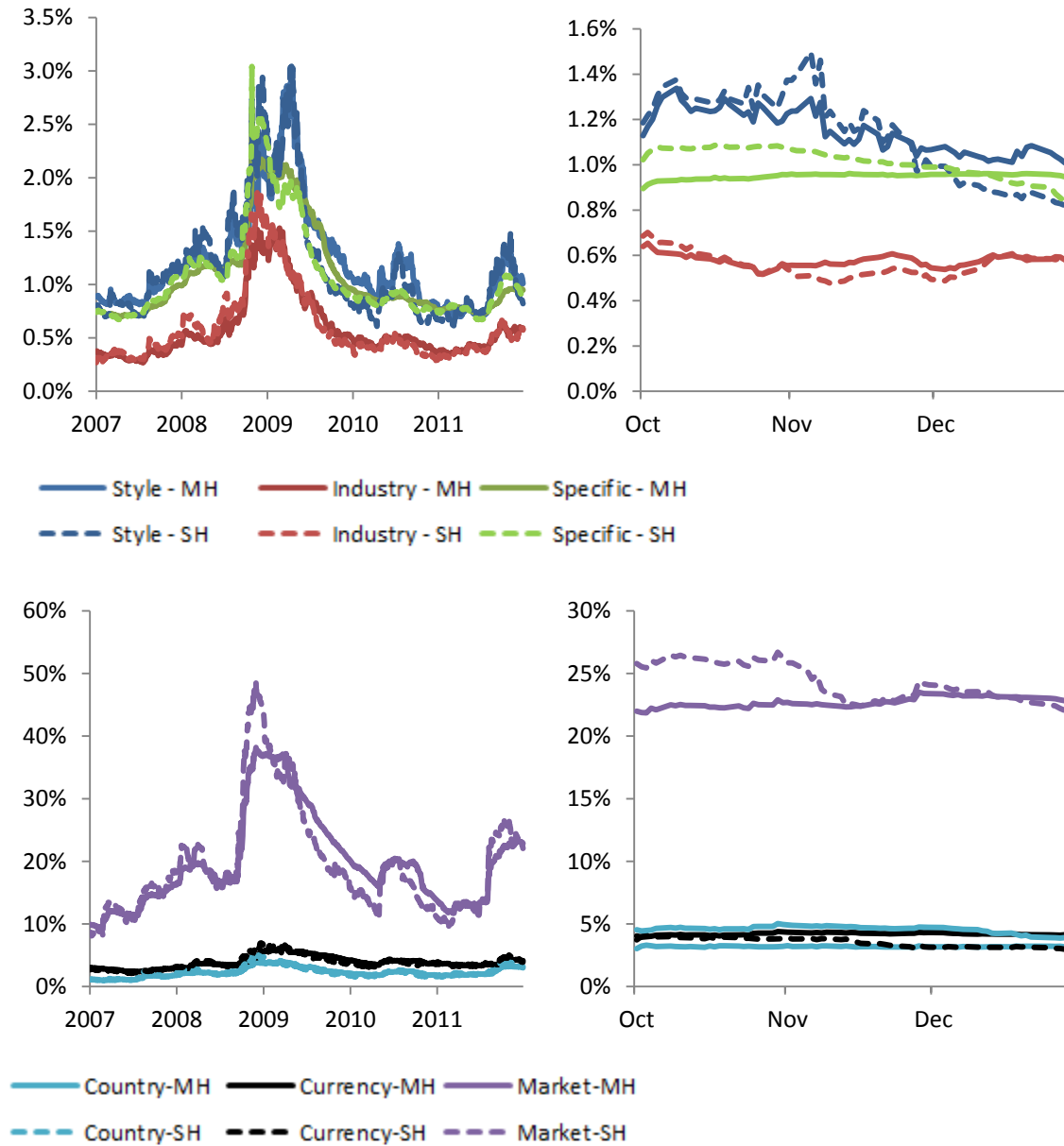
By the end of 2011, risk estimates for the FTSE Developed index had edged down from their highs at the beginning of October, but they remained well above their recent lows at the end of last year (Figures 2 and 3). In addition, estimates from Axioma’s four model variants were in more agreement than they were at the beginning of the fourth quarter. Style risk – already low – fell from its near-term peak at the beginning of the quarter. Market risk, which is the biggest contributor to overall risk, leveled off during the fourth quarter, after climbing for most of 2011. In addition, the predicted market risk from the short-horizon and medium-horizon models converged. Other sources of risk remained steady throughout the quarter.

**Figure 2. FTSE Developed Index Predicted Risk Characteristics, Last Five Years and Most Recent 3 Months**



Source: FTSE, Axioma, Inc.

**Figure 3. FTSE Developed Index Components of Risk**



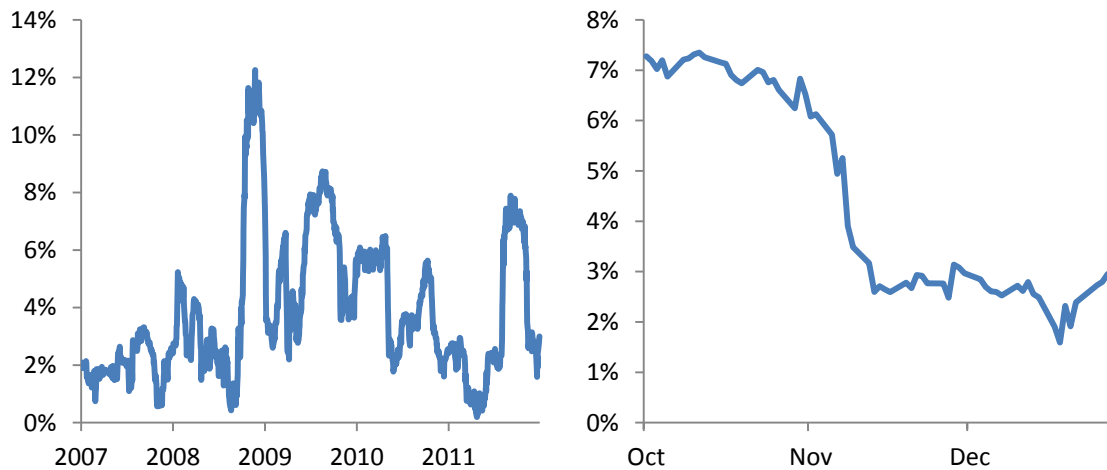
Source: FTSE, Axioma, Inc.

Differences in risk estimates are described further by risk *spreads*. The predicted risk spread measures the difference between the largest and smallest risk estimates from the four risk models (medium-term fundamental, medium-term statistical, short-term fundamental and short-term statistical). The higher the number, the larger the disagreement among models. Short-horizon models may lead their medium-horizon counterparts as risk changes, and statistical models may pick up new or different factors that are not detected by their fundamental counterparts.

In 2011, the risk spread reached a peak in August. It had begun to decline at the beginning of the fourth quarter, and continued its downward trend throughout most of the quarter (Figure 4). The models ended the year in fairly close agreement.

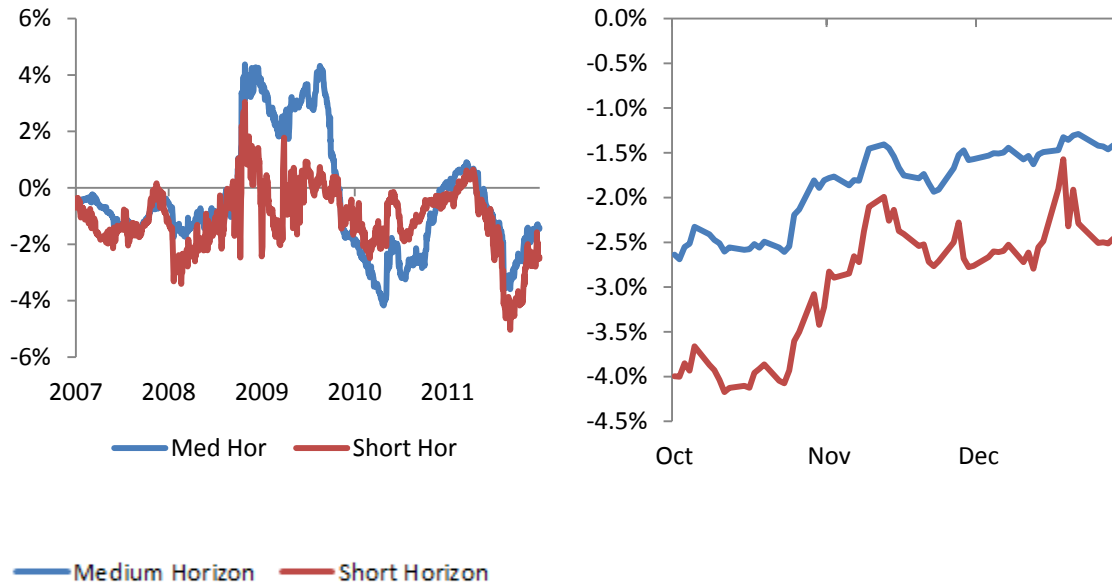
While the statistical models were forecasting lower risk than the fundamental models – with their biggest disagreement in at least five years occurring in August – the spread between them narrowed throughout the quarter (Figure 5). At the same time, the short-horizon models, which forecasted higher risk than the medium-horizon models for the past three quarters, also converged toward the end of the year, and ended 2011 with slightly lower forecasts (Figure 6).

**Figure 4. Predicted Risk Spread: The Difference Between the Highest and Lowest Risk Estimates Based on the Four Model Variants, FTSE Developed Index**



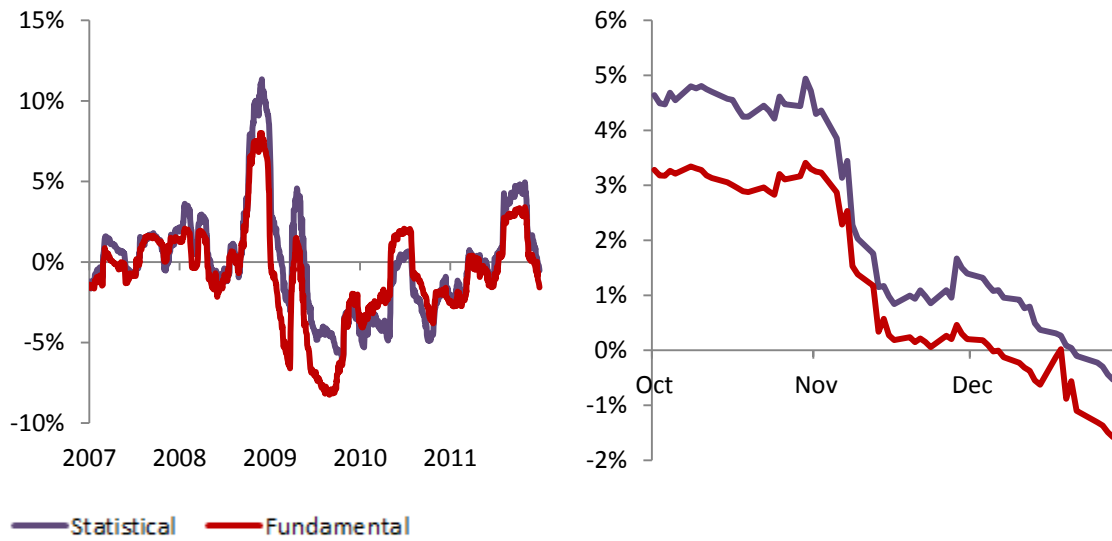
Source: FTSE, Axioma, Inc.

**Figure 5. Statistical – Fundamental Spread**



Source: FTSE, Axioma, Inc.

**Figure 6. Short – Medium Spread**



Source: FTSE, Axioma, Inc.

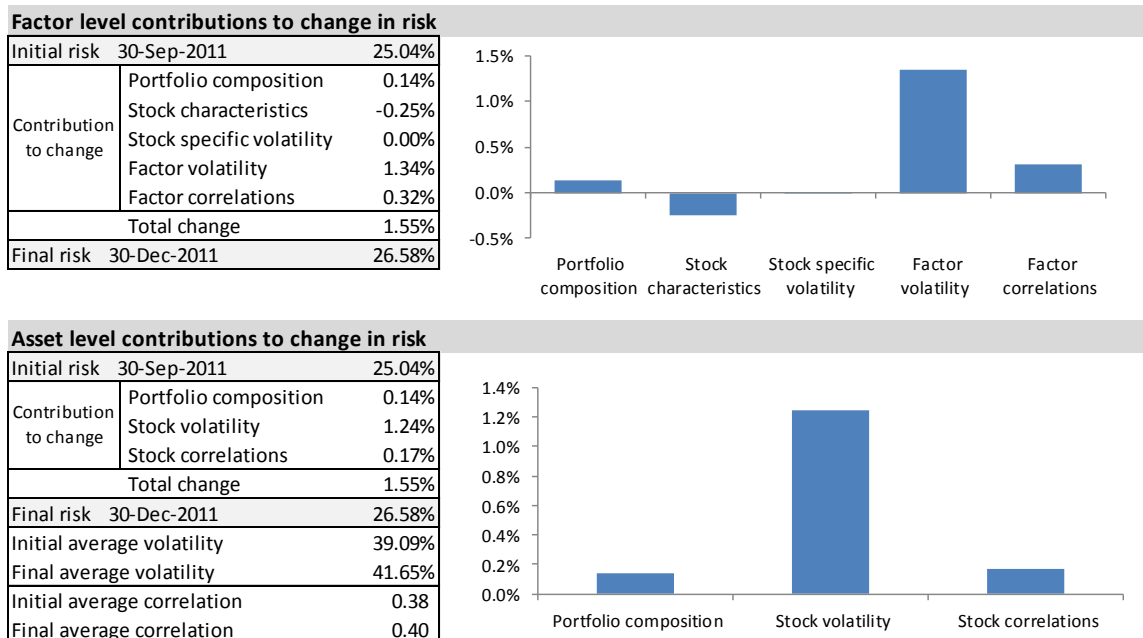
## Decomposition of the Change in Risk

The issue of high stock-stock correlations has been front and center in the financial media and in Axioma’s own reporting for quite a while now. High correlation clearly has an impact on market risk, and below we aim to quantify that effect relative to other components of risk estimates.

To understand what is driving the change in medium-horizon risk for each benchmark we look at the contribution to change from each of the underlying components: portfolio composition/weights, portfolio stock characteristics, stock-specific volatility, factor volatility and factor correlations<sup>ii</sup>. The overall impact of asset level correlations is not seen until we combine these components, so to see the impact of changes in stock correlations we also do decomposition of the full asset covariance matrix.

Figure 7 describes these changes in risk for the FTSE Developed Global Index from the end of the third quarter to the end of the fourth. Increased factor- and asset-level volatility was the major source of the change, whereas both factor and asset-asset correlations had a small positive impact. (Note that the base currency for the global benchmarks is USD.)

**Figure 7. Change in Risk Decomposition, FTSE Developed Index**



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## Macro Influences

One of the advantages of using a statistical factor model is that the structure of the model is not fixed, which allows for the possibility of significant transient factors that come and go over time. We monitor the correlation of the statistical factors with a number of macro variables to better understand the macro effects that are currently influencing the markets. Table 2 shows the absolute value of correlations between the statistical factors and macro variables, where the correlations are greater than 0.2 and above the 90% confidence level. Only the first five statistical factors are shown in this list. A complete list is available on request.

The first statistical factor, that which has the biggest influence on volatility, is essentially a market factor. Those factors correlated with the market – such as interest rates and credit spreads – have been consistent drivers of the statistical factors. Similarly, many of the fundamental model style factors are correlated with the stat factors, and have been consistently throughout the year.

Interestingly, there is a strong correlation between the current stat factors and the Purchasing Managers' Index (PMI) in Great Britain, whereas the US, European and other PMIs are not correlated. Measures of volatility, including the VIX and the Axioma Volatility risk factor, have also had a strong influence throughout the year.

**Table 2. Macro Influences on the Global Developed Market**

Macro Variables		Current Stat Factors					Last Quarter Stat Factors					Last Year Stat Factors				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Yield	US 1y yield											0.22				
	US 5y yield	0.44					0.32					0.39				
	US 10y yield	0.59	0.22				0.45					0.47				
	JP 1y yield															
	JP 5y yield	0.20	0.35					0.31							0.25	
	JP 10y yield	0.21	0.23	0.24		0.23		0.22							0.27	
	EU 1y yield				0.21		0.43			0.25		0.29				
	EU 5y yield	0.32			0.31		0.42			0.37		0.48				
	EU 10y yield	0.34			0.33		0.40			0.37		0.43				
	US yield spread	0.59	0.23				0.43					0.45				
	JP yield spread	0.21	0.23	0.26		0.24		0.22							0.26	
	EU yield spread				0.26					0.24		0.24				
Credit	US TR CDI SPREAD	0.64		0.31		0.20	0.59	0.24	0.24			0.66		0.23		
	Itraxx Europe 3Y Spread	0.51	0.20	0.40	0.23		0.45	0.22	0.37	0.32		0.64	0.23	0.41	0.25	
	Itraxx Asia Ex Japan 5Y Spread			0.34		0.21			0.39			0.29	0.35		0.24	0.41
Volatility	VIX	0.82					0.84					0.79	0.23			
	VSTOXX	0.40					0.28									
Commodity	GOLD (USD)			0.28				0.20								
	SILVER (USD)	0.23		0.28				0.28				0.43				
	OIL (WTI)(USD)											0.26				0.25
	HSBC JC BASE METAL INDEX							0.21				0.25				0.26
	CREDIT SUISSE S&P GSCI SOFTs															
Economic	JAPAN CPI															
	UK CPI															
	US CPI															
	EURO CPI		0.74												0.65	
	US PMI											0.60				0.54
	China PMI															
	AU PMI					0.80				0.64						
	GB PMI	0.66	0.58	0.85	0.74					0.59					0.59	
	EURO PMI										0.68					
	US ISM INVENTORY															
	OECD + Major Six NME						0.62				0.59			0.53	0.68	0.55
Local Style	Exchange Rate Sensitivity		0.28		0.25			0.24		0.26		0.31	0.20	0.30	0.28	
	Growth	0.45		0.27	0.25		0.44			0.32		0.55	0.21		0.32	
	Leverage		0.35	0.45				0.20	0.42				0.44			
	Liquidity	0.38			0.26		0.40			0.26		0.29		0.23	0.30	
	Medium-Term Momentum		0.24				0.23			0.35	0.36	0.44				
	Short-Term Momentum	0.57		0.29			0.66					0.38				
	Size	0.35	0.31	0.29	0.33		0.35	0.34		0.43	0.28	0.53	0.26	0.28		
	Value	0.32			0.34		0.26			0.38	0.25	0.27			0.25	
	Volatility	0.87		0.28			0.86		0.26			0.91				0.23

Source: Axioma Inc.

## Volatilities and Returns

Several factors exhibited returns far from the norm in October, with the return for Volatility more than two standard deviations above the average (Table 3). In most cases returns settled down to +/- one standard deviation or less in November and December. Medium-term momentum fared well for most of 2011 (Figure 8), but for most of the year the best global strategy among Axioma's risk factors would have been to invest in a low-volatility portfolio.

As mentioned earlier, style risk in aggregate fell from the beginning of the fourth quarter. Risk in the Volatility factor rose over that period, however, and is up substantially over the last year, showing by far the highest predicted risk of any of the style risk factors (Table 4). Predicted risk for selected countries and currencies appears in Appendix 1.

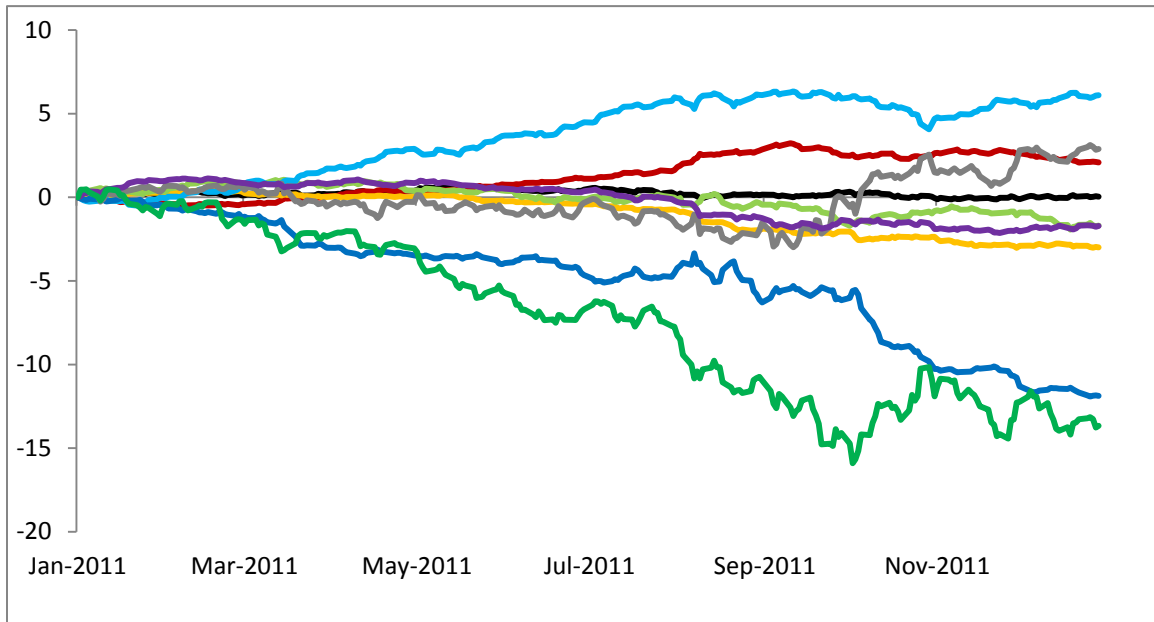
**Table 3. Worldwide Medium-Horizon Fundamental Model Realized Factor Returns**

Axioma Medium Horizon Model Risk Factor	2011 Returns			Average Monthly Return				
	Dec	Nov	Oct	3Q 2011	2Q 2011	1Q 2011	4Q 2010	Long Term*
Exchange Rate Sensitivity	0.12	-0.10	-0.30	-0.04	0.09	0.06	0.03	0.00
Growth	-0.50	0.08	0.02	0.45	0.35	0.02	-0.06	0.17
Leverage	0.08	-0.68	-0.32	-0.55	-0.15	0.01	-0.14	-0.13
Liquidity	-0.67	-0.12	0.75	-0.52	-0.25	0.21	-0.08	0.21
Medium-Term Momentum	0.16	1.33	-1.49	0.47	0.90	0.57	0.47	0.34
Short-Term Momentum	-1.45	-0.82	-4.29	-0.48	-0.56	-1.01	-0.20	-1.47
Size	0.59	0.21	2.54	-0.08	0.08	-0.18	-0.34	-0.06
Value	0.23	-0.28	-0.25	-0.60	-0.14	0.26	0.12	0.31
Volatility	-1.53	-1.57	4.52	-2.95	-1.50	-0.79	0.41	-0.72

\* January 1999 - present

Highlighted cells are 1 standard deviation above or below average























































**Figure 8. Worldwide Medium-Horizon Model Cumulative Style Factor Returns, Last 12 Months (%)**



- Exchange Rate Sensitivity    — Growth    — Leverage
- Liquidity    — Medium-Term Momentum    — Short-Term Momentum
- Size    — Value    — Volatility

Source: Axioma, Inc.

**Table 4. Worldwide Fundamental Models, Style Factor Predicted Volatility (%)**

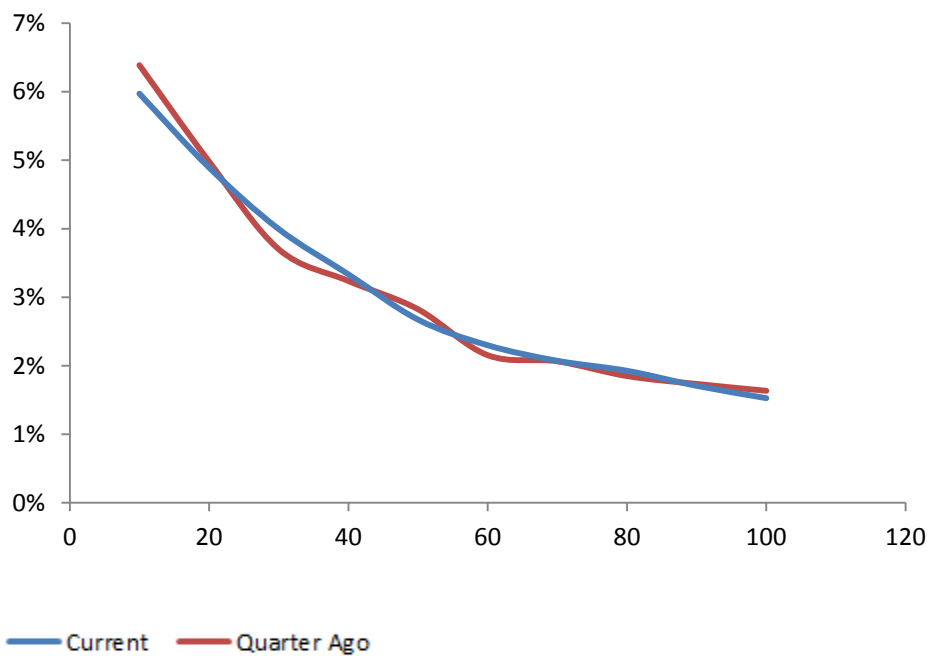
	Month End Value (%)			Change From		Trends		
	Current (30 Dec 2011)	Quarter Ago (30 Sep 2011)	Year Ago (31 Dec 2010)	Quarter Ago	Year Ago	5 Year	1 Year	3 Month
<b>Exchange Rate Sensitivity</b>								
Medium Horizon	0.9	0.9	0.7	0.0	0.1			
Short Horizon	0.8	0.9	0.7	0.0	0.1			
<b>Growth</b>								
Medium Horizon	1.2	1.2	0.9	0.0	0.3			
Short Horizon	1.1	1.4	0.9	-0.3	0.2			
<b>Leverage</b>								
Medium Horizon	1.1	1.0	0.6	0.1	0.5			
Short Horizon	1.1	1.2	0.6	-0.1	0.4			
<b>Liquidity</b>								
Medium Horizon	1.8	1.8	1.3	0.0	0.5			
Short Horizon	1.7	2.2	1.2	-0.4	0.5			
<b>Medium-Term Momentum</b>								
Medium Horizon	2.3	2.2	1.9	0.2	0.4			
Short Horizon	2.4	2.3	1.8	0.0	0.6			
<b>Short-Term Momentum</b>								
Medium Horizon	4.2	3.6	2.1	0.6	2.1			
Short Horizon	4.1	4.3	1.6	-0.2	2.5			
<b>Size</b>								
Medium Horizon	5.0	4.7	3.4	0.3	1.6			
Short Horizon	4.9	5.5	3.4	-0.6	1.5			
<b>Value</b>								
Medium Horizon	1.5	1.5	1.1	0.0	0.4			
Short Horizon	1.3	1.7	1.1	-0.4	0.2			
<b>Volatility</b>								
Medium Horizon	8.5	7.2	5.1	1.4	3.5			
Short Horizon	8.6	8.2	3.9	0.4	4.8			

Source: Axioma, Inc.

## Implications for Tracking Error

The muted change in overall risk is also highlighted in Figure 9, which shows the tracking error to the FTSE Developed benchmark versus the number of stocks. With the exception of a very concentrated portfolio of only 10 names, the differences in risk for a specific number of stocks barely budged between the end of the third quarter and the end of the fourth.

**Figure 9. Tracking Error as Number of Stocks Increases, FTSE Developed**



As of 30 Dec 2011

Source: FTSE, Axioma Inc.

## Correlations and Cross-Sectional Dispersion

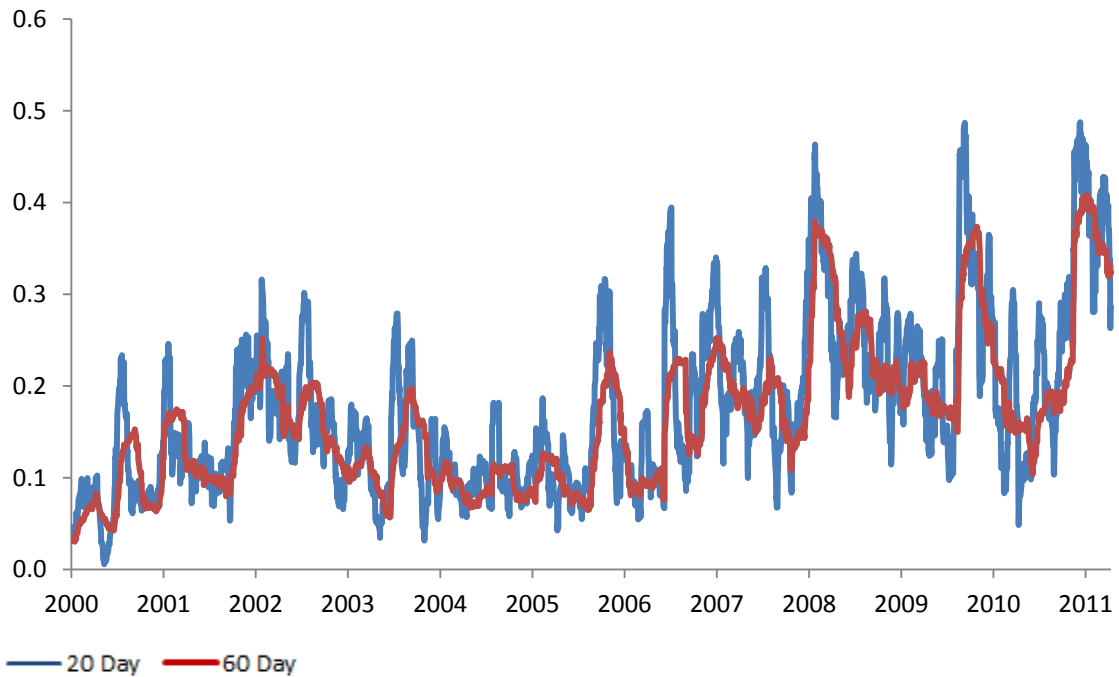
Stock correlations rose substantially in 2011. Although both 20- and 60-day correlations within the FTSE Developed index ended the year below their end-of-August peak, they remained well above their historical average (Figure 10). This is in sharp contrast to their near all-time-low value at the beginning of 2011. At around 10%, the proportion of stock pairs that have a negative correlation has risen since the low in August 2011, but like the median it remains well below average (Figure 11). Correlations of stocks across the globe are, of course, substantially lower than those in any single country or region.

When the holding period is extended to monthly, and we calculate the dispersion (cross-sectional standard deviation) of returns, the conclusion was similar (Figure 12). Stocks' returns were more similar to each other. This is not necessarily a bad thing. Current levels of dispersion are similar to what we observed in the long stretch from 2003 through 2007, which was a time of generally good markets *and* active returns.

As stock returns have been more similar to each other recently, so have currency returns (Figure 13). Currencies started the decade of the 2000s with fairly low correlations, but those correlations climbed throughout the decade, especially for developed currencies, likely due to the increasing significance of the euro. Since 2005 correlations have stayed in a (wide) range, with emerging currencies trending a bit higher. At the end of 2011 correlations for developed currencies were above the prior high of their range, and emerging market currencies were just below their high in 2010.

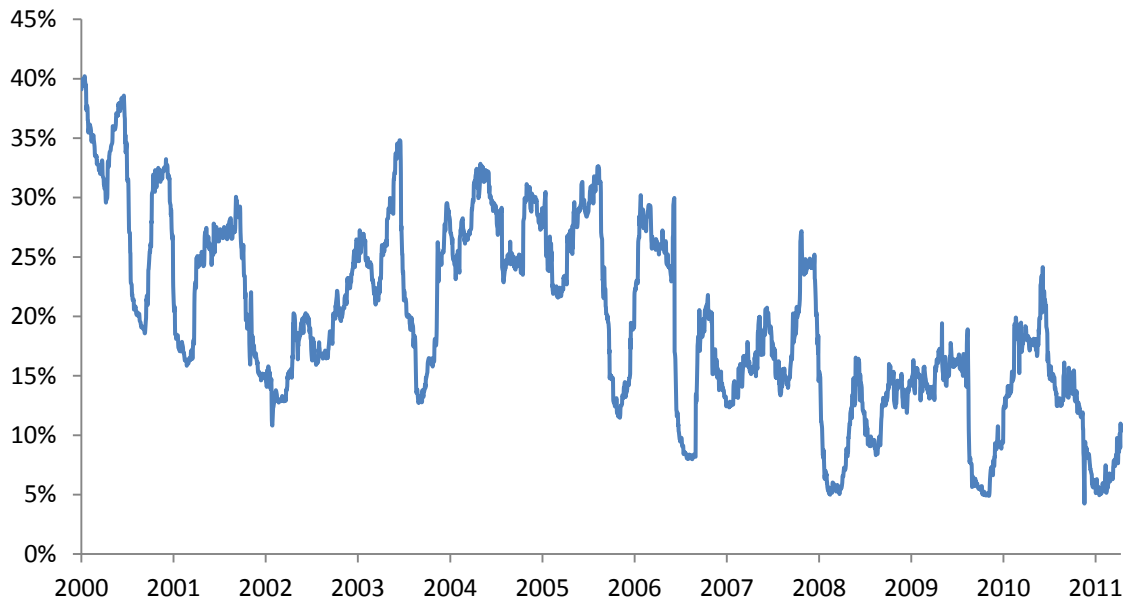
Finally, the standard deviation of predicted volatility for the various major risk model components (Figure 14) also suggests that their returns are likely to be more similar to each other than in recent years, although these correlations were at similar levels for much of the period between 2003 and 2008, which was, incidentally, a good time for stocks in general.

**Figure 10. FTSE Developed Median Realized 20- and 60-day Pairwise Asset Correlations**



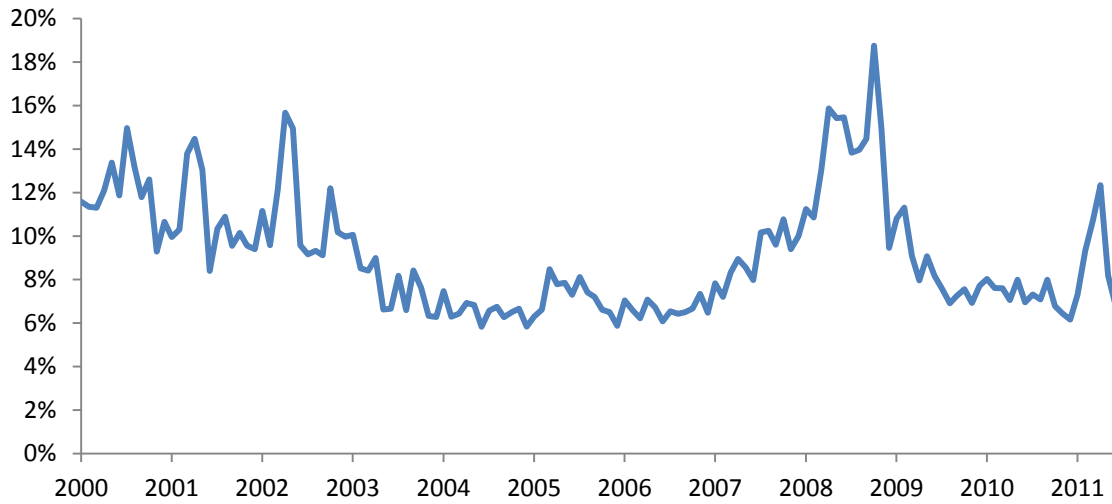
Source: FTSE, Axioma, Inc.

**Figure 11. Percent of FTSE Developed Stock-Stock Realized 60-Day Correlations That Are Negative**



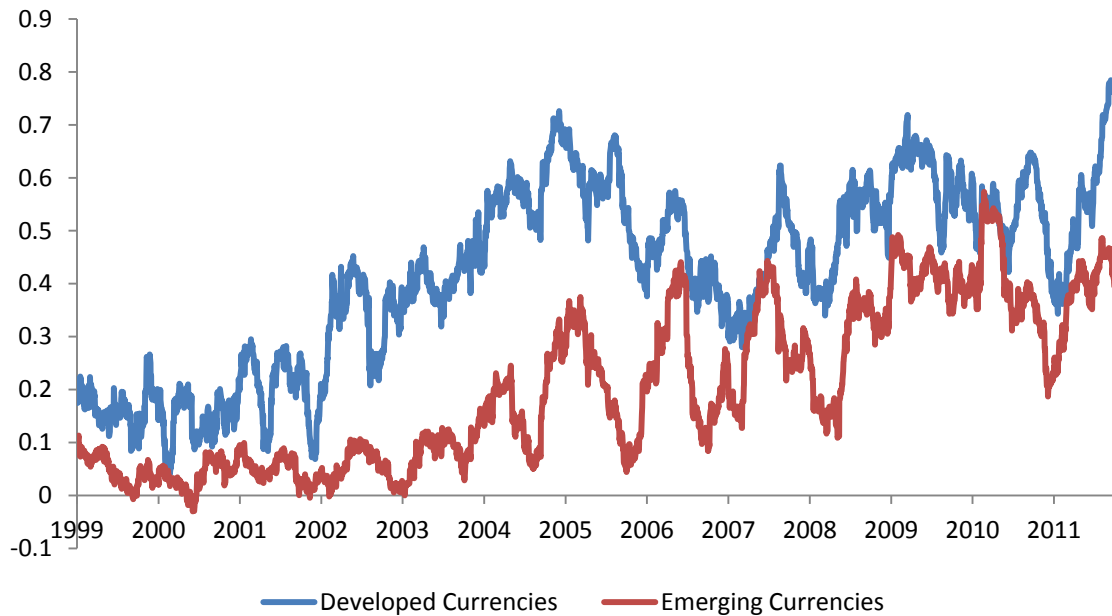
Source: FTSE, Axioma, Inc.

**Figure 12. FTSE Developed Cross-Sectional Dispersion of Monthly Returns**



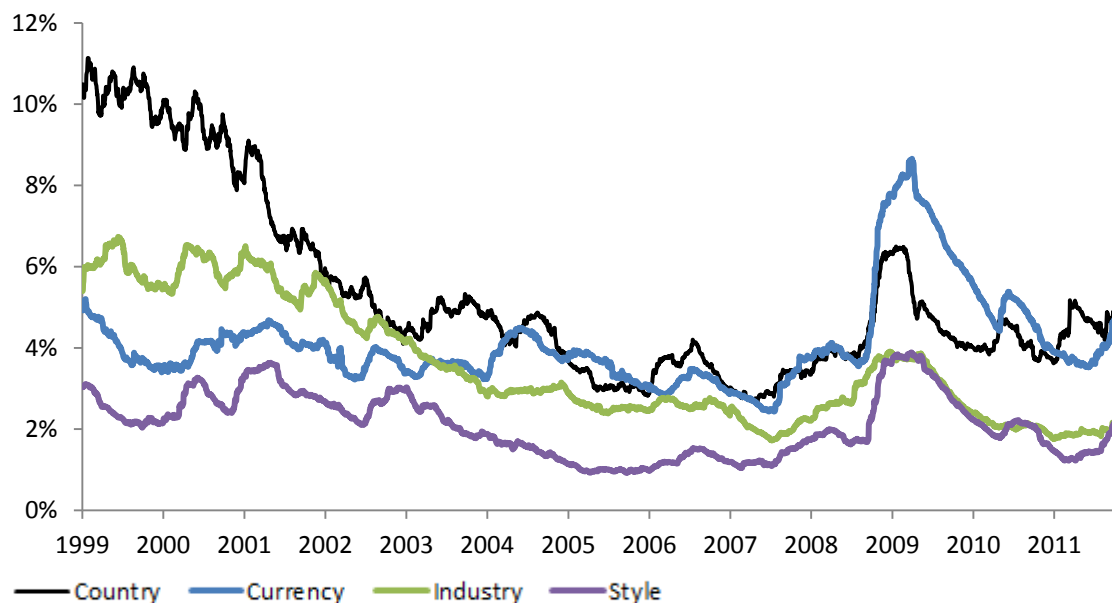
Source: FTSE, Axioma, Inc.

**Figure 13. Median Currency Correlations**



Source: Axioma, Inc.

**Figure 14. Worldwide Medium-Horizon Fundamental Model, Cross-Sectional Standard Deviation, Common Factor Predicted Volatility**



Source: Axioma, Inc.

Note: Country and currency correlations include only developed markets.

As mentioned earlier, changes in factor correlations had relatively little impact on changes in market risk forecasts during the fourth quarter. Although these changes have been relatively modest, we do observe that between the end of the third and fourth quarters the correlation between the Global Market factor and Medium-Term Momentum moved from just about zero to -0.14, and the relationship between Momentum and Volatility became more negative as well. At the end of 2011, the correlations between the average currency and the Global Market factor and Volatility were quite high, although that did not change much versus the end of the third quarter.

Of course, not everything is correlated. A number of countries actually have negative correlations when the market factor is removed (Table 6). The US and some European countries have fairly high negative correlations with a number of developed Asian countries. As noted above, currency correlations have climbed, and we consequently find very few currencies that are negatively correlated (Table 7). Note that since the base currency of this analysis is USD, we do not have correlations of the dollar with other currencies included in this table. During the fourth quarter, CHF has become more highly correlated with a number of currencies (Table 8), whereas the correlations between Medium-Term Momentum and a number of currencies and other style risk factors were among the biggest declines.

**Table 5. Style, Currency and Country Correlations**

As of 30 Dec 2011	Global Market	Value	Lev- erage	Growth	Size	Short- Term		Vol- atility	Liq- uidity	Exch Rate Sens	Average		
						Mom	Mom				Country	Cur- rency	Ind- ustry
Global Market	1	0.36	0.17	-0.31	0.55	-0.52	-0.14	0.92	0.36	0.22	0.03	0.41	-0.07
Value	0.36	1	0.43	-0.48	0.34	-0.24	-0.47	0.38	-0.06	0.36	0.12	0.16	0.00
Leverage	0.17	0.43	1	-0.19	0.03	-0.09	-0.19	0.19	0.00	0.12	0.08	0.07	-0.01
Growth	-0.31	-0.48	-0.19	1	-0.24	0.01	0.16	-0.31	0.04	-0.30	-0.04	-0.06	-0.01
Size	0.55	0.34	0.03	-0.24	1	-0.30	-0.17	0.53	0.12	0.29	0.11	0.28	-0.01
Short-Term Momentum	-0.52	-0.24	-0.09	0.01	-0.30	1	0.20	-0.48	-0.26	-0.09	-0.03	-0.22	0.03
Medium-Term Momentum	-0.14	-0.47	-0.19	0.16	-0.17	0.20	1	-0.26	-0.05	-0.19	-0.06	-0.08	-0.01
Volatility	0.92	0.38	0.19	-0.31	0.53	-0.48	-0.26	1	0.38	0.20	0.04	0.41	-0.07
Liquidity	0.36	-0.06	0.00	0.04	0.12	-0.26	-0.05	0.38	1	-0.08	0.00	0.09	-0.05
Exchange Rate Sensitivity	0.22	0.36	0.12	-0.30	0.29	-0.09	-0.19	0.20	-0.08	1	0.08	0.11	0.03

As of 30 Sep 2011	Global Market	Value	Lev- erage	Growth	Size	Short- Term		Vol- atility	Liq- uidity	Exch Rate Sens	Average		
						Mom	Mom				Country	Cur- rency	Ind- ustry
Global Market	1	0.36	0.24	-0.35	0.49	-0.53	-0.03	0.91	0.36	0.20	0.02	0.38	-0.07
Value	0.36	1	0.47	-0.51	0.35	-0.27	-0.46	0.40	-0.06	0.37	0.12	0.15	0.00
Leverage	0.24	0.47	1	-0.27	0.07	-0.11	-0.18	0.27	0.05	0.14	0.09	0.08	-0.01
Growth	-0.35	-0.51	-0.27	1	-0.29	0.05	0.19	-0.39	0.00	-0.34	-0.05	-0.06	-0.01
Size	0.49	0.35	0.07	-0.29	1	-0.23	-0.12	0.46	0.08	0.29	0.12	0.23	0.00
Short-Term Momentum	-0.53	-0.27	-0.11	0.05	-0.23	1	0.13	-0.46	-0.27	-0.10	-0.04	-0.20	0.03
Medium-Term Momentum	-0.03	-0.46	-0.18	0.19	-0.12	0.13	1	-0.13	0.02	-0.20	-0.06	0.00	-0.03
Volatility	0.91	0.40	0.27	-0.39	0.46	-0.46	-0.13	1	0.37	0.18	0.03	0.38	-0.08
Liquidity	0.36	-0.06	0.05	0.00	0.08	-0.27	0.02	0.37	1	-0.08	0.01	0.08	-0.05
Exchange Rate Sensitivity	0.20	0.37	0.14	-0.34	0.29	-0.10	-0.20	0.18	-0.08	1	0.07	0.09	0.03

Change	Global Market	Value	Lev- erage	Growth	Size	Short- Term		Vol- atility	Liq- uidity	Exch Rate Sens	Average		
						Mom	Mom				Country	Cur- rency	Ind- ustry
Global Market	0	0.00	-0.07	0.04	0.06	0.00	-0.11	0.01	0.00	0.01	0.01	0.03	0.00
Value	0.00	0	-0.04	0.03	-0.01	0.03	-0.01	-0.02	0.00	-0.01	0.00	0.01	0.00
Leverage	-0.07	-0.04	0	0.08	-0.04	0.02	-0.01	-0.08	-0.05	-0.02	-0.02	0.00	0.00
Growth	0.04	0.03	0.08	0	0.04	-0.04	-0.02	0.08	0.04	0.04	0.02	0.00	0.00
Size	0.06	-0.01	-0.04	0.04	0	-0.07	-0.05	0.07	0.03	0.00	0.00	0.05	-0.01
Short-Term Momentum	0.00	0.03	0.02	-0.04	-0.07	0	0.07	-0.02	0.00	0.01	0.01	-0.02	0.00
Medium-Term Momentum	-0.11	-0.01	-0.01	-0.02	-0.05	0.07	0	-0.13	-0.07	0.01	0.00	-0.08	0.02
Volatility	0.01	-0.02	-0.08	0.08	0.07	-0.02	-0.13	0	0.01	0.02	0.01	0.04	0.01
Liquidity	0.00	0.00	-0.05	0.04	0.03	0.00	-0.07	0.01	0	0.00	0.00	0.01	0.00
Exchange Rate Sensitivity	0.01	-0.01	-0.02	0.04	0.00	0.01	0.01	0.02	0.00	0	0.02	0.02	-0.01

Source: Axioma, Inc.

**Table 6. Country-Country Correlations, 30 Dec 2011**

<b>Top 20</b>			<b>Bottom 20</b>		
China	Hong Kong	0.77	United States	Korea, Rep of	-0.48
Italy	Spain	0.76	United States	Singapore	-0.42
France	Netherlands	0.75	United States	Hong Kong	-0.37
France	Germany	0.71	United States	Japan	-0.37
Belgium	France	0.71	United States	China	-0.35
Belgium	Netherlands	0.68	United States	Denmark	-0.35
France	Italy	0.68	France	Korea, Rep of	-0.31
Germany	Netherlands	0.67	United Kingdom	Japan	-0.30
Finland	Sweden	0.67	Hong Kong	Italy	-0.28
Finland	France	0.64	United States	United Kingdom	-0.27
Portugal	Spain	0.63	United States	Israel	-0.27
Italy	Netherlands	0.62	United States	Portugal	-0.27
United Kingdom	France	0.61	United States	Norway	-0.26
Belgium	Italy	0.61	Germany	Hong Kong	-0.25
France	Spain	0.60	China	Italy	-0.25
Finland	Netherlands	0.60	United States	Greece	-0.25
Belgium	Finland	0.59	Germany	Korea, Rep	-0.25
Belgium	Germany	0.57	Korea, Rep	Netherlands	-0.25
United Kingdom	Netherlands	0.57	Hong Kong	Switzerland	-0.24
Austria	France	0.57	Belgium	Japan	-0.24

Note: These are correlations in excess of the market  
Source: Axioma, Inc.

**Table 7. Currency-Currency Correlations, 30 Dec 2011**

Top 20			Bottom 20		
DKK	EUR	1.00	JPY	CAD	-0.08
SEK	EUR	0.90	JPY	KRW	-0.05
DKK	SEK	0.90	JPY	NZD	0.04
AUD	NZD	0.89	JPY	AUD	0.07
EUR	NOK	0.88	JPY	GBP	0.08
DKK	NOK	0.87	JPY	SEK	0.13
SGD	AUD	0.85	JPY	SGD	0.14
CAD	AUD	0.85	JPY	NOK	0.15
SEK	NOK	0.84	CHF	KRW	0.21
CAD	NZD	0.80	JPY	DKK	0.23
SGD	NZD	0.79	JPY	EUR	0.24
SEK	SGD	0.78	CAD	CHF	0.31
CAD	SGD	0.78	CHF	NZD	0.35
SGD	NOK	0.77	CHF	AUD	0.36
AUD	NOK	0.76	JPY	CHF	0.39
GBP	SEK	0.76	GBP	CHF	0.41
GBP	DKK	0.75	SEK	CHF	0.43
GBP	EUR	0.75	DKK	KRW	0.43
SEK	AUD	0.74	KRW	EUR	0.43
SGD	EUR	0.74	CHF	NOK	0.46

Source: Axioma, Inc.

**Table 8. Biggest Changes in Factor Correlations Over Last 3 Months**







































































































<b>Biggest Upward Change</b>		30-Dec-11	30-Sep-11	<b>Biggest Downward Change</b>		30-Dec-11	30-Sep-11
CAD	CHF	0.31	0.15	Medium-Term Mom	Volatility	-0.26	-0.13
Short-Term Mom	Life Sci Tools & Svcs	0.19	0.04	Medium-Term Mom	AUD	-0.10	0.03
AUD	CHF	0.36	0.21	Medium-Term Mom	SGD	-0.05	0.08
Life Sci Tools & Svcs	Wireless Tel Svcs	0.10	-0.04	SGD	CNY	0.23	0.35
CHF	NZD	0.35	0.22	Medium-Term Mom	CAD	-0.08	0.03
GBP	CHF	0.41	0.29	Life Sci Tools & Svcs	IT Svcs	0.05	0.16
GBP	CAD	0.61	0.49	CNY	KRW	0.26	0.37
SEK	CHF	0.43	0.31	Distributors	Wireless Tel Svcs	0.03	0.14
Life Sci Tools & Svcs	Real Estate Investment	-0.03	-0.14	Global Market	Medium-Term Mom	-0.14	-0.03
Leverage	Multiline Retail	-0.10	-0.21	Software	Comml Svcs & Supplie	0.19	0.30
CHF	NOK	0.46	0.34	Life Sci Tools & Svcs	Ireland	-0.09	0.02
CAD	EUR	0.61	0.50	Life Sci Tools & Svcs	Machinery	-0.07	0.04
SGD	CHF	0.46	0.35	France	Israel	0.04	0.15
Life Sci Tools & Svcs	Greece	0.13	0.02	Marine	Road & Rail	-0.01	0.09
Medium-Term Mom	Household Products	0.03	-0.08	Electrical Equipment	Air Freight & Logistics	0.10	0.20
DKK	CAD	0.61	0.50	Medium-Term Mom	KRW	-0.13	-0.03
Volatility	CHF	0.16	0.06	Multiline Retail	Wireless Tel Svcs	0.11	0.21
Life Sci Tools & Svcs	Independent Power Pri	0.07	-0.03	Hotels, Restaurants &	Wireless Tel Svcs	0.07	0.17
CHF	EUR	0.53	0.43	New Zealand	Norway	0.02	0.12
DKK	CHF	0.53	0.43	Medium-Term Mom	NZD	-0.09	0.01

Source: Axioma, Inc.

## Conclusion















































































Risk globally was substantially higher for most of 2011 than it had been since mid-2009, although it ticked down toward the end of the year. This was true for the FTSE Global Developed index as well as most of the single-country, regional and subset benchmarks we track. By the middle of 2011, the four Axioma risk model variants had quite a bit of disagreement about risk, but by December they converged, led by declines in risk forecasts from the short-horizon models. Again, this also proved true for the individual countries and regions we track. While stock-stock correlations rose substantially throughout 2011 and neared record highs since at least 1999, they eased downward by the end of the year. We hope and expect this will improve prospects for active managers, particularly those focused on individual stock selection.

### Appendix 1. Predicted Volatility, Selected Developed Market Countries

	Month End Value (%)			Change From		Trends		
	Current (30 Dec 2011)	Quarter Ago (30 Sep 2011)	Year Ago (31 Dec 2010)	Quarter Ago	Year Ago	5 Year	1 Year	3 Month
<b>Australia</b>								
Medium Horizon	11.0	9.7	6.9	1.2	4.0			
Short Horizon	11.7	10.8	6.1	0.9	5.6			
<b>Canada</b>								
Medium Horizon	8.6	8.6	6.6	0.0	2.1			
Short Horizon	7.8	9.5	5.7	-1.7	2.1			
<b>China</b>								
Medium Horizon	17.2	16.0	11.8	1.2	5.5			
Short Horizon	17.6	18.5	11.7	-0.9	5.9			
<b>France</b>								
Medium Horizon	10.8	9.3	6.3	1.5	4.5			
Short Horizon	11.0	11.0	6.1	0.0	5.0			
<b>Germany</b>								
Medium Horizon	9.8	9.3	5.5	0.5	4.3			
Short Horizon	9.7	11.2	5.3	-1.5	4.4			
<b>Greece</b>								
Medium Horizon	31.1	30.9	22.0	0.2	9.1			
Short Horizon	26.7	33.3	20.4	-6.6	6.4			
<b>Hong Kong</b>								
Medium Horizon	14.3	13.6	9.3	0.7	5.1			
Short Horizon	13.6	16.0	9.2	-2.4	4.4			
<b>Italy</b>								
Medium Horizon	14.4	13.8	8.8	0.5	5.6			
Short Horizon	14.2	16.2	9.0	-2.0	5.2			
<b>Japan</b>								
Medium Horizon	14.7	14.6	10.9	0.1	3.8			
Short Horizon	12.0	15.3	9.6	-3.3	2.4			
<b>Korea, Republic of</b>								
Medium Horizon	18.7	18.2	10.6	0.5	8.1			
Short Horizon	17.9	22.1	11.2	-4.2	6.8			
<b>Netherlands</b>								
Medium Horizon	10.4	9.4	6.0	1.0	4.3			
Short Horizon	10.6	11.2	5.5	-0.6	5.1			
<b>Singapore</b>								
Medium Horizon	12.4	13.0	9.2	-0.5	3.3			
Short Horizon	11.2	14.7	9.2	-3.5	2.1			
<b>Spain</b>								
Medium Horizon	13.6	14.0	11.4	-0.4	2.2			
Short Horizon	12.4	14.8	12.3	-2.4	0.0			
<b>Sweden</b>								
Medium Horizon	12.2	11.9	7.6	0.3	4.6			
Short Horizon	11.5	13.4	6.2	-1.9	5.3			
<b>Switzerland</b>								
Medium Horizon	8.8	9.5	4.8	-0.7	4.0			
Short Horizon	7.6	11.7	4.8	-4.1	2.8			
<b>United Kingdom</b>								
Medium Horizon	8.0	7.5	5.2	0.4	2.7			
Short Horizon	7.7	8.8	5.4	-1.1	2.3			
<b>United States</b>								
Medium Horizon	8.6	8.5	5.6	0.1	3.0			
Short Horizon	7.9	10.1	4.6	-2.1	3.4			

Source: Axioma, Inc.

## Appendix 2. Predicted Volatility, Developed Market Currencies

	Month End Value (%)			Change From		Trends		
	Current (30 Dec 2011)	Quarter Ago (30 Sep 2011)	Year Ago (31 Dec 2010)	Quarter Ago	Year Ago	5 Year	1 Year	3 Month
<b>AUD</b>								
Medium Horizon	16.2	14.6	12.7	1.6	3.5			
Short Horizon	15.6	16.4	13.4	-0.8	2.2			
<b>CAD</b>								
Medium Horizon	11.2	10.4	10.1	0.8	1.1			
Short Horizon	10.4	11.5	10.5	-1.1	-0.1			
<b>CHF</b>								
Medium Horizon	13.6	14.2	9.8	-0.6	3.8			
Short Horizon	12.9	16.4	10.4	-3.4	2.5			
<b>CNY</b>								
Medium Horizon	2.1	1.8	1.8	0.2	0.2			
Short Horizon	2.3	1.9	2.2	0.5	0.2			
<b>DKK</b>								
Medium Horizon	12.6	12.4	10.1	0.2	2.5			
Short Horizon	11.6	13.9	11.1	-2.4	0.5			
<b>EUR</b>								
Medium Horizon	12.6	12.5	10.1	0.2	2.5			
Short Horizon	11.6	13.9	11.1	-2.4	0.5			
<b>GBP</b>								
Medium Horizon	9.5	9.3	9.3	0.2	0.3			
Short Horizon	8.9	10.0	9.5	-1.1	-0.7			
<b>KRW</b>								
Medium Horizon	11.2	10.8	10.7	0.4	0.5			
Short Horizon	10.6	11.7	10.6	-1.1	-0.1			
<b>KWD</b>								
Medium Horizon	2.4	2.4	3.0	0.0	-0.6			
Short Horizon	2.3	2.5	2.6	-0.2	-0.3			
<b>NOK</b>								
Medium Horizon	15.2	14.6	12.6	0.6	2.6			
Short Horizon	14.4	16.4	13.4	-2.0	1.0			
<b>NZD</b>								
Medium Horizon	15.9	15.1	13.1	0.7	2.8			
Short Horizon	15.0	16.5	13.6	-1.6	1.3			
<b>SEK</b>								
Medium Horizon	16.0	15.4	12.5	0.6	3.6			
Short Horizon	15.1	17.2	13.5	-2.0	1.6			
<b>SGD</b>								
Medium Horizon	8.2	7.0	5.1	1.1	3.1			
Short Horizon	8.1	8.1	5.8	-0.1	2.3			

Source: Axioma, Inc.

## Endnotes

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<sup>i</sup> Some of the markets we cover do not have official benchmarks, but we are able to back into the risk estimates. For example, FTSE does not have a PIIGS index, but we are able to create a derivative by starting with the FTSE Developed Europe index and removing all countries except Portugal, Italy, Ireland, Greece and Spain. The remaining stocks are then reweighted in proportion to their original weights. In this report we will refer to these derivations as benchmarks, although we will only use the provider's name (e.g. FTSE) for their official indexes.

<sup>ii</sup> The components of a risk forecast are the portfolio holdings, its factor exposures, the covariance matrix, and stock-specific risk. In order to decompose the change in risk of a benchmark or portfolio, we employ the following methodology: We first look at the impact of the change in holdings, so we use last period's risk model with the current portfolio to calculate a risk forecast, and the difference is attributable solely to the change in holdings. Next, to evaluate the change in stocks' characteristics, we update the factor exposures, and again use last period's risk model, but current holdings and exposures. Third, we look at the impact of specific risk changes by using current specific risk estimates but the prior period's covariance matrix. We calculate the impact of changes in correlation by using last period's correlations with all the other data as of the current period. Finally, the residual is the impact of the change in factor volatility. While the ordering described above will affect the results, we find that the results do not change substantially when we change the order. Intuitively we believe that the biggest impact will come from change in factor volatility, and our results bear out our intuition.

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