
THE CURRENT RISK LANDSCAPE: AXIOMA INSIGHT FINDINGS

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TODAY'S DISCUSSION: FAREWELL LOW VOLATILITY

- Our focus will largely be on the first quarter, but we will note some changes that have occurred since it ended
- Not surprisingly, given the market downturn, risk jumped in the first quarter
 - The increase was biggest in the Russell 1000, which after hitting an all-time low last November saw SH risk increase to a level *above* the historical median.
 - The Russell 1000 is now the 6th riskiest of the 16 benchmarks we follow closely, up from almost the lowest. Even the so-called “Eurocrisis” countries now have lower risk. The US now contributes more to global risk than its weight would imply
 - Risk for the Russell 2000 is now on par with that of the Russell 1000, after ending last year about 50% higher
- FTSE Developed risk more than doubled, rising from 5.9% at the end of 2017 to 13.3% at the end of Q1
 - The main driver of the increase was market risk
 - After ending 2017 at a record 2X the risk of developed markets, emerging markets ended Q1 only about 25% riskier
- FTSE Japan retook the top spot (from FTSE Emerging) in terms of short-horizon benchmark risk

TODAY'S DISCUSSION: FAREWELL LOW VOLATILITY

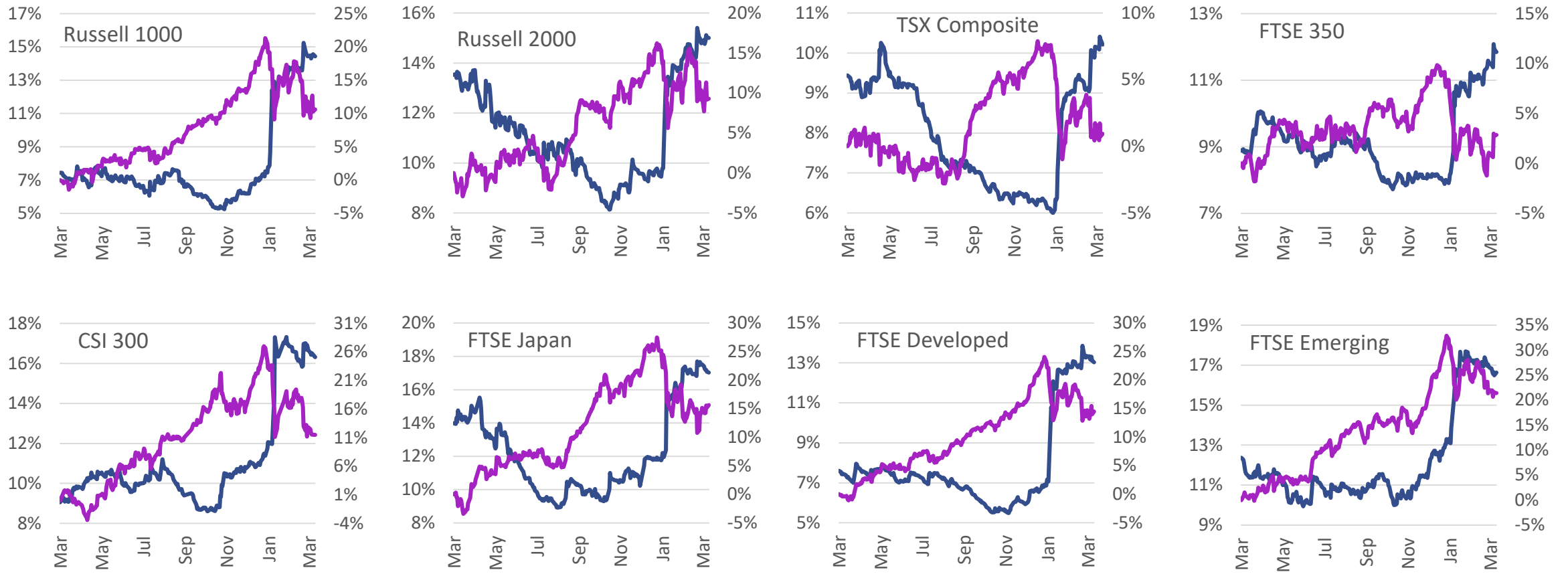
- After falling fairly steadily for the past 2-3 years asset correlations shot up during Q1 in most cases to above-median levels from near long-term lows, driving risk up
- Median currency correlations also rose, but style factor correlations fell
- Although markets reeled, style factor performance was relatively muted, with few factors experiencing outsized returns
 - Overall style risk for FTSE Developed increased only slightly, and some factors, most notably momentum, saw risk fall
 - Only Momentum and Volatility had returns of > 2 standard deviations across multiple markets, and both were in the expected direction
 - Sample factor portfolios generally followed the path of their underlying factor. In some cases, constraints were quite harmful to performance
- We will end the discussion with some thoughts on equity market performance in the near-term

MARKET RISK

MAJOR BENCHMARK RISK AND RETURN

Risk started to rise in December, shot up sharply in February and has only settled down in the last few days

— SH Risk (Left) — Cumulative Return (Right)

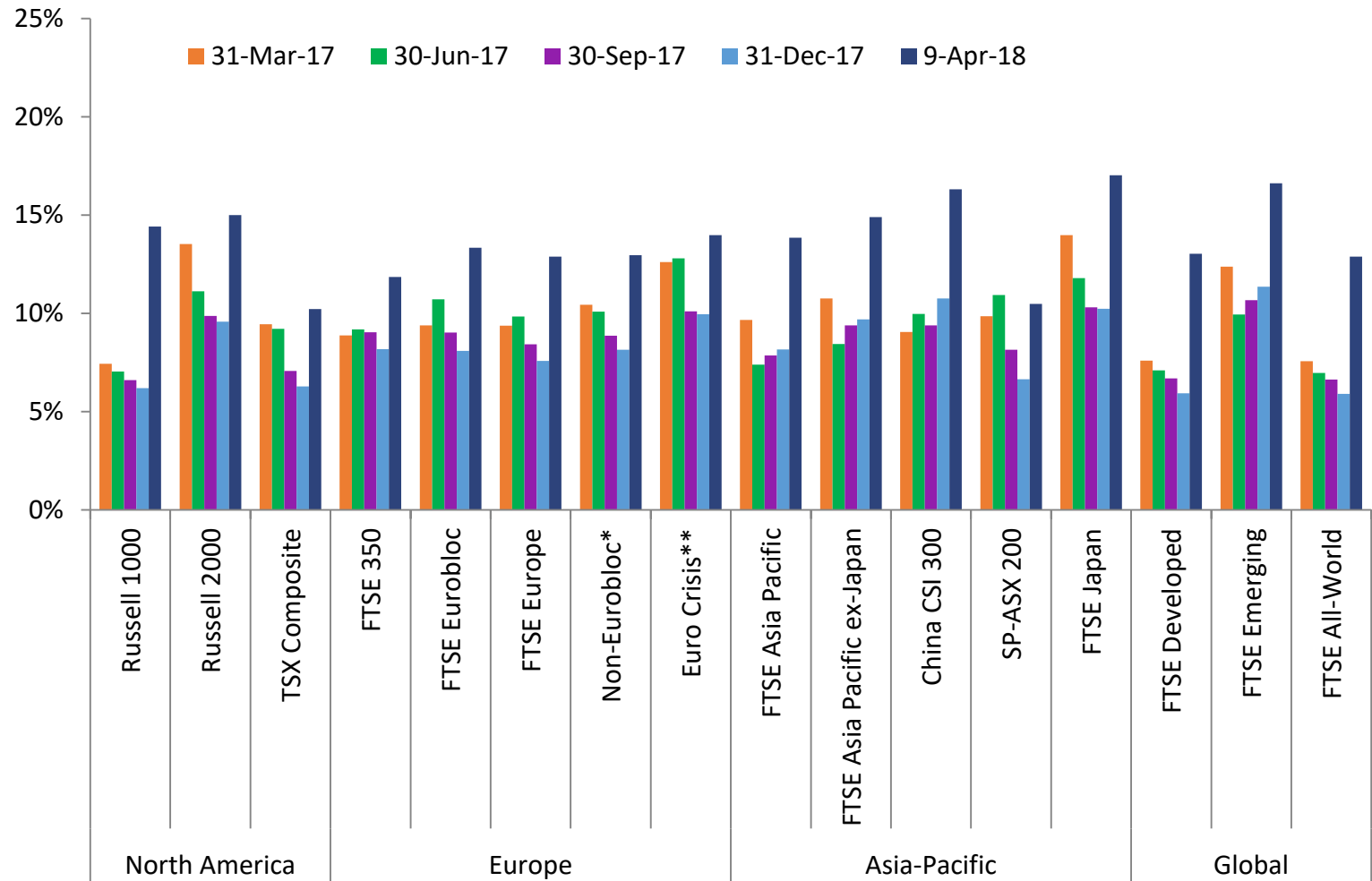


Note that analysis of the Russell 2000 Index now uses our USSC4 model

Source: FTSE Russell, Axioma

SHORT-HORIZON PREDICTED VOLATILITY

- Risk increased across-the-board in Q1, but the biggest increase was in the US
- US is now riskier than European benchmarks, even the so-called “euro-crisis” countries
- Japan and China are now the riskiest markets

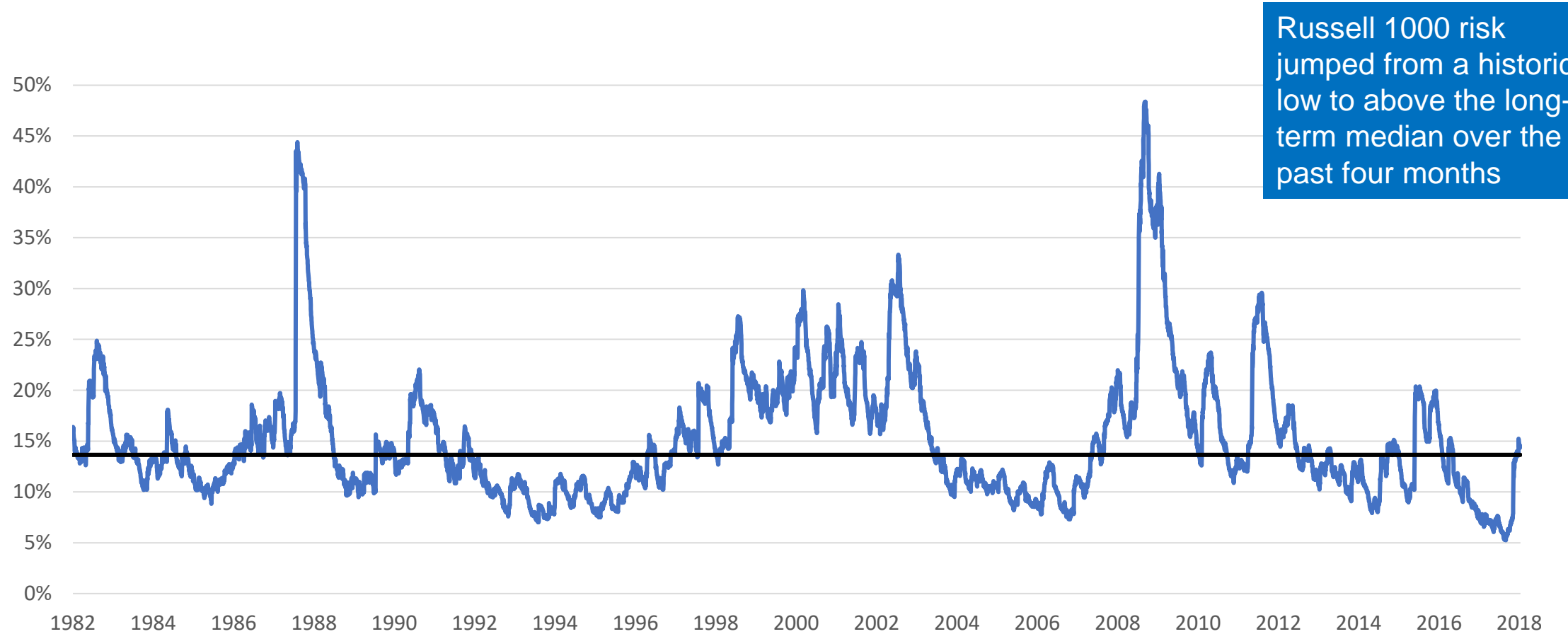


*FTSE Europe minus FTSE Eurobloc

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

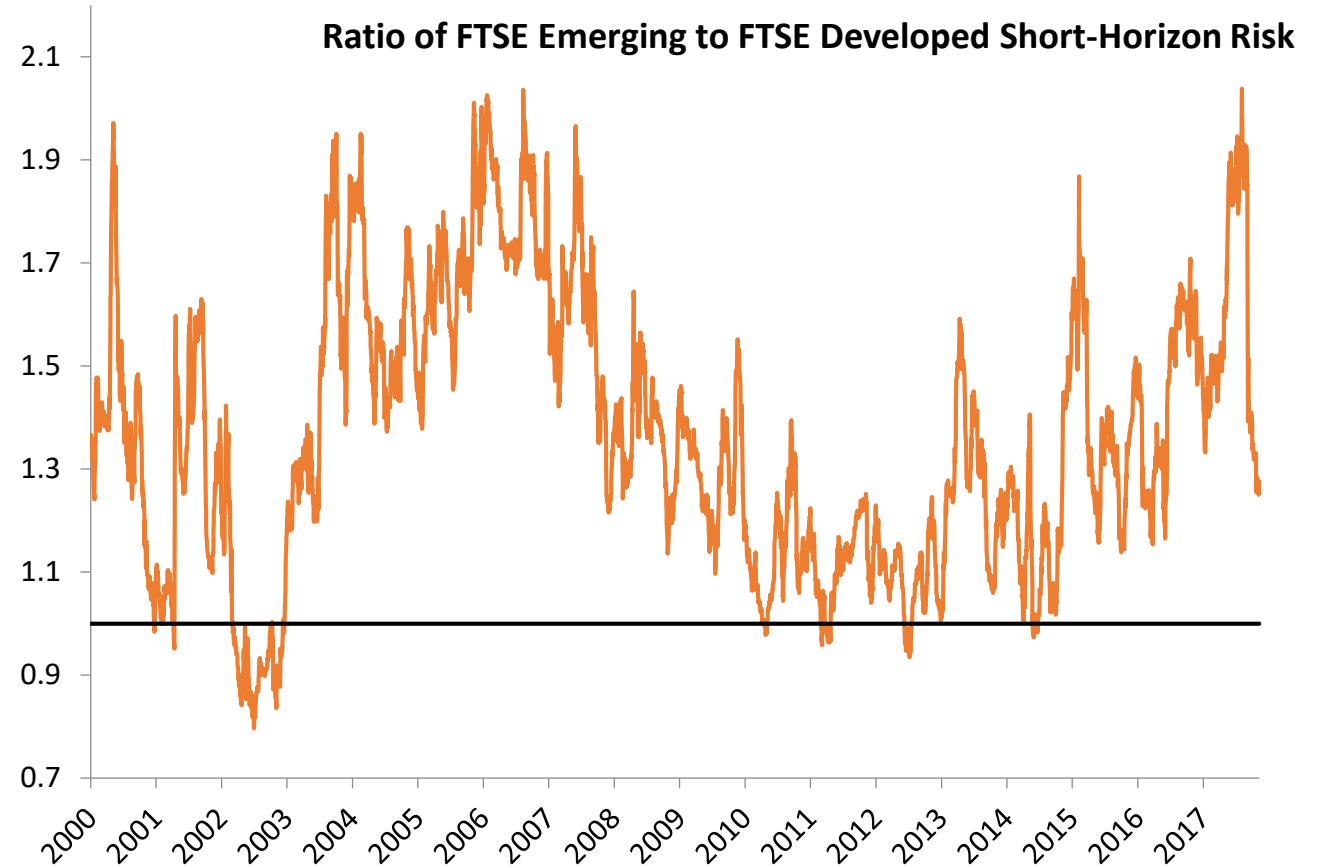
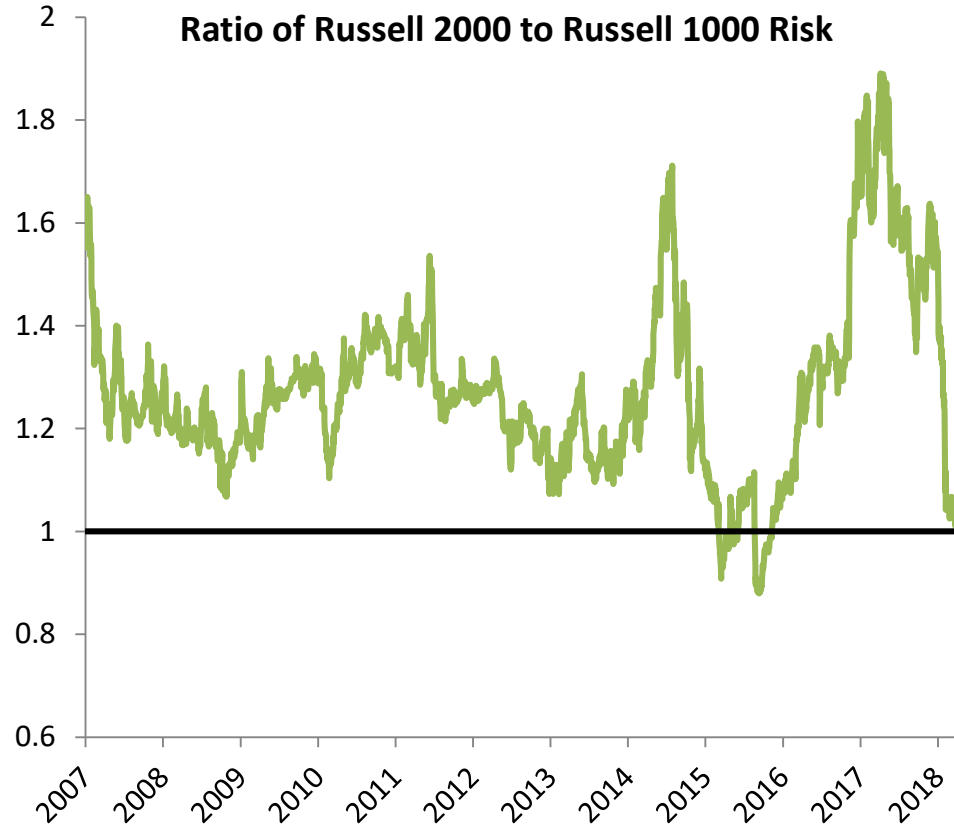
Source: FTSE Russell, Standard & Poor's, China Securities Index Company, Ltd, Axioma Inc.

SHORT-HORIZON FUNDAMENTAL RISK FORECAST, RUSSELL 1000



Black line represents the median value

TRADITIONALLY RISKIER ASSET CLASSES HAVE CONVERGED WITH THEIR LESS-RISKY COUNTERPARTS

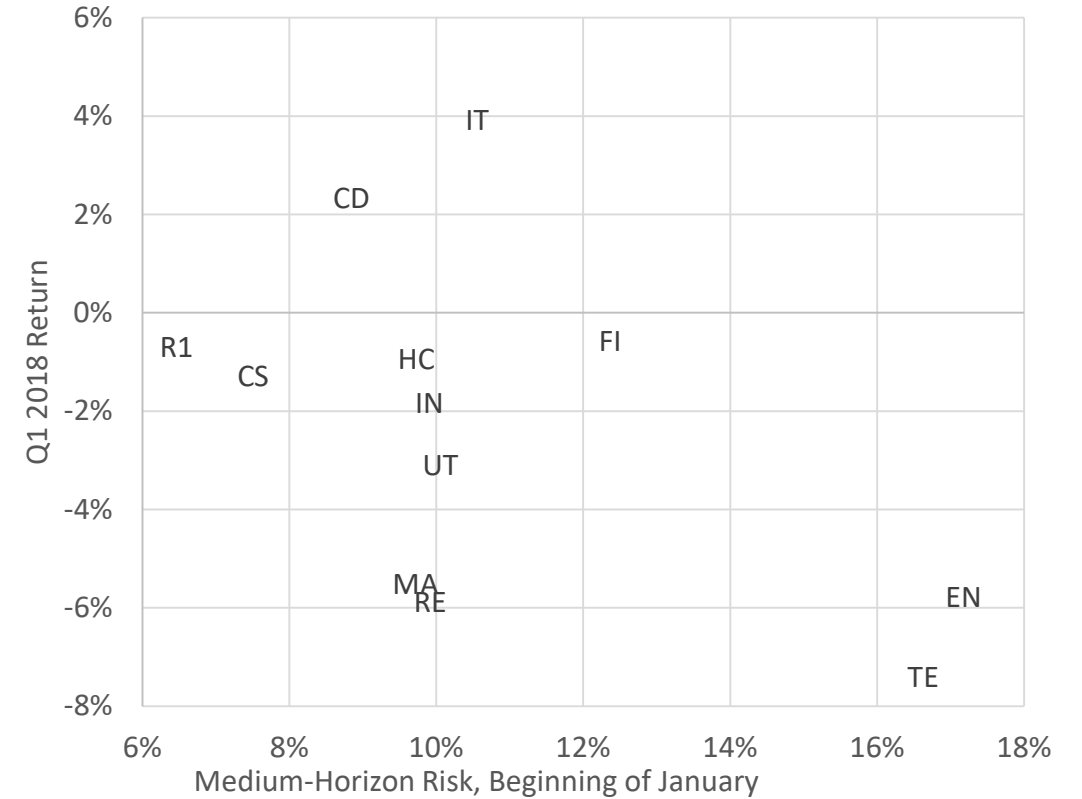
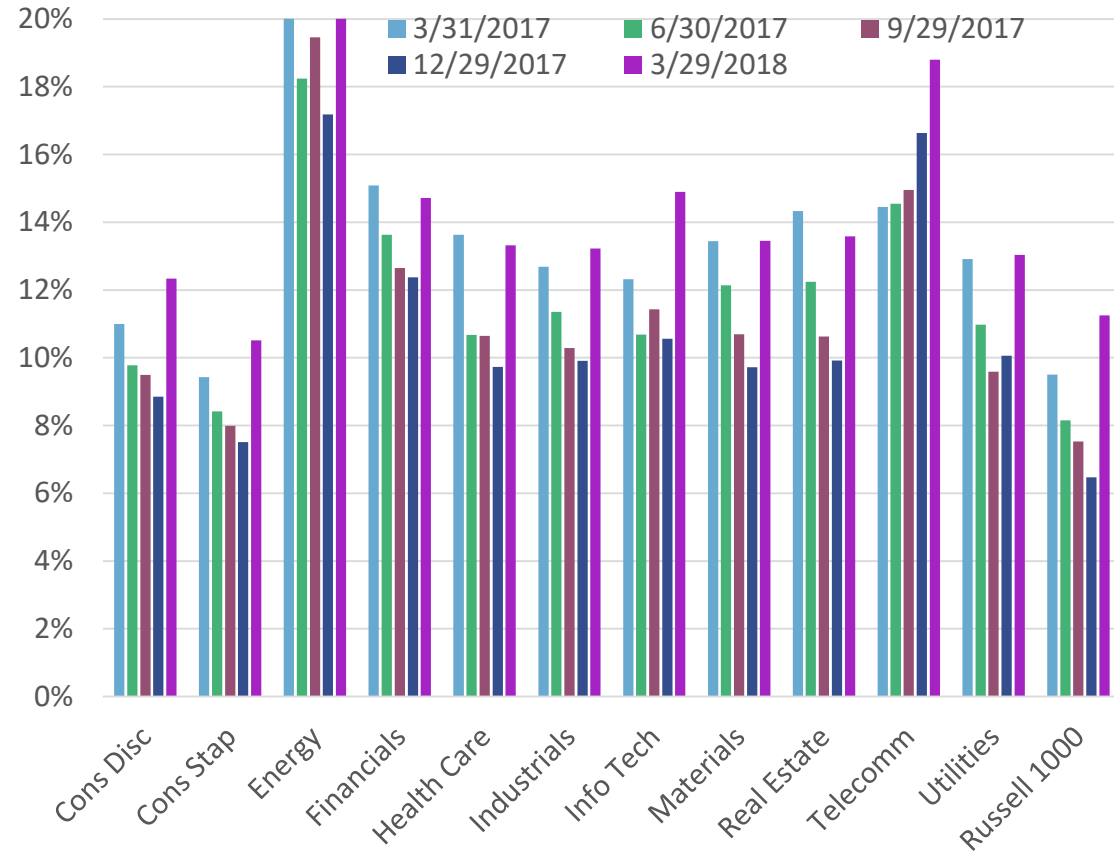


Based on short-horizon fundamental model forecasts

US SECTOR RISK

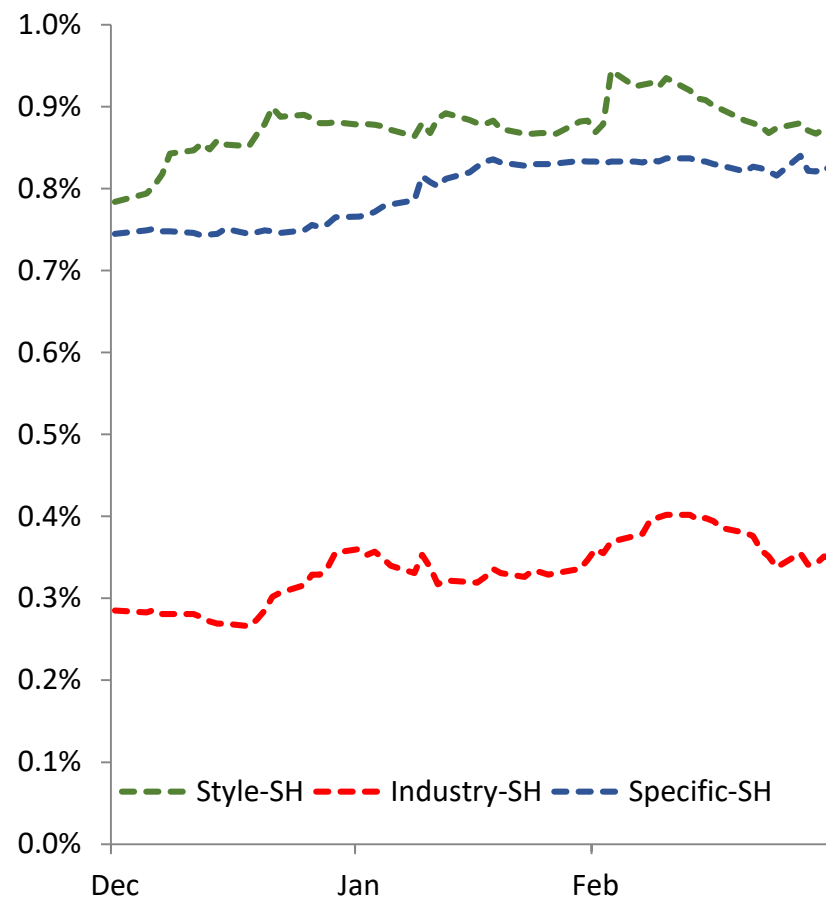
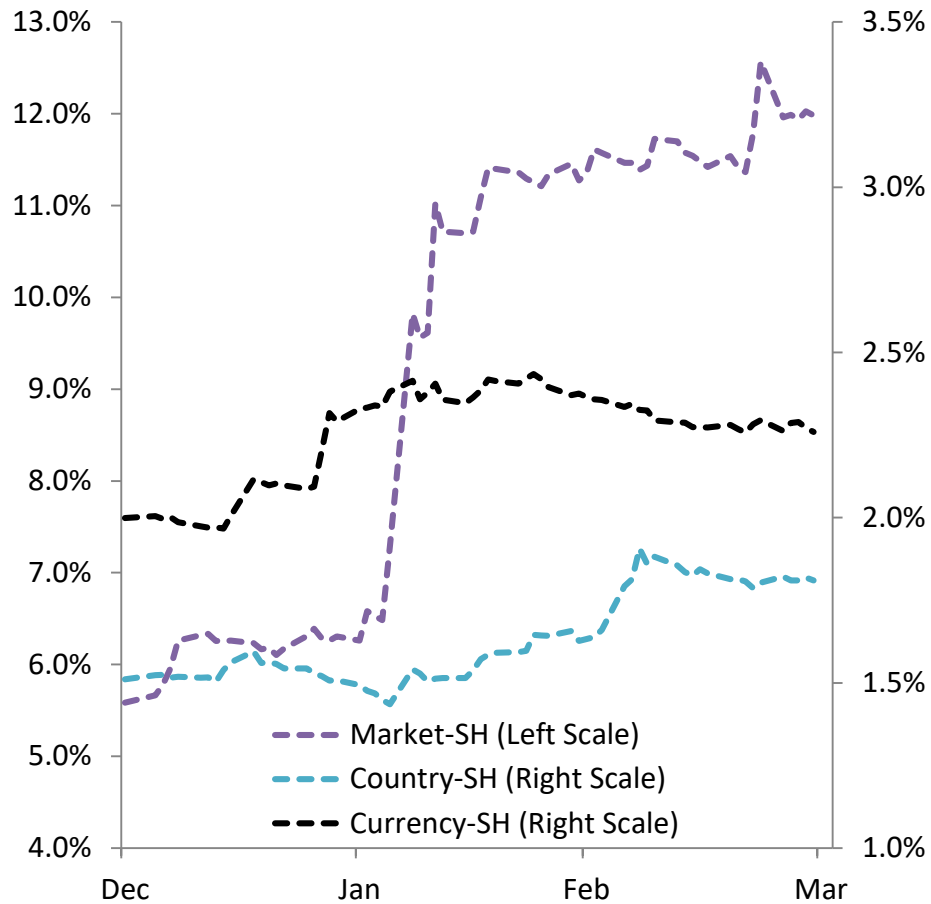
US SECTOR MEDIUM-HORIZON FUNDAMENTAL RISK

Risk for all US sectors increased in Q1, and despite the recent rout IT produced the highest Sharpe



COUNTRY AND CURRENCY RISK

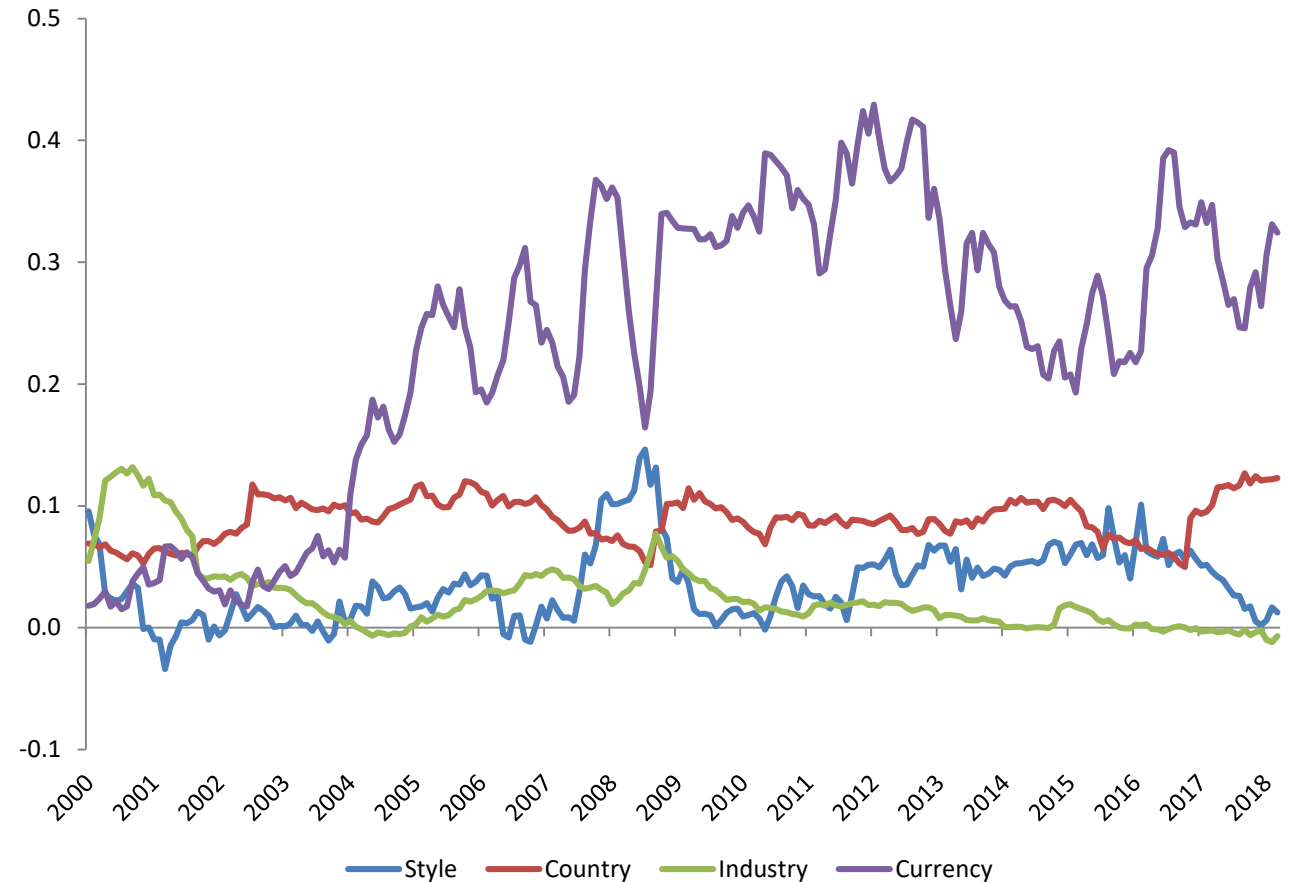
MAJOR COMPONENTS OF SHORT-HORIZON RISK: FTSE GLOBAL DEVELOPED INDEX (USD BASE)



Market risk was the major driver of the overall higher level of volatility

WORLDWIDE MODEL MEDIAN FACTOR CORRELATIONS BY FACTOR BLOCK

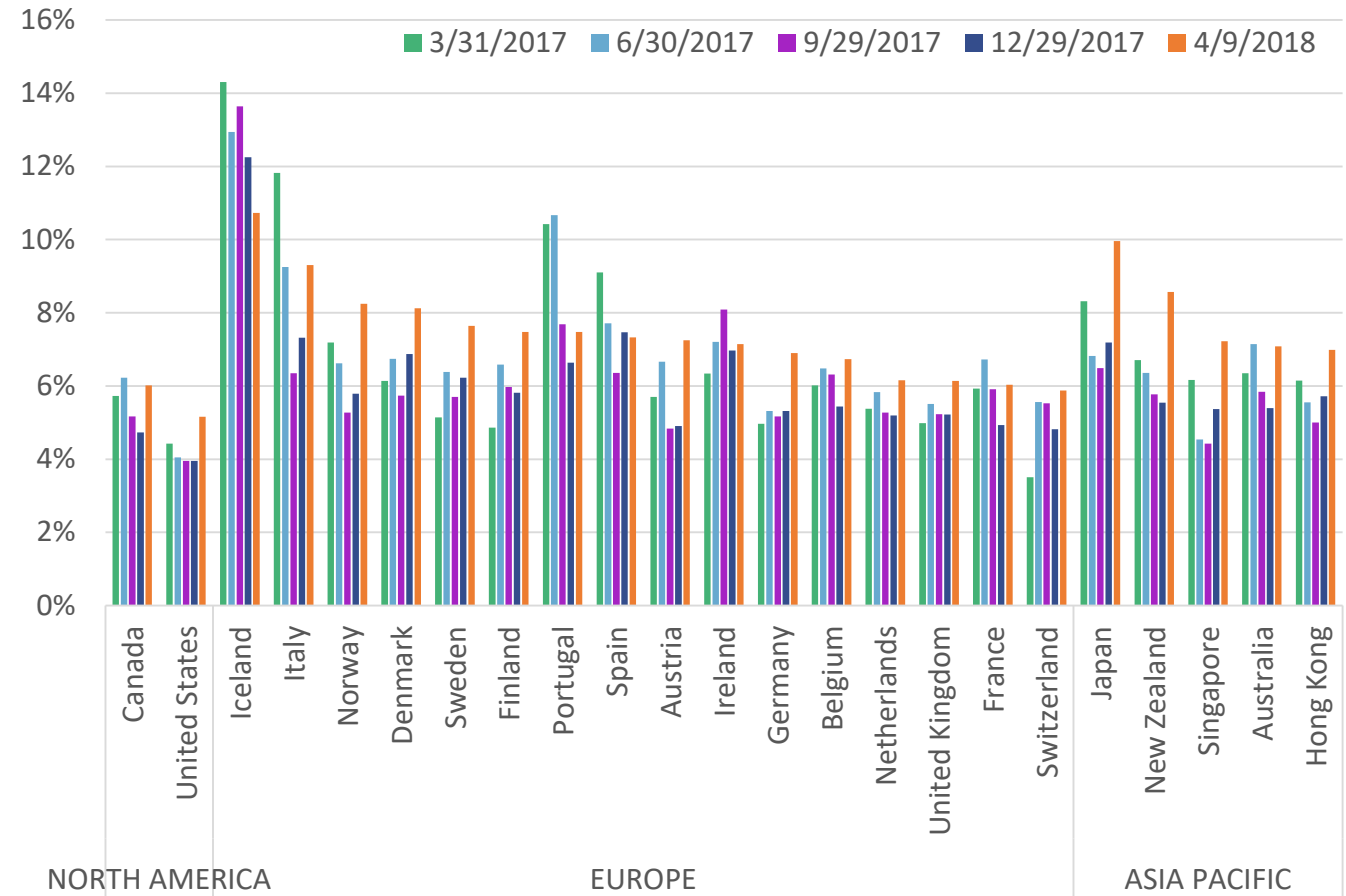
- **Currency Correlations versus the dollar have once again climbed, suggesting the moves are about the dollar, not individual currencies**
- **Country correlations rose slightly, while style correlations – already low – have been falling for two years**



Source: Axioma

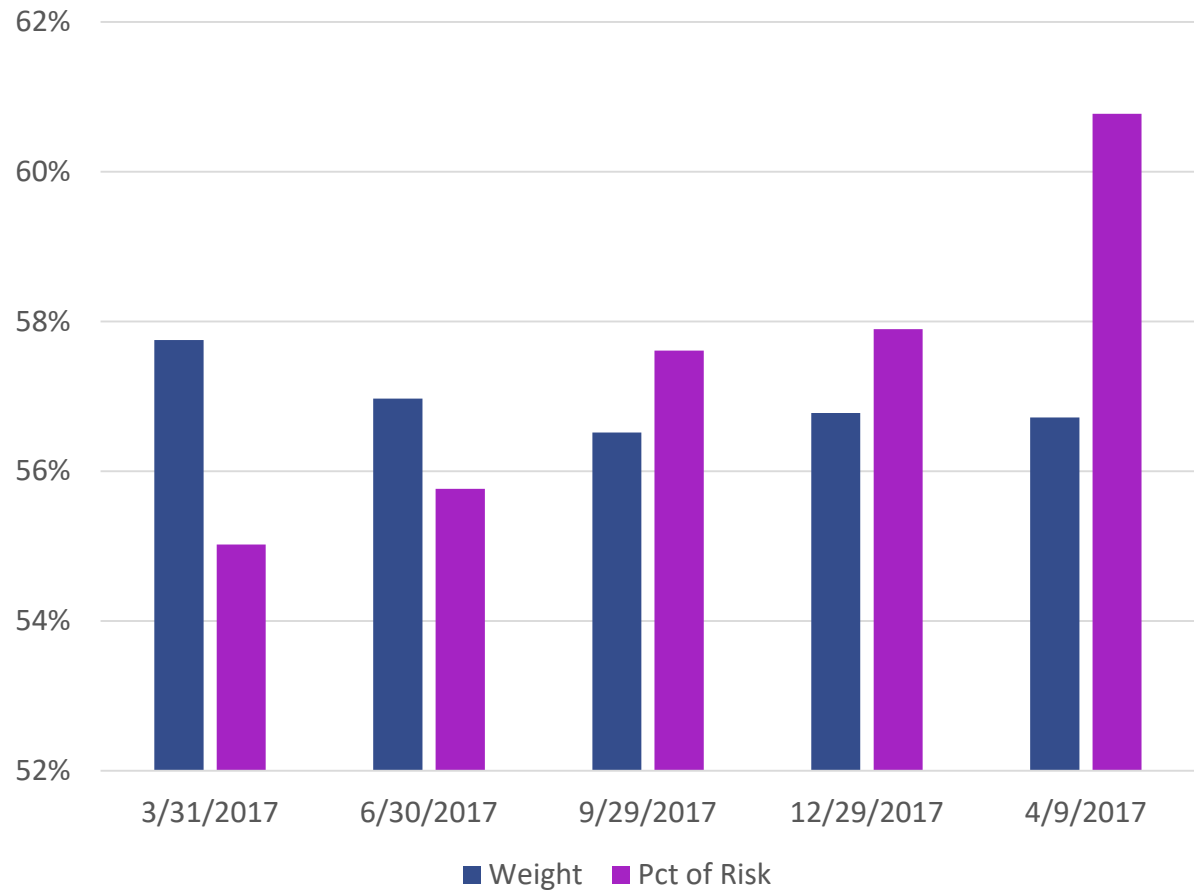
DEVELOPED MARKET COUNTRY EXTRA-MARKET VOLATILITY (NUMERAIRE USD)

- All developed-market countries saw higher extra-market risk at the end of Q1 vs. Q4, except Spain and Iceland
- In most cases risk is higher than it was a year ago
- New Zealand had the biggest increase, both in percentage points (3.0) and in percent change (more than 50%)



Source: Axioma

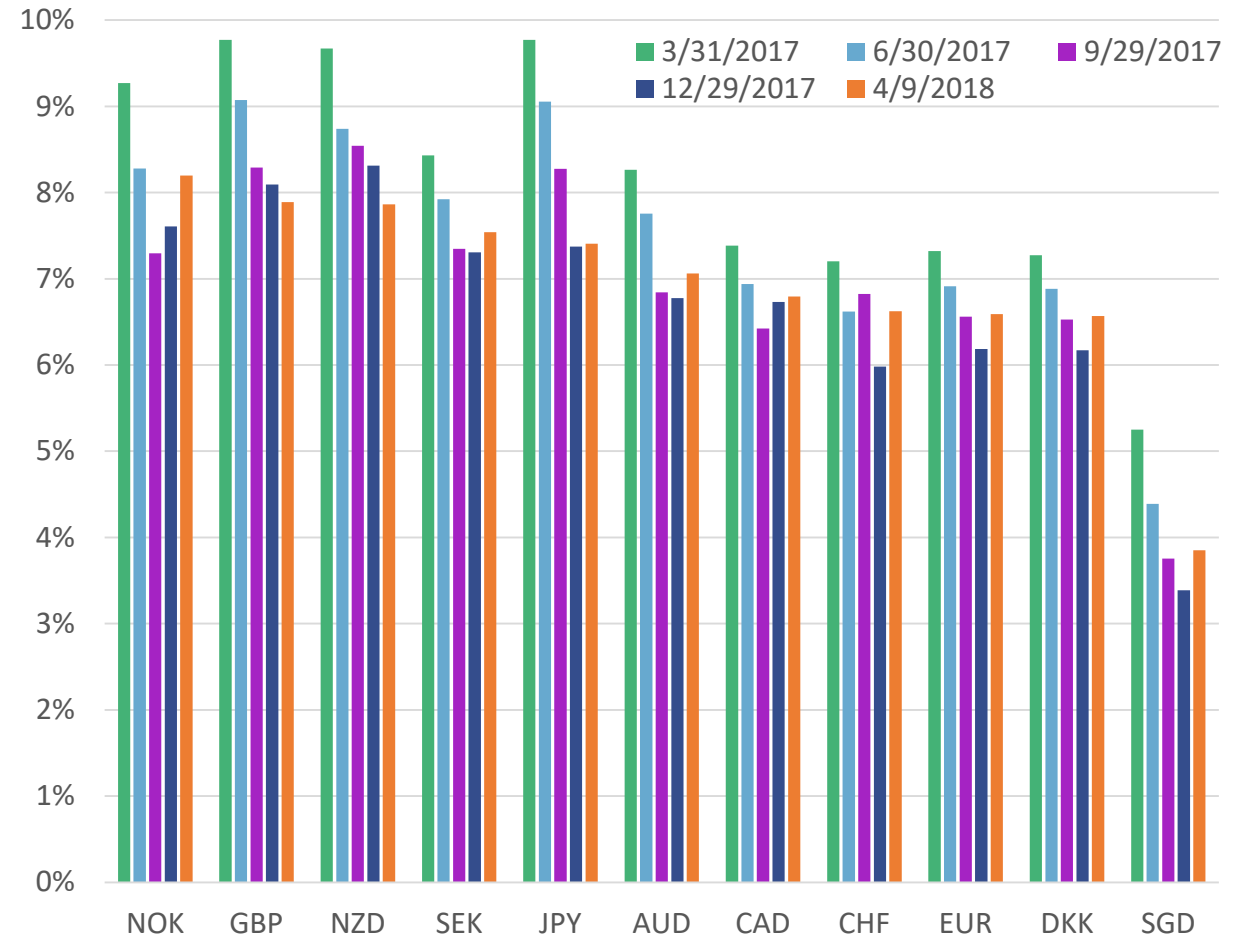
UNITED STATES WEIGHT AND CONTRIBUTION TO SHORT-HORIZON RISK, FTSE DEVELOPED INDEX



A year ago, the US contribution to risk was almost 3 percentage points less than its weight, suggesting the US was less risky than other countries. That has reversed, and the contribution is now 4 percentage points higher than the weight

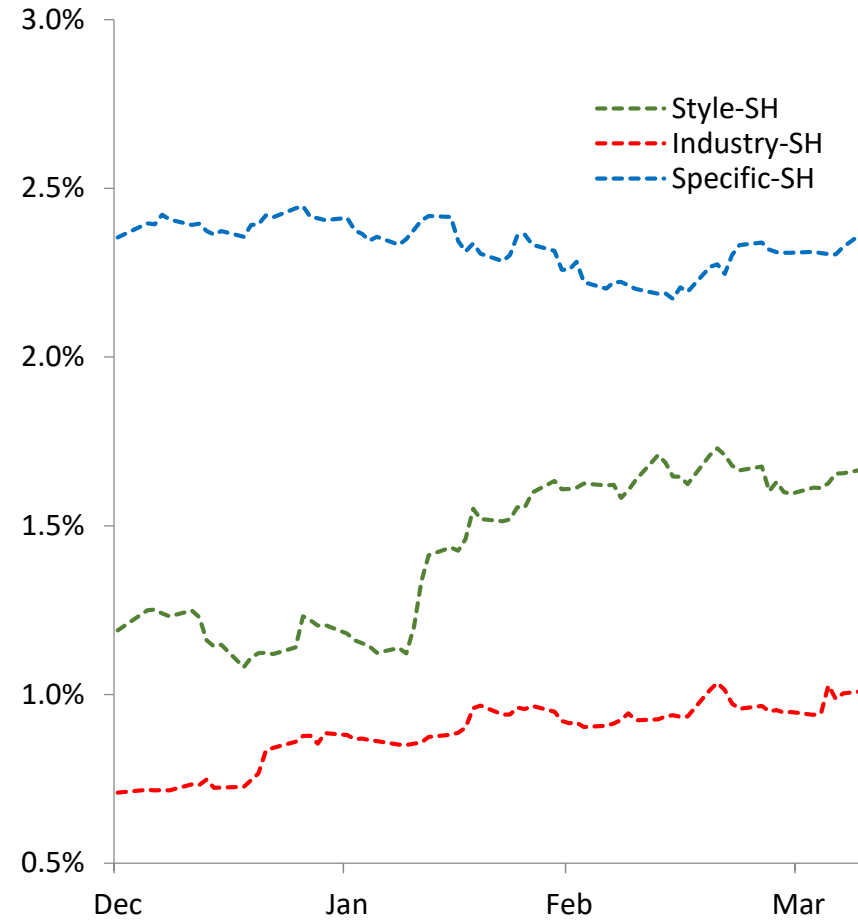
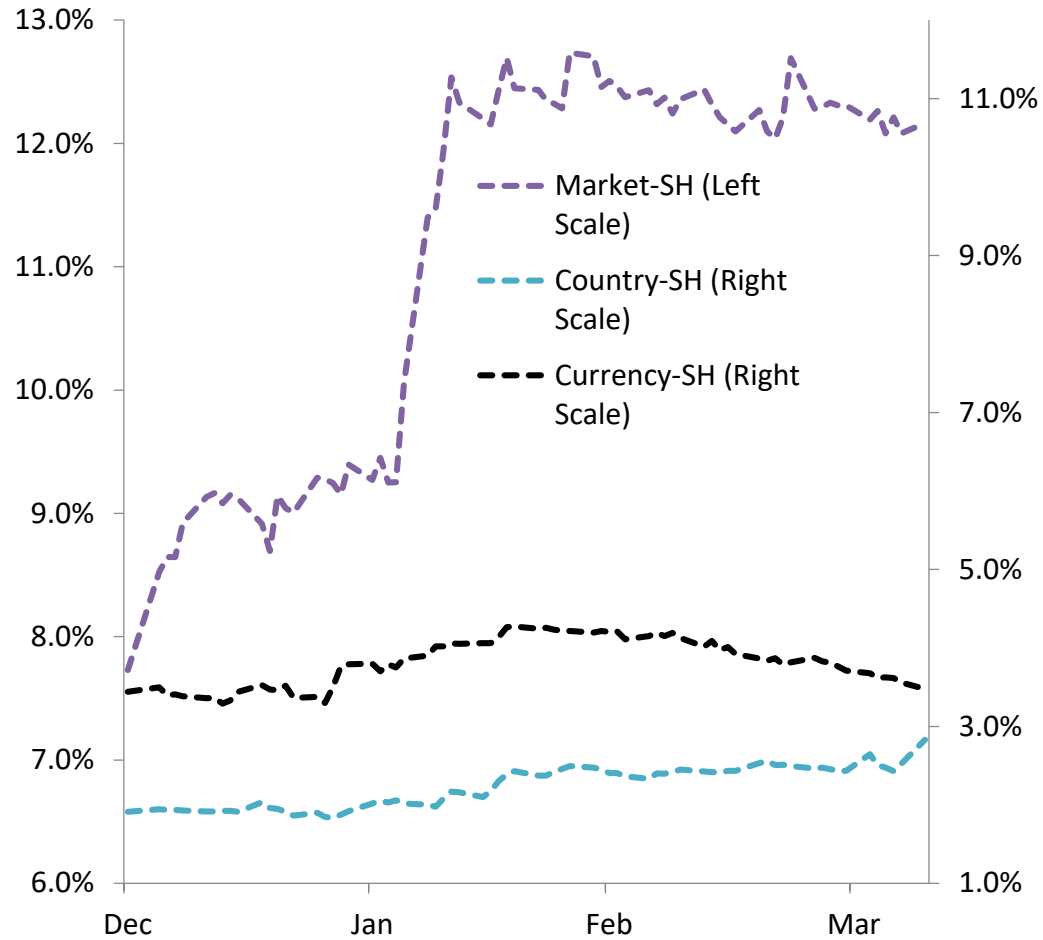
DEVELOPED MARKET CURRENCY VOLATILITY (VS. USD)

- Risk for most developed currencies rose in Q1 relative to USD, but the increases were small
- Risk for all developed currencies vs. USD remains lower than it was a year ago – so dollar is more volatile



Source: Axioma

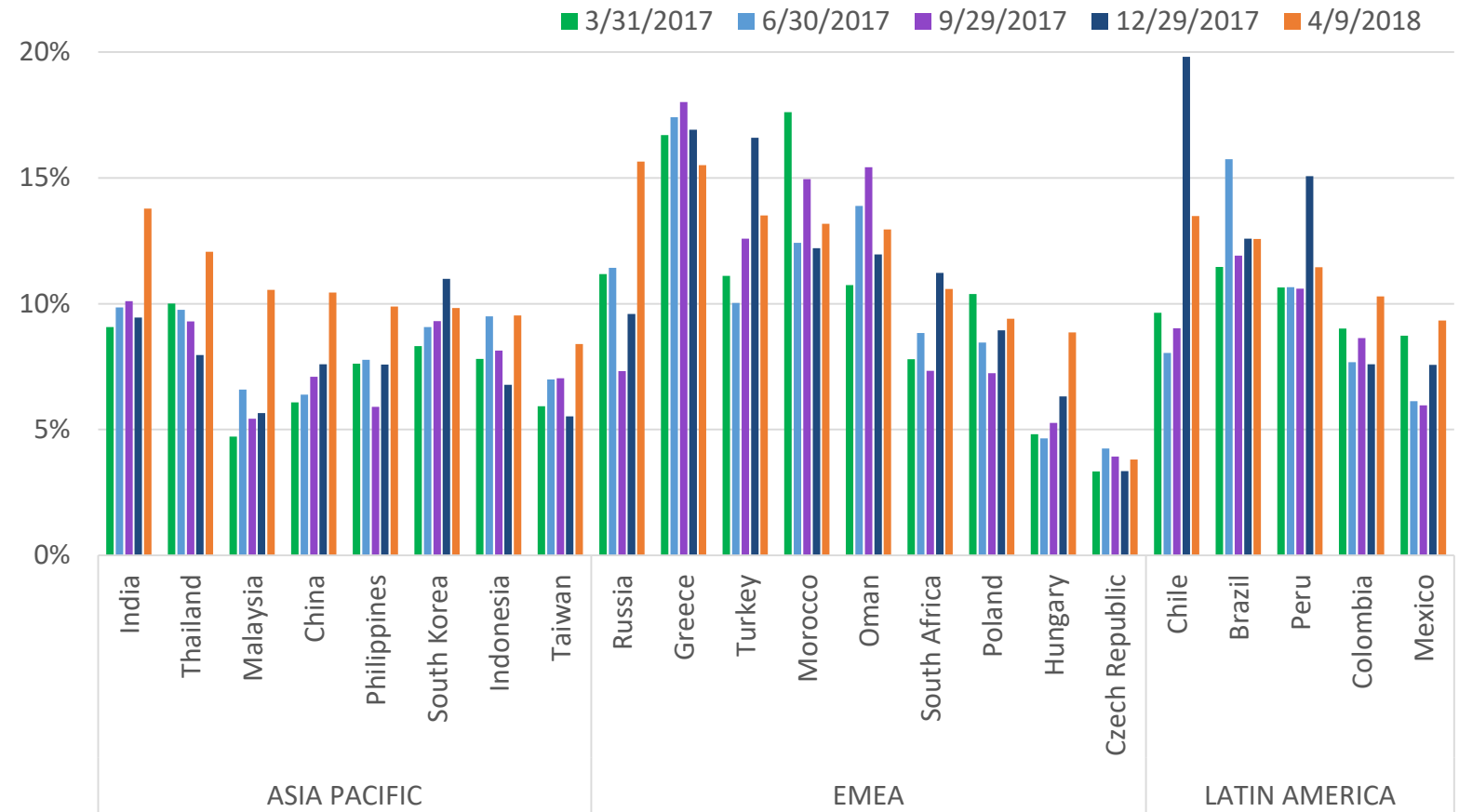
MAJOR COMPONENTS OF SHORT-HORIZON RISK: FTSE EMERGING INDEX (USD BASE)



Market risk also drove Emerging Market risk, but the impact was confined to a few days

EMERGING COUNTRIES EXTRA-MARKET RISK LEVELS

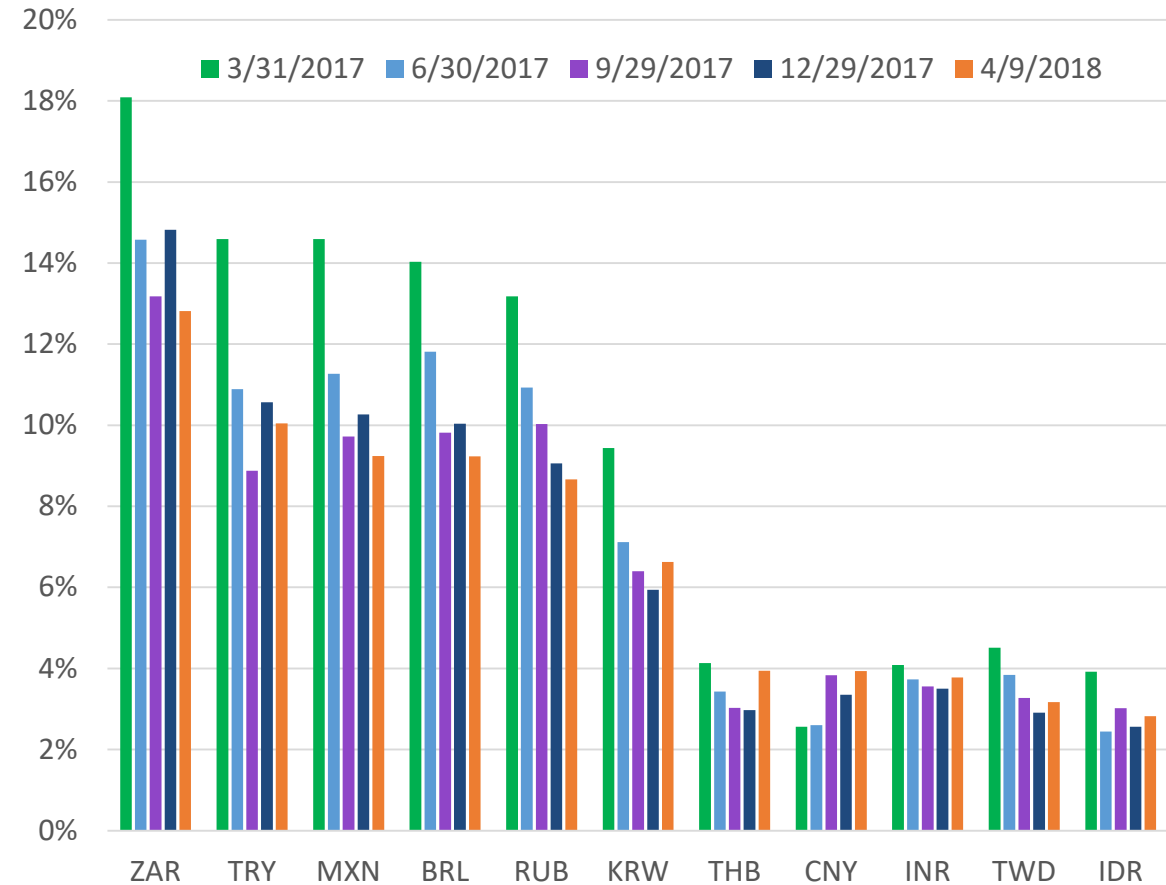
- EM countries had mixed risk changes from Q4 – Malaysia, Russia, Taiwan and Thailand each saw increases of more than 50%, while several countries saw decreases, including South Korea
- Risk is generally higher than it was a year ago
- The sharp increase in Russia’s risk occurred since the end of March



Source: Axioma

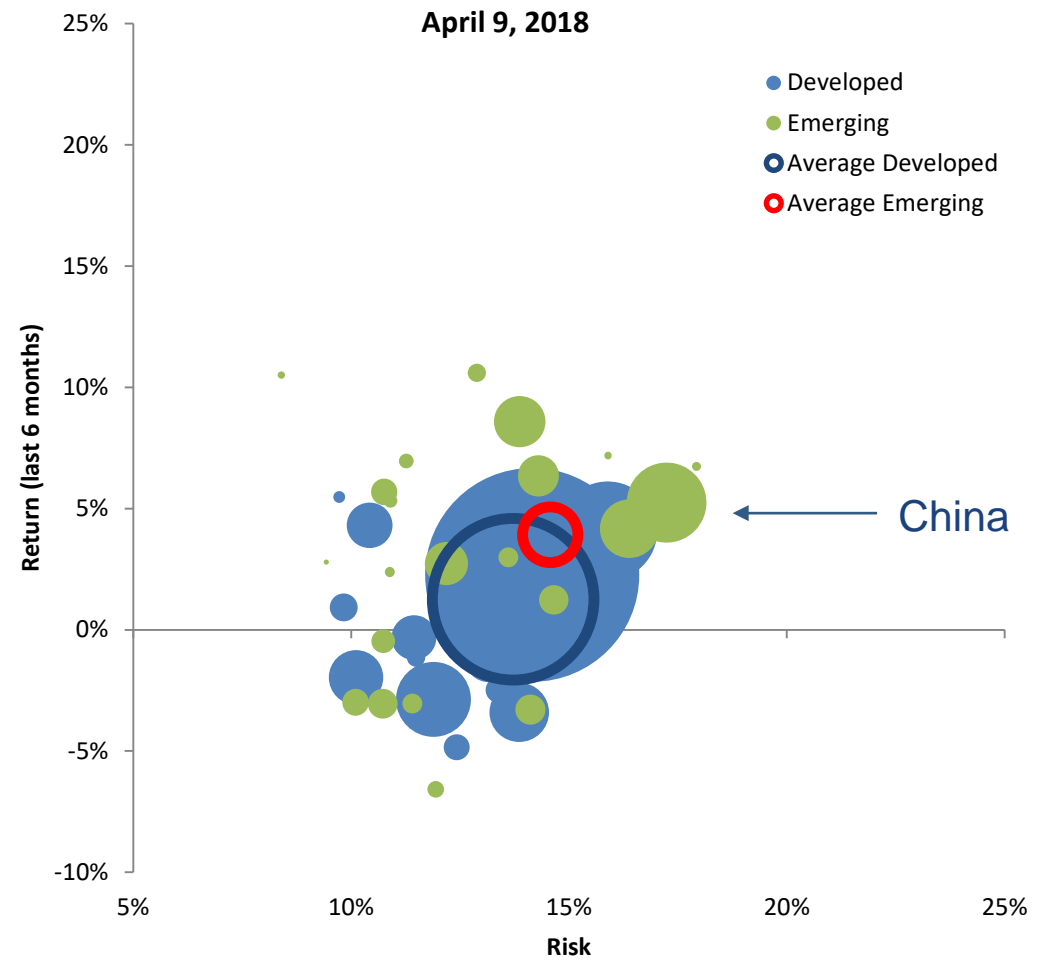
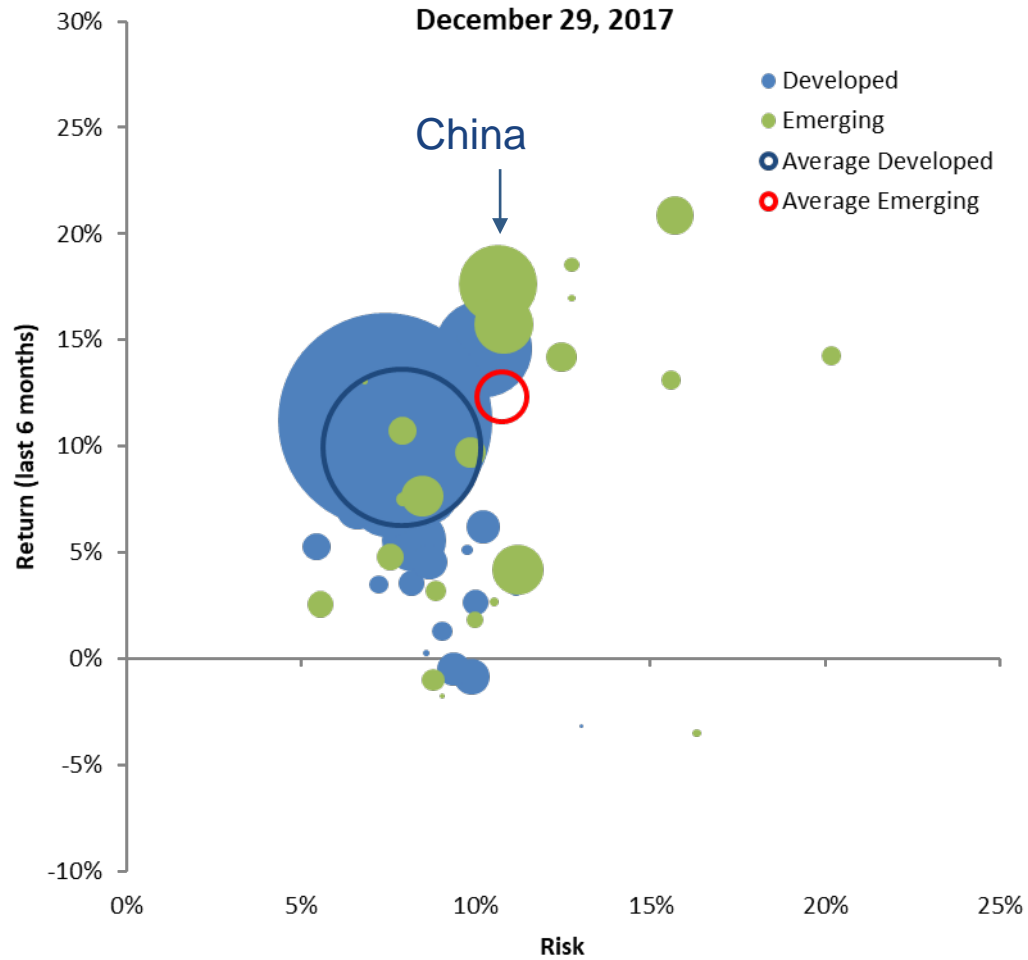
EMERGING MARKET CURRENCY VOLATILITY (vs. USD)

- Currencies that ended Q4 with the highest risk saw it fall in Q1
- As in developed market currencies, most currencies have lower risk than a year ago
- Although Russian market risk rose, risk of the ruble fell in Q1



Source: Axioma

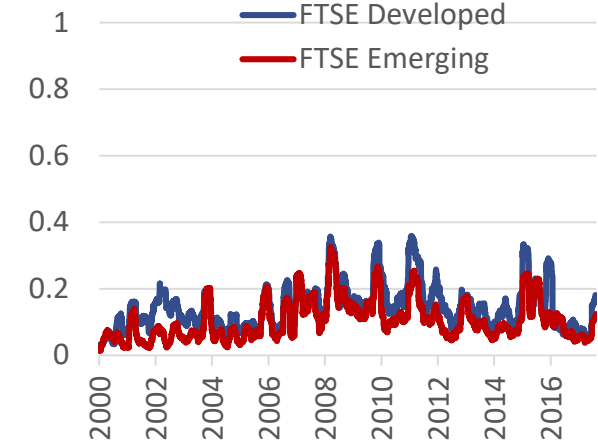
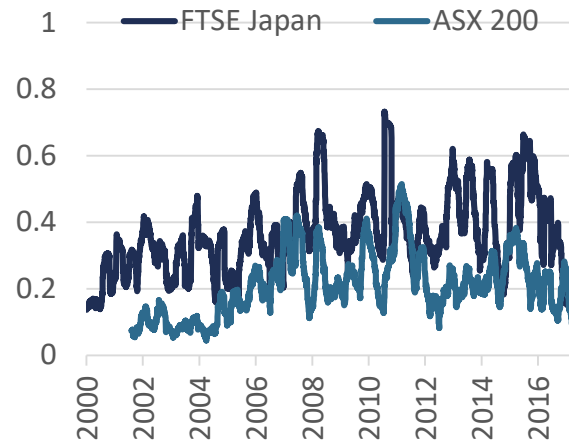
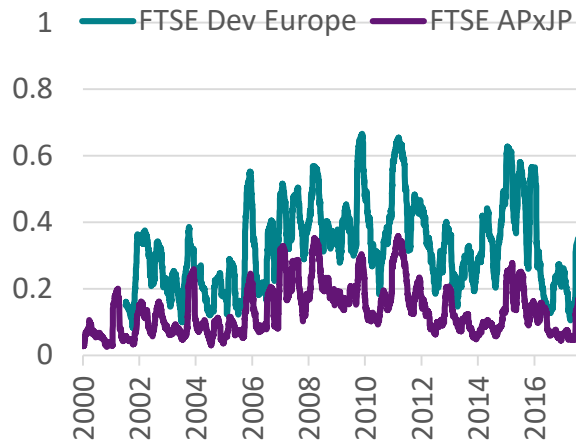
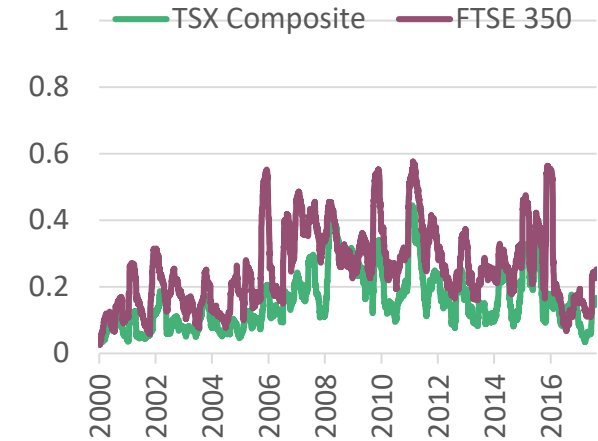
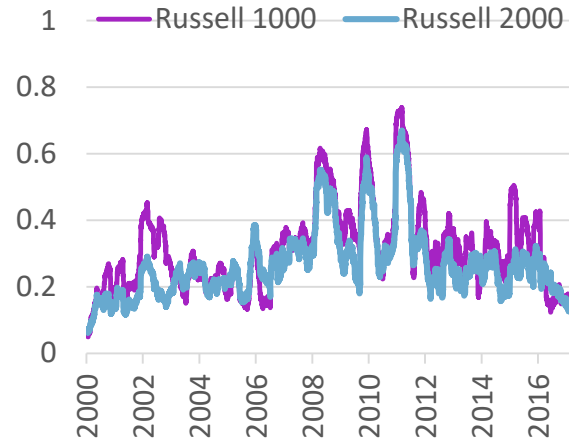
EM RISK HAS CONVERGED, BUT NOW ONLY GREECE IS RISKIER THAN CHINA



CORRELATIONS, DISPERSION AND THE DECOMPOSITION OF THE CHANGE IN RISK

MEDIAN PAIRWISE ROLLING 60-DAY ASSET CORRELATIONS

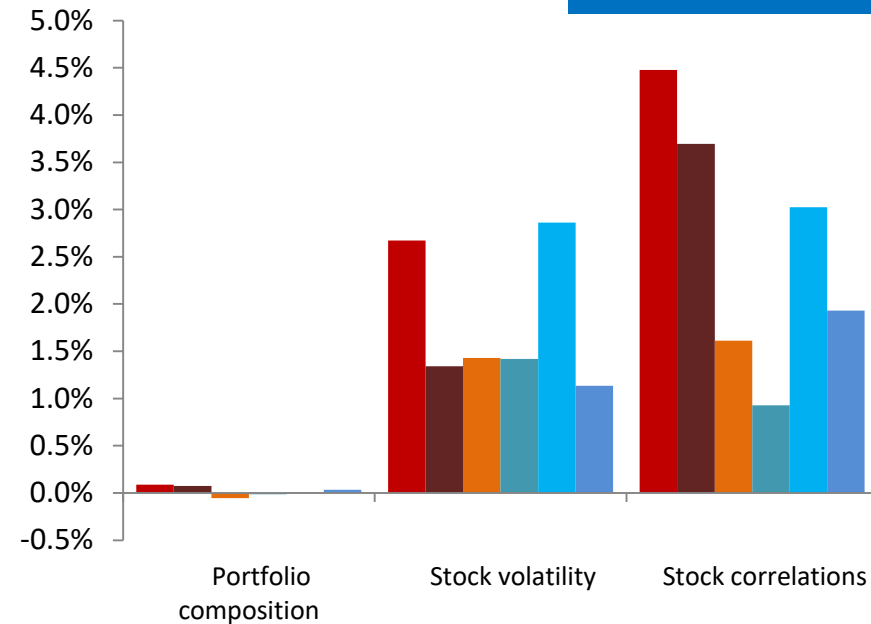
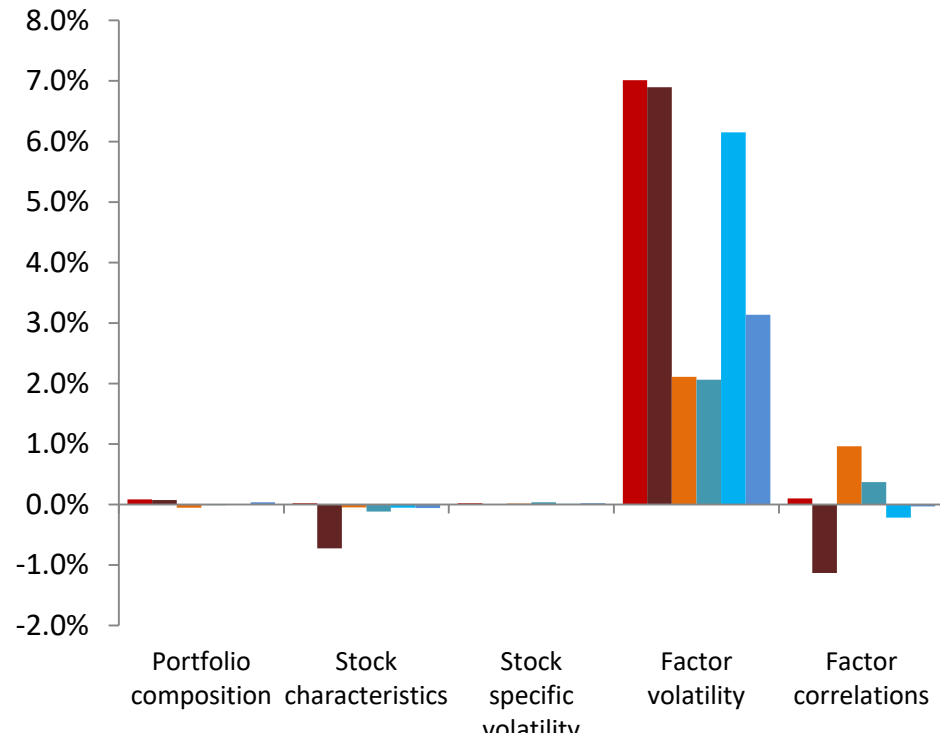
- After nearing or hitting record lows during the fourth quarter, correlations rose dramatically in Q1
- The increases were biggest in the Russell 1000 and FTSE Japan
- Investors may be once again getting more concerned about macro events



Source: Axioma

DECOMPOSITION OF THE Q1 CHANGE IN SHORT-HORIZON RISK: SINGLE-COUNTRY MODELS

Just as correlations drove risk down for the past several quarters, they boosted it back up in Q1

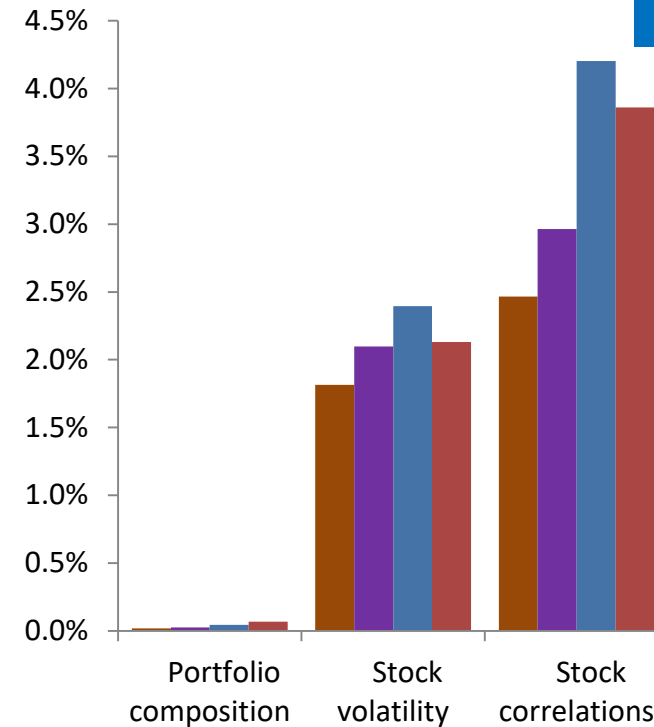
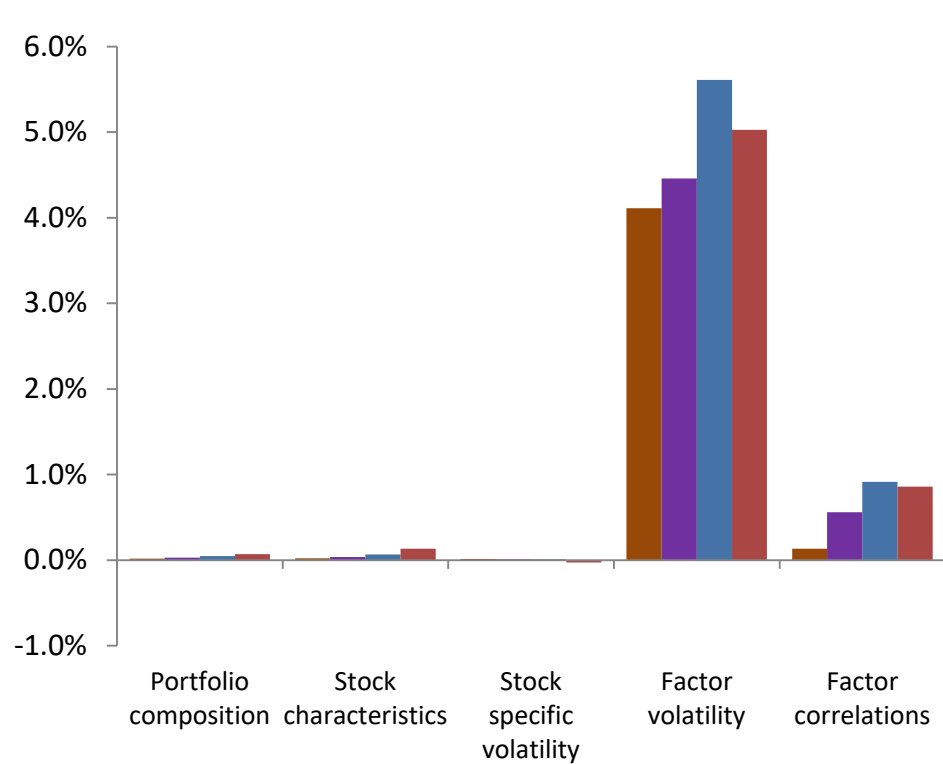


■ Russell 1000 ■ Russell 2000 ■ TSX Composite ■ FTSE 350 ■ FTSE Japan ■ ASX 200

Source: Axioma

DECOMPOSITION OF THE Q1 CHANGE IN SHORT-HORIZON RISK: REGIONAL MODELS

Higher factor correlations also played a role in boosting risk in regional models

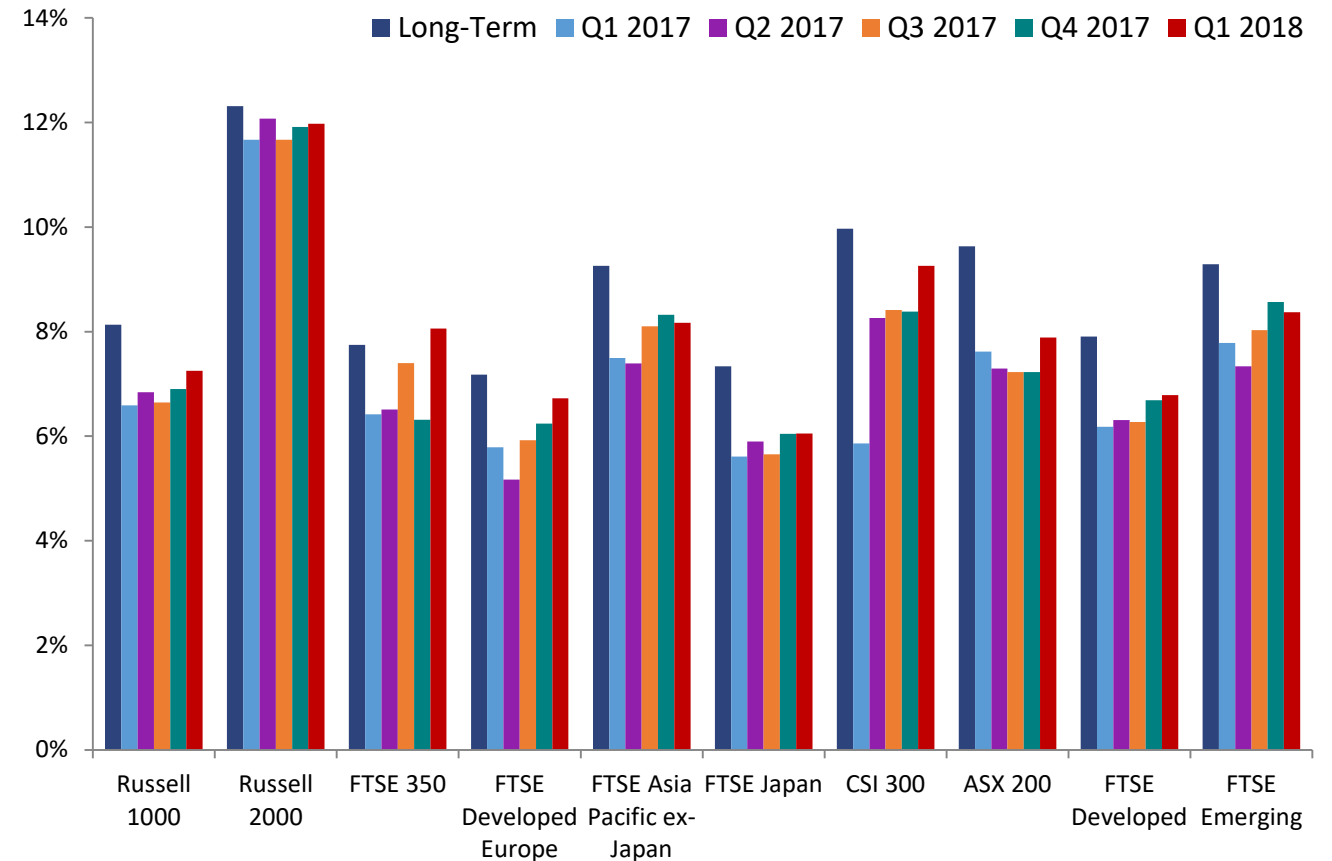


■ FTSE Developed Europe ■ FTSE Asia Pacific ex JP ■ FTSE Developed ■ FTSE Emerging

Source: Axioma

AVERAGE MONTHLY ASSET-RETURN DISPERSION

- Dispersion is the cross-sectional standard deviation of monthly returns for stocks included in each benchmark
- Dispersion rose in most markets in Q1, driven by higher volatility, but in most cases remains below the long-term average
- Low correlations, high dispersion and high specific risk are all theoretically good indicators for stock pickers, as the reward to picking the right stocks is higher



STYLE FACTOR PERFORMANCE AND VOLATILITY

DESPITE THE APPARENT CHANGE IN MARKET DIRECTION, MOMENTUM CONTINUED FULL-SPEED AHEAD

	US Small					Asia Pac		World		Emerging
	US	Cap	Canada	UK	Europe	ex-Japan	Japan	Australia	wide	Markets
	YTD 2018 Return in %, Highest and Lowest region for each factor is highlighted, * means return was >2 std dev									
Momentum	1.94	0.69	-0.18	2.32 *	1.44	3.22 *	0.17	4.56 *	2.13 *	3.98 *
Value	-0.12	0.54	0.59	0.62	-0.55	-0.31	-0.15	1.17	-0.45	-0.14
Earnings Yield	-1.09	-1.34	—	—	—	—	-1.38 *	—	0.06	—
Volatility	-2.15	-1.50	-5.29 *	-2.44 *	-2.73	-3.87 *	0.04	-6.57 *	-1.37	-1.98
Mkt Sensitivity	-1.03	-1.14	-0.07	0.54	—	—	-0.55	-0.49	-0.19	—
Growth	0.43	0.19	2.33 *	1.13	0.14	0.70	0.80	-0.06	0.10	0.76
Profitability	0.74	0.63	—	—	—	—	0.91	1.67	0.26	—
Dividend Yield	-0.68	-1.07	—	—	—	—	0.41	-0.81	-0.10	—
Exch Rate Sens	-0.39	-0.52	—	0.48	-0.24	-0.40	0.53	0.65	-0.06	-0.15
Size	-0.71	0.11	-0.02	-1.60	-2.02	2.32	-1.68	-3.42	-0.82	1.84
Leverage	-0.25	-0.24	-0.50	-0.70	-0.80	-0.08	0.18	0.52	-0.22	-0.33
Liquidity	0.24	-0.11	-0.50	0.72	-0.08	0.41	-0.55	-1.43	-0.61	-1.17

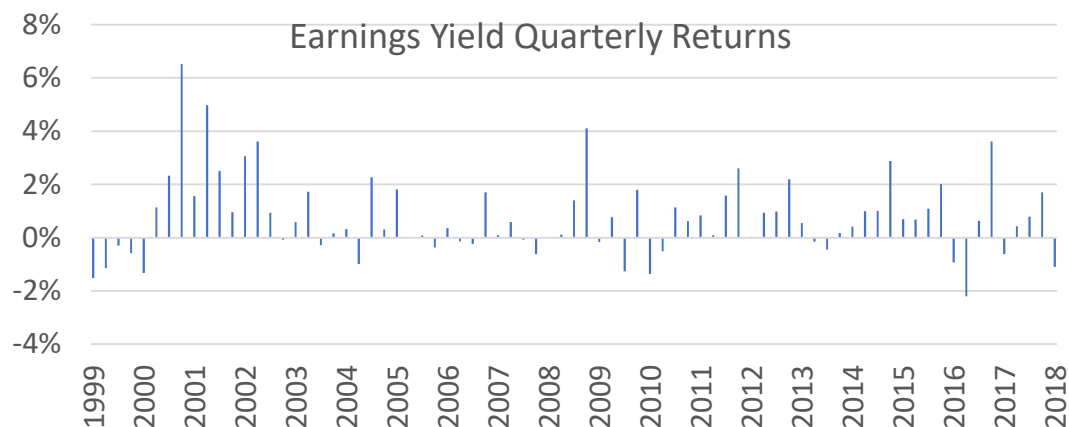


In most cases Australia had the highest or lowest factor returns, although the market had lower overall returns than many others and a smaller increase in risk

Source: Axioma

EARNINGS YIELD IN THE US HAD ONE OF ITS TOUGHEST QUARTERS EVER

	US Small			Asia Pac				World wide	Emerging Markets	
	US	Cap	Canada	UK	Europe	ex-Japan	Japan			Australia
	Q1 2018 Percentile Rank (highest rank means most positive return, top and bottom 10% highlighted)									
Momentum	78	53	23	85	45	79	41	77	76	91
Value	31	55	63	62	24	10	26	65	19	13
Earnings Yield	9	12	—	—	—	—	14	—	33	—
Volatility	36	35	28	38	33	26	58	6	35	45
Mkt Sensitivity	37	55	55	62	—	—	41	42	44	—
Growth	68	68	79	56	40	49	78	53	63	59
Profitability	44	41	—	—	—	—	72	69	28	—
Dividend Yield	15	13	—	—	—	—	45	24	29	—
Exch Rate Sens	26	22	—	74	74	27	78	60	49	41
Size	60	81	49	13	36	72	35	27	46	72
Leverage	33	31	32	28	27	54	53	68	35	51
Liquidity	47	50	15	56	19	62	32	19	19	24

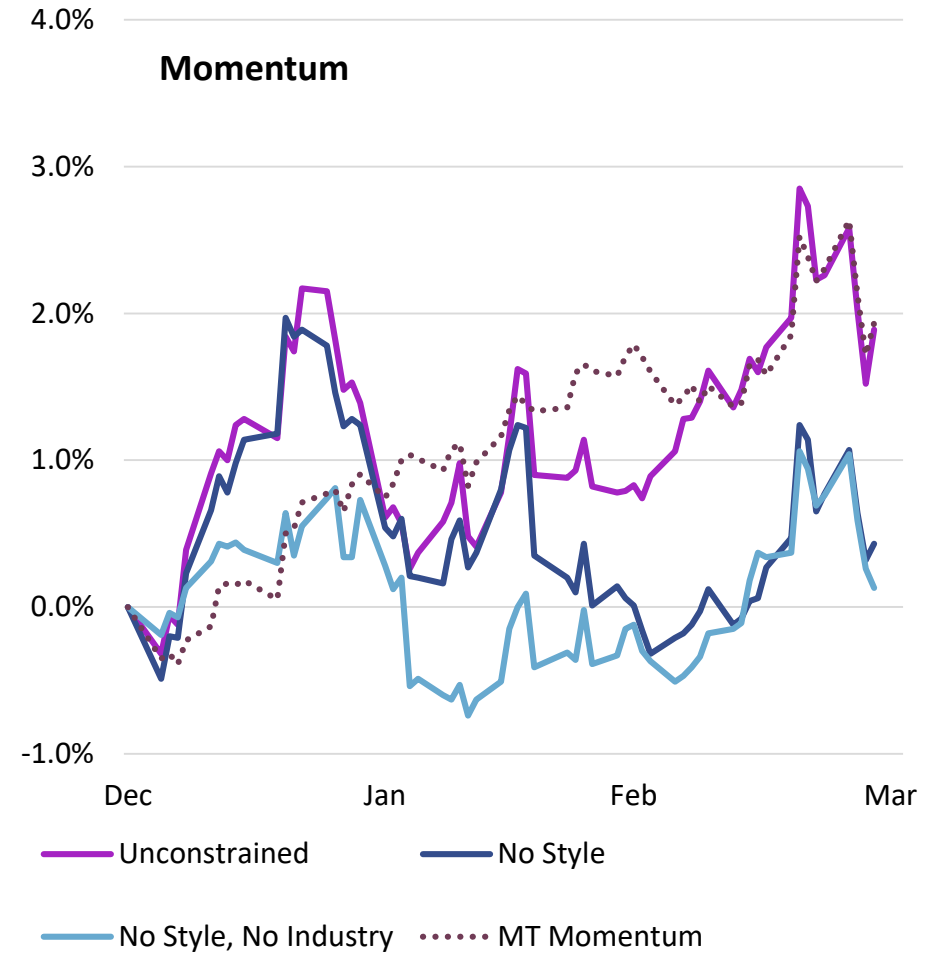
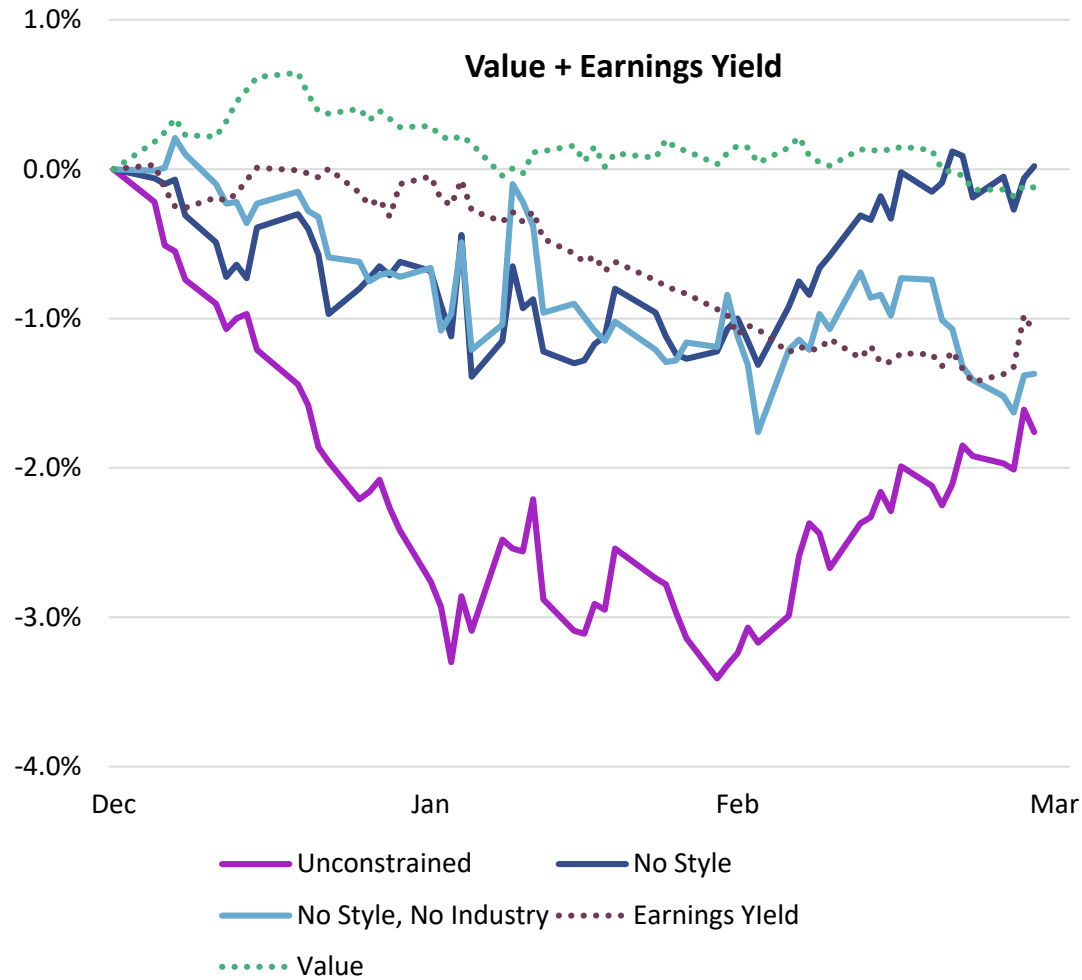


Source: Axioma

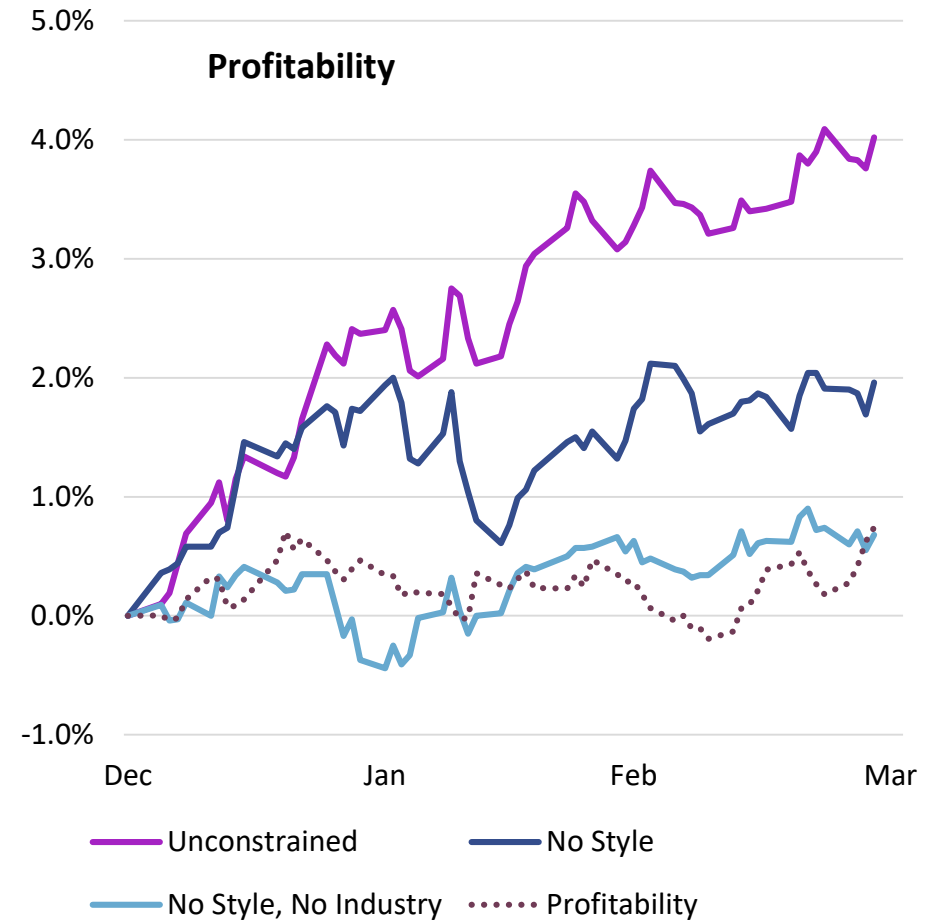
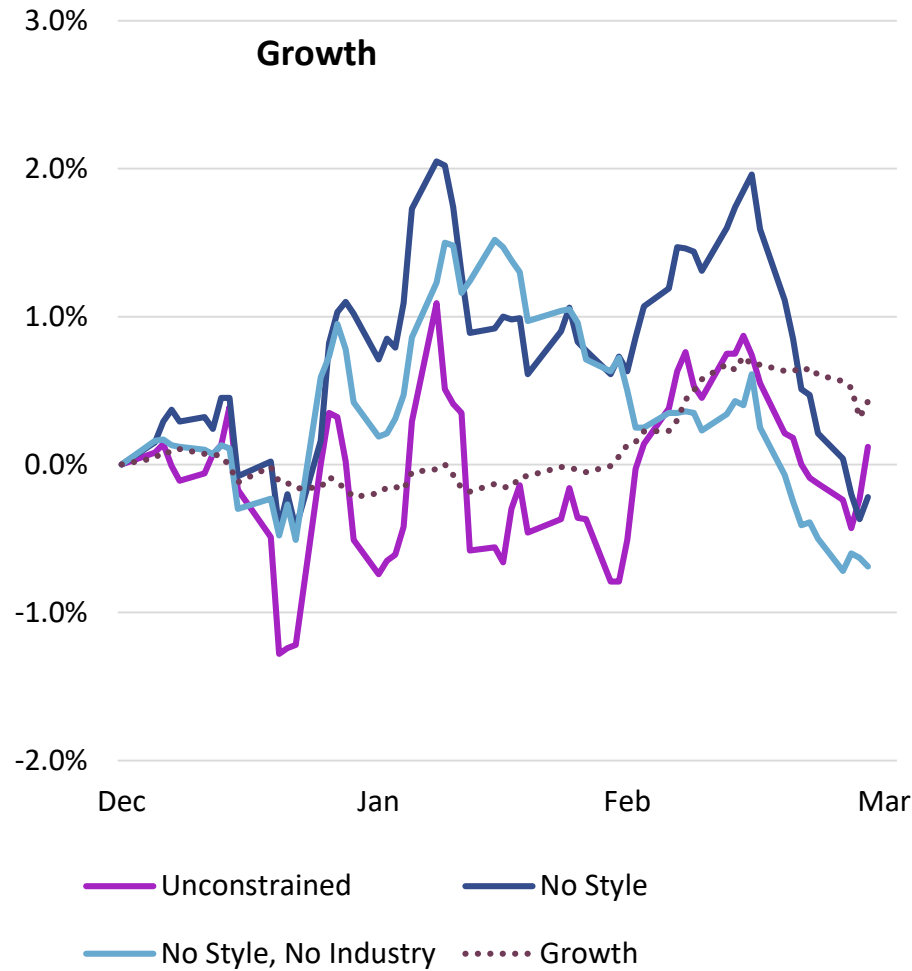
SAMPLE FACTOR PORTFOLIOS

VALUE CONTINUES TO STRUGGLE, WHILE UNCONSTRAINED MOMENTUM FARED WELL

Active Returns

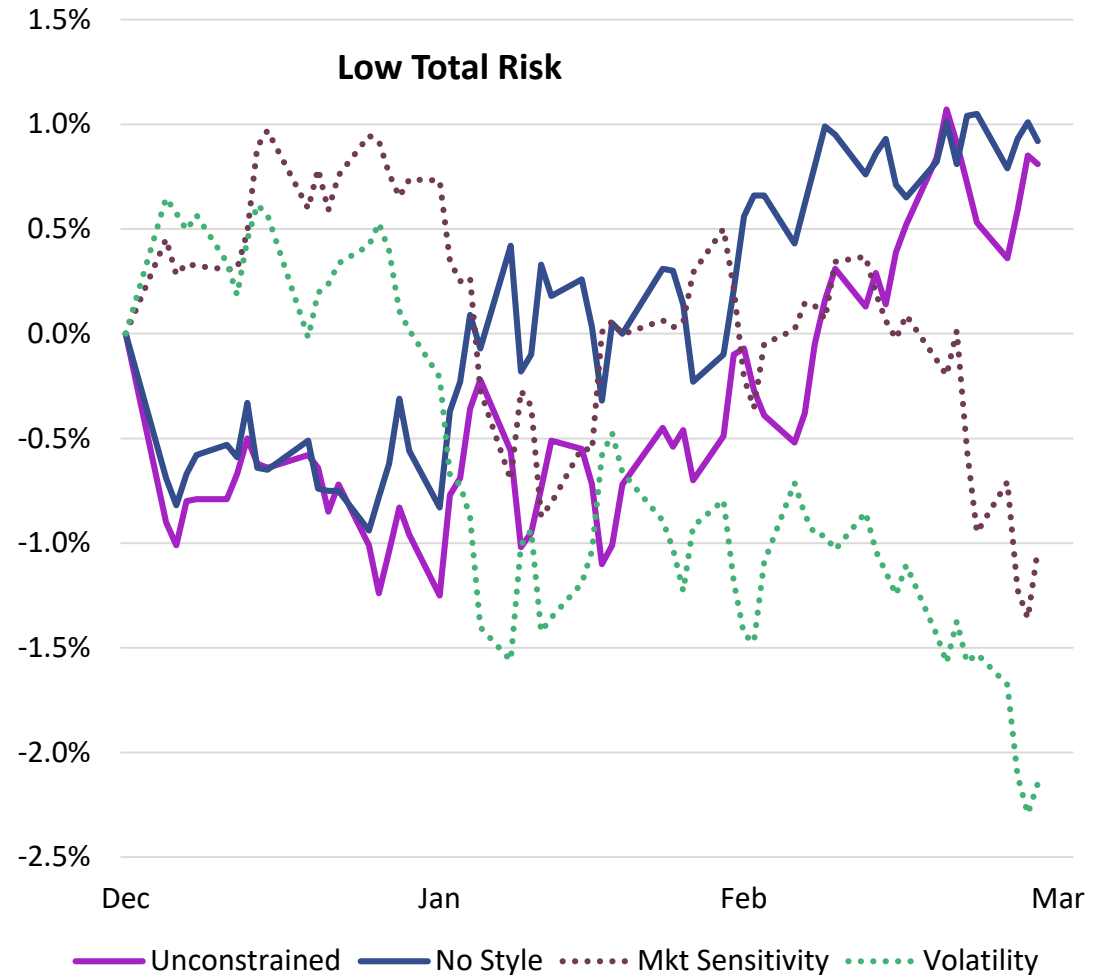
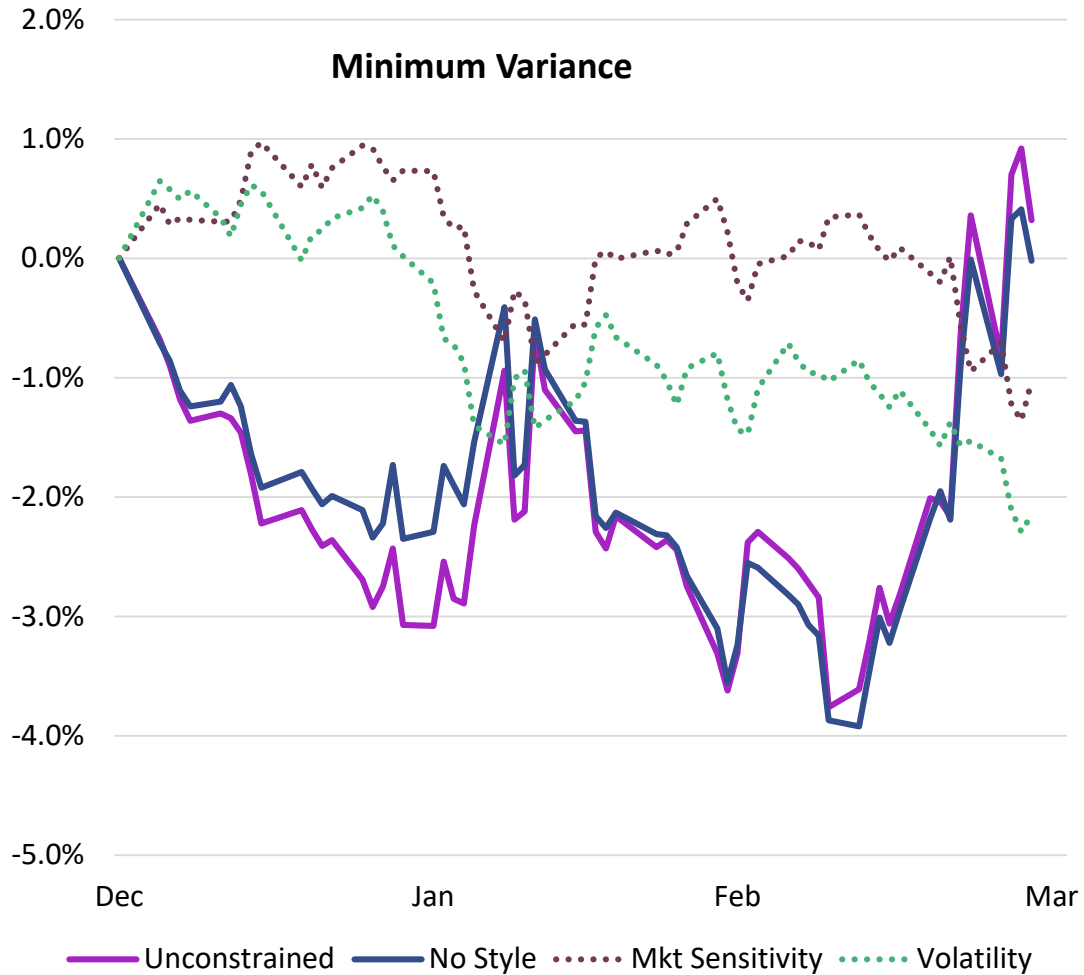


PROFITABILITY PORTFOLIOS HAVE FAR OUTPACED THE FACTOR Active Returns



BOTH LOW VOLATILITY PORTFOLIOS STARTED OUT WITH LOSSES BUT THEN RECOVERED

Active Returns



IT WAS A GOOD YEAR FOR MOMENTUM, HOWEVER

Value + EY	No Style	No Style, No Ind	Unconstrained
Portfolio	-0.67%	-2.06%	-2.45%
Benchmark	-0.69%	-0.69%	-0.69%
Active	0.02%	-1.37%	-1.76%
Specific Return	-0.07%	-0.82%	-0.38%
Factor Contribution	0.09%	-0.55%	-1.38%
Style	-0.78%	-0.56%	-1.53%
Dividend Yield	0.00%	0.00%	-0.42% +
Earnings Yield	-0.54%	-0.41%	-0.77% +
Exchange Rate Sensitivity	-0.02%	-0.02%	0.01% +
Growth	0.00%	0.01%	0.13% +
Leverage	-0.01%	-0.01%	-0.01% +
Liquidity	0.00%	-0.02%	0.04% +
Market Sensitivity	-0.04%	-0.04%	0.01% -
Med-Term Momentum	-0.04%	-0.03%	-0.30% -
MidCap	0.00%	0.00%	0.02% +
Profitability	-0.02%	-0.01%	-0.13% -
Size	0.00%	0.01%	0.08% -
Value	-0.08%	-0.03%	-0.12% +
Volatility	-0.03%	-0.02%	-0.07% +
Industry	0.88%	0.01%	0.16%

Momentum Portfolios	No Style	No Style, No Ind	Unconstrained
Portfolio	-0.25%	-0.56%	1.21%
Benchmark	-0.69%	-0.69%	-0.69%
Active	0.43%	0.13%	1.89%
Specific Return	-0.79%	-1.07%	0.54%
Factor Contribution	1.22%	1.20%	1.36%
Style	1.48%	1.21%	1.86%
Dividend Yield	0.01%	0.01%	0.15% -
Earnings Yield	0.01%	0.00%	0.06% -
Exchange Rate Sensitivity	0.00%	0.01%	0.09% -
Growth	0.00%	0.00%	0.04% +
Leverage	-0.01%	-0.01%	-0.01% +
Liquidity	0.00%	0.00%	0.07% +
Market Sensitivity	0.02%	-0.01%	-0.08% +
Medium-Term Momentum	1.48%	1.21%	1.65% +
MidCap	0.00%	0.00%	0.02% +
Profitability	0.01%	0.00%	0.08% +
Size	0.00%	0.00%	0.06% -
Value	0.00%	0.00%	0.03% -
Volatility	-0.03%	0.00%	-0.30% +
Industry	-0.26%	-0.02%	-0.51%

Top 4 Industries	Internet Soft & Svcs 0.43%(+)	NA	Internet&Dir Mkt Retail 0.17%(+)
	Inter&Dir Mkt Retail 0.13%(+)	NA	Internet Soft & Svcs 0.16%(+)
	Chemicals 0.12%(-)	NA	Chemicals 0.12%(-)
	Machinery 0.09%(-)	NA	Div Telecomm Svcs 0.08%(-)
Bottom 4 Industries	Automobiles -0.29%(+)	NA	Mortgage REITs -0.29%(+)
	Hlth Care Equip&Supp -0.12%(-)	NA	Electric Utilities -0.13%(+)
	Aerospace & Defense -0.10%(-)	NA	Automobiles -0.12%(+)
	Consumer Finance -0.08%(+)	NA	IT Services -0.09%(-)

Top 4 Industries	Equity REITs 0.21%(-)	NA	Equity REITs 0.18%(-)
	Personal Products 0.17%(+)	NA	Personal Products 0.15%(+)
	Hrdw, Strg & Periph 0.08%(+)	NA	Hrdw, Strg & Periph 0.10%(+)
	Chemicals 0.07%(-)	NA	Oil, Gas & Cons Fuels 0.06%(-)
Bottom 4 Industries	Household Durables -0.37%(+)	NA	Internet Soft & Svcs -0.28%(-)
	Internet Soft & Svcs -0.34%(-)	NA	Household Durables -0.25%(+)
	Machinery -0.18%(+)	NA	Software -0.24%(-)
	Semi & Semi Equip -0.12%(-)	NA	Machinery -0.22%(+)

Source: Axioma

A LOT OF THE DOWNFALL IN GROWTH HAS BEEN FROM SPECIFIC RETURNS

Growth Portfolios	No Style	No Style, No Ind	Unconstrained
Portfolio	-0.91%	-1.37%	-0.57%
Benchmark	-0.69%	-0.69%	-0.69%
Active	-0.22%	-0.69%	0.12%
Specific Return	-1.40%	-0.96%	-0.85%
Factor Contribution	1.18%	0.27%	0.96%
Style	0.41%	0.29%	0.73%
Dividend Yield	0.01%	0.02%	0.25% -
Earnings Yield	-0.05%	-0.03%	-0.10% +
Exchange Rate Sensitivity	0.02%	0.01%	0.04% -
Growth	0.46%	0.34%	0.63% +
Leverage	0.01%	0.00%	0.05% -
Liquidity	-0.01%	-0.01%	0.07% +
Market Sensitivity	0.02%	0.03%	0.03% +
Med-Term Momentum	-0.03%	-0.02%	-0.19% -
MidCap	0.00%	0.00%	0.04% +
Profitability	0.01%	0.00%	0.06% +
Size	0.00%	-0.01%	0.14% -
Value	0.00%	0.00%	-0.04% +
Volatility	-0.03%	-0.05%	-0.25% +
Industry	0.76%	-0.03%	0.23%

Profitability Portfolios	No Style	No Style, No Ind	Unconstrained
Portfolio	1.27%	-0.01%	3.33%
Benchmark	-0.69%	-0.69%	-0.69%
Active	1.96%	0.68%	4.02%
Specific Return	0.65%	0.34%	2.35%
Factor Contribution	1.31%	0.34%	1.67%
Style	0.60%	0.35%	1.08%
Dividend Yield	0.00%	0.00%	0.13% -
Earnings Yield	-0.01%	-0.02%	0.05% -
Exchange Rate Sensitivity	0.02%	0.00%	0.04% -
Growth	0.00%	0.00%	0.14% +
Leverage	0.00%	0.00%	-0.16% +
Liquidity	0.01%	0.00%	0.04% +
Market Sensitivity	0.03%	-0.02%	0.06% -
Medium-Term Momentum	0.05%	-0.01%	0.09% +
MidCap	0.00%	0.00%	0.02% +
Profitability	0.49%	0.35%	0.69% +
Size	0.01%	0.01%	0.15% -
Value	0.01%	0.03%	0.06% -
Volatility	-0.01%	0.00%	-0.22% +
Industry	0.70%	-0.01%	0.58%

Top 4 Industries	Int & Dir Mkt Retail 0.33%(+)	NA Internet & Dir Mkt Retail 0.26%(+)
	Internet Soft & Svcs 0.29%(+)	NA Internet Soft & Svcs 0.18%(+)
	Software 0.15%(+)	NA Chemicals 0.13%(-)
	Chemicals 0.13%(-)	NA Professional Services 0.10%(-)
Bottom 4 Industries	Building Products -0.19%(+)	NA Equity REITs -0.35%(+)
	Equity REITs -0.17%(+)	NA Air Freight & Logistics -0.13%(+)
	Food Products -0.14%(+)	NA Multi-Utilities -0.12%(+)
	Air Freight & Logistics -0.11%(+)	NA Food Products -0.12%(+)

Top 4 Industries	Int & Dir Mkt Retail 0.35%(+)	NA Software 0.44%(+)
	Software 0.31%(+)	NA Oil, Gas & Cons Fuels 0.28%(-)
	Equity REITs 0.19%(-)	NA Equity REITs 0.21%(-)
	Biotechnology 0.09%(+)	NA Int & Dir Mkt Retail 0.17%(+)
Bottom 4 Industries	Specialty Retail -0.20%(+)	NA Internet Soft & Svcs -0.24%(-)
	Food&Stap Retail -0.18%(+)	NA Air Freight & Logistics -0.21%(+)
	Banks -0.13%(-)	NA Internet Soft & Svcs -0.24%(+)
	Air Freight & Log -0.12%(+)	NA Banks -0.15%(-)

MIN VAR WAS HURT BY SPECIFIC AND INDUSTRIES, LOW RISK HELPED BY INDUSTRIES

Minimum Variance Portfolios	No Style	Unconstrained
Portfolio	-0.71%	-0.37%
Benchmark	-0.69%	-0.69%
Active	-0.02%	0.32%
Specific Return	0.09%	-0.03%
Factor Contribution	-0.11%	0.35%
Style	1.51%	1.51%
Dividend Yield	0.00%	-0.25% +
Earnings Yield	-0.04%	-0.07% +
Exchange Rate Sensitivity	0.01%	0.09% -
Growth	-0.01%	-0.12% -
Leverage	0.00%	-0.01% +
Liquidity	-0.01%	-0.06% +
Market Sensitivity	1.01%	1.15%
Med-Term Momentum	-0.09%	-0.21% -
MidCap	0.00%	0.01% +
Profitability	0.00%	-0.11% -
Size	0.48%	0.91% -
Value	0.00%	-0.06% +
Volatility	0.15%	0.24%
Industry	-1.62%	-1.16%

Low Total Risk Portfolios	No Style	Unconstrained
Portfolio	0.24%	0.13%
Benchmark	-0.69%	-0.69%
Active	0.92%	0.81%
Specific Return	0.50%	0.91%
Factor Contribution	0.43%	-0.10%
Style	0.81%	0.94%
Dividend Yield	0.01%	0.06% -
Earnings Yield	0.03%	0.03% -
Exchange Rate Sensitivity	0.00%	0.06% -
Growth	0.00%	-0.02% -
Leverage	0.00%	0.00% -
Liquidity	0.01%	-0.08% -
Market Sensitivity	0.31%	0.20%
Med-Term Momentum	-0.07%	0.02% +
MidCap	0.00%	0.00% -
Profitability	0.00%	-0.10% -
Size	0.01%	0.05% -
Value	0.01%	0.01% +
Volatility	0.51%	0.71%
Industry	-0.38%	-1.04%

Top 4 Industries	Multi-Utilities 0.18%(+)	Multi-Utilities 0.19%(+)
	Personal Products 0.15%(+)	Equity REITs 0.13%(-)
	Machinery 0.13%(-)	Machinery 0.13%(-)
	Div Telecomm Svcs 0.09%(-)	Personal Products 0.10%(+)
Bottom 4 Industries	Oil, Gas & Cons Fuels -0.39%(+)	Oil, Gas & Cons Fuels -0.41%(+)
	Software -0.33%(-)	Software -0.37%(-)
	Internet Soft & Svcs -0.31%(-)	Internet Soft & Svcs -0.27%(-)
	Hard Storage&Periph -0.25%(-)	Hard, Storage&Periph -0.24%(-)

Top 4 Industries	Oil, Gas & Cons Fuels 0.22%(-)	IT Services 0.28%(+)
	IT Services 0.13%(+)	Oil, Gas & Cons Fuels 0.21%(-)
	Beverages 0.12%(-)	Capital Markets 0.09%(+)
	Multi-Utilities 0.12%(+)	Div Telecomm Svcs 0.09%(-)
Bottom 4 Industries	Chemicals -0.66%(+)	Chemicals -0.45%(+)
	Ind Conglomerates -0.42%(+)	Ind Conglomerates -0.44%(+)
	Electric Utilities -0.17%(-)	Software -0.28%(-)
	Semi & Semi Equip -0.16%(-)	Hrdw, Strg & Periph -0.22%(-)

Source: Axioma

CONCLUSIONS: WHAT DOES THIS MEAN FOR MARKETS?

Positives

- In most cases, factors continued to behave “normally” in the first quarter
- Risk spreads (the difference between our statistical and fundamental forecasts) remain very low or negative
- As noted earlier, the relative risk levels of the traditionally riskier asset categories—US Small Cap (versus US Large Cap) and Emerging Markets vs. Developed Markets—has shifted, suggesting a lower required risk premium for these assets

CONCLUSIONS: WHAT DOES THIS MEAN FOR MARKETS?

Negatives

- Asset correlations have increased, suggesting that investors see more macro risk in the market, as stocks are moving less on their own individual characteristics
- The magnitude of the increase in short-horizon risk, which began last December, has now moved to a more worrisome level
- The yield curve seems to be flattening. As noted by Christoph Schon in a recent note, the spread between 10-year and 2-year US Treasuries is at its tightest level since September 2007
- Valuations backed off a bit from the end of last quarter, but remain quite high. The P/E and Price/Book ratios for the Russell 1000 have not been this high since 2002
 - This alone does not portend a market peak, but continues to suggest a downturn could be more severe as valuations readjust.

QUESTIONS?

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