

Asia Quantitative Insights

February 2017

- **While stalling in the rest of the world, Value in Asia still has legs** — After a prolonged Value rally in the second half of 2016, Value performance has been flat to down over the past month in most of the world with the exception of Asia and EM. For Asia, there still could be upside to Value given that the Value spreads (the differential between the cheapest and most expensive quintiles of stocks) remain wide relative to history at nearly 1 standard deviation. In the rest of the world where Value performance has been more disappointing, the Value spreads have already narrowed closer to historical levels.
- **However, style correlations are down which makes the case for Value less powerful** — Pairwise correlations between style returns have trended down after peaking in mid-2016 to levels not seen in 5 years (Figure 3). Thus having Value as a style diversifier is a bit less crucial as there is now less correlation amongst styles.
- **Recommend balanced exposure to styles** — While we are incrementally more cautious towards Value, we still recommend maintaining Value exposure particularly on the short side by avoiding the most expensive names. Value spreads remain wide and Value now has tailwinds from Momentum as the recent winners have been the Value stocks. Our [APAC Radar Screener](#) that blends Value + Momentum is a great way to gain balanced factor exposure.

Chris Ma^{AC}

+852-2501-2404
chris.ma@citi.com

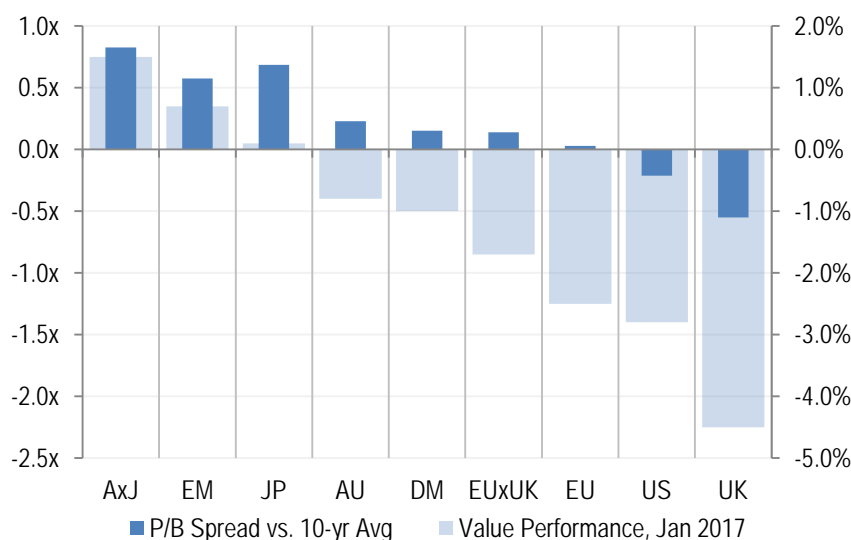
Jason Kim

+852-2501-2735
jason.jh.kim@citi.com

Liz Dinh, CFA

+61-2-8225-4896
liz.dinh@citi.com

Figure 1. P/Book spread between cheap and expensive vs. history, compared to Value performance in January 2017 – MSCI AC Asia ex-Japan



Source: Citi Research, IBES, Worldscope, Factset

See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.

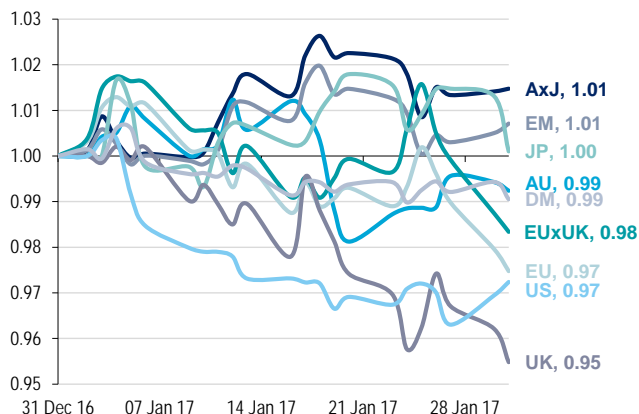
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In Focus - Charts of the Month

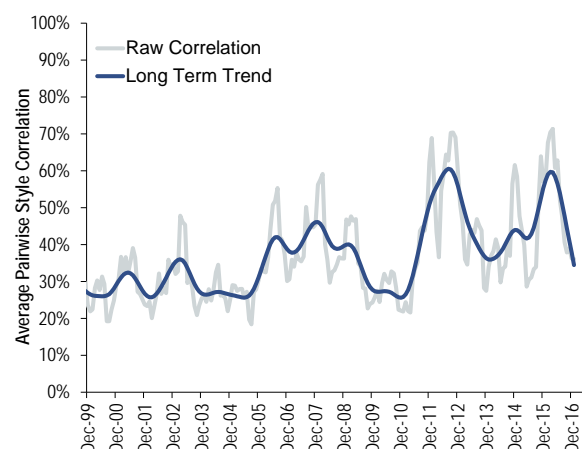
Figure 2. Value performance in January 2017 around the world



Source: Citi Research, MSCI, IBES, Worldscope

- Looking a bit deeper into the intra-month performance of Value around the world, we can see significant style volatility and a divergence in trend between Asia and the rest of the world.
- With investors outside of Asia becoming more skeptical on the pro-cyclical trade, could this fear spread to Asia?
- Looking a bit deeper into the underperformance of Value in the US we see that it was [sold off not because of Cyclical, but rather the net short exposure of Health Care and IT](#). Thus it's hard to conclude the market has truly reached an inflection point and become defensive.

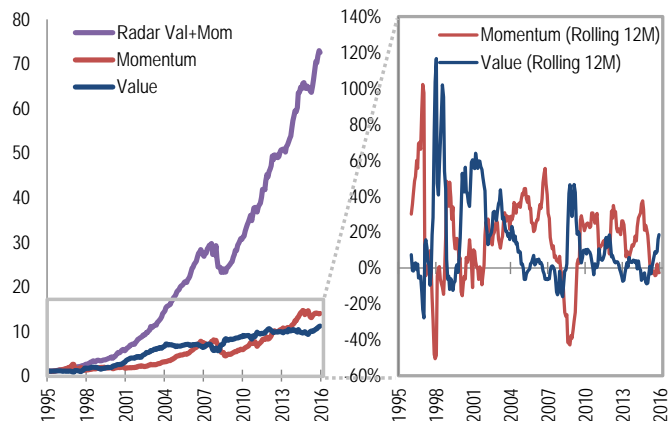
Figure 3. Rolling average pairwise style correlation – MSCI AC Asia ex-Japan



Source: Citi Research, MSCI, IBES

- In recent years with macro factors increasingly important in driving stock returns, it's not surprising that style correlations had been on the rise. This had made it an increasingly difficult environment for differentiating stocks based on fundamental factors.
- However, towards the end of 2016 correlations trended sharply back down towards historical levels, making it a better environment for style selection.
- When correlations were high for much of 2016, it was important to maintain Value exposure as it had low correlation to other styles. Now that style correlations have tapered off, the diversifying benefit of Value has become less necessary.

Figure 4. Asia Pacific Radar: Blending Value + Momentum for more than the sum of its parts – S&P Asia Pacific BMI

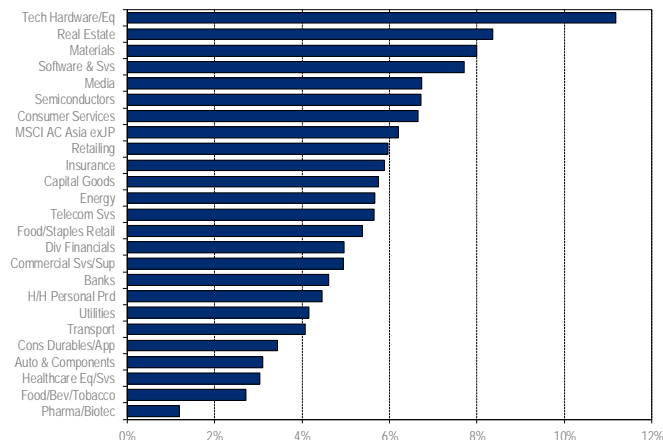


Source: Citi Research, MSCI, S&P, IBES, Worldscope, Datastream

- We believe a balanced exposure to styles best suits the current environment of heightened macro and geopolitical risks elevating market and style volatility.
- Combining Value with Momentum in the [APAC Radar](#) is a highly effective approach as the two styles are typically inversely correlated. In other words, when Value is zigging, Momentum is zagging (and vice versa).
- Comparing the returns of the standalone Value and Momentum to the Radar, we see that the blend is much greater than the sum of its parts as it dampens style volatility to deliver smoother risk-adjusted returns. This model was originally developed at Citi in 2006 and has worked very well out of sample.

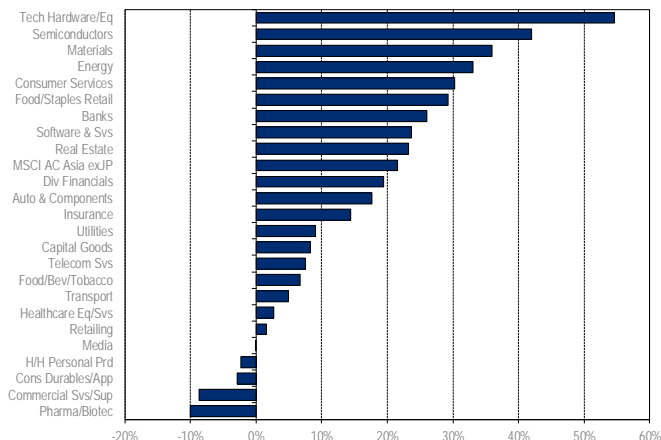
Asia ex Japan: What Has the Market Done?

Figure 5. One-Month Total USD Returns (Percentage)



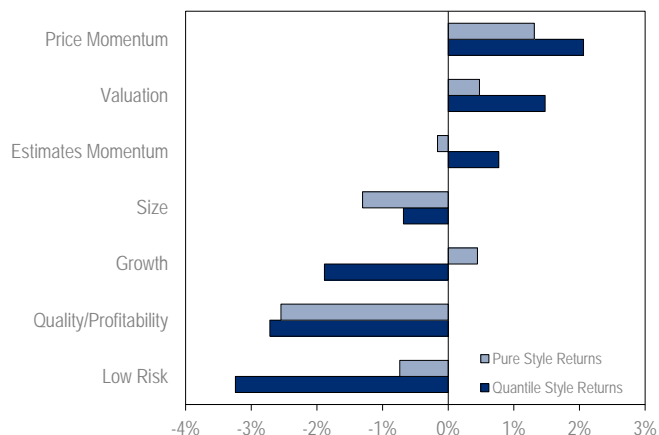
Source: Citi Research, MSCI

Figure 6. Last 12 Months Total USD Returns (Percentage)



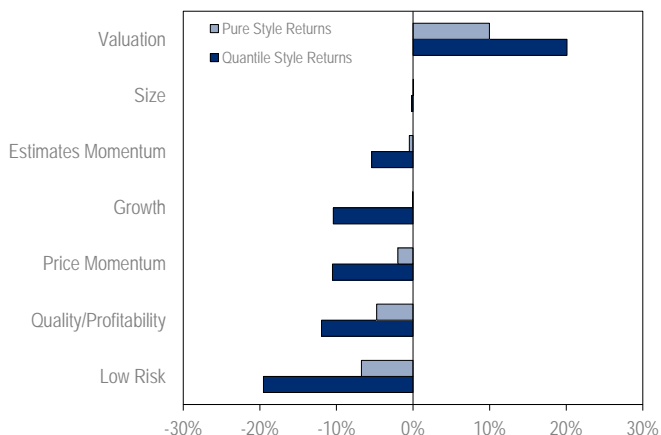
Source: Citi Research, MSCI

Figure 7. Style Performance Across Market, Last Month



Source: Citi Research, MSCI, IBES, Worldscope, Datastream

Figure 8. Style Performance Across Market, Last 12 Months



Source: Citi Research, MSCI, IBES, Worldscope, Datastream

Asia ex Japan Countries

Last Month's Style Leaders and Laggards

Figure 9. Performance Spread Between High (Top 20%) and Low (Bottom 20%), and Pure Factor Portfolios, Last Month

	Quantile Perf.	Pure Perf.	China	South Korea	Taiwan	India	Malaysia	Hong Kong	Thailand	Indonesia	Singapore	Philippines
Valuation	1.5%	0.5%	-1.3%	-1.1%	1.0%	6.7%	5.4%	1.1%	9.1%	3.7%	-2.3%	1.6%
Earnings Yield - 12 month forward	-0.7%		-4.2%	-3.7%	0.7%	0.2%	-1.1%	1.2%	10.1%	-2.1%	0.1%	-2.0%
Earnings Yield- 12 month historical	-1.5%		-4.0%	-2.0%	-2.8%	1.3%	-0.3%	0.6%	9.0%	-1.6%	-1.7%	0.0%
Cash Flow To Price	3.0%		0.3%	-0.7%	3.0%	7.5%	8.7%	1.3%	9.3%	6.0%	2.2%	2.9%
Dividend Yield	-2.1%		-5.2%	-3.7%	-1.7%	-2.3%	1.3%	0.6%	7.0%	-4.2%	-2.6%	-2.0%
Book to Price Ratio	3.2%		-0.4%	5.1%	1.4%	9.9%	6.9%	2.4%	9.1%	7.8%	0.2%	-0.3%
Sales to Price Ratio	3.0%		3.6%	-1.1%	3.5%	13.2%	8.7%	-2.8%	5.2%	7.9%	2.3%	4.6%
EBITDA / EV	3.4%		0.3%	2.1%	3.1%	3.7%	-0.2%	-7.2%	8.3%	3.7%	-2.3%	0.4%
Sales / EV	3.8%		3.4%	0.6%	2.1%	9.7%	7.9%	-4.7%	5.6%	1.3%	3.1%	-0.2%
Growth	-1.9%	0.4%	2.1%	-1.5%	-2.0%	-4.6%	-3.8%	-3.5%	-7.2%	4.4%	1.0%	2.0%
Earnings Growth (12 month forward)	2.3%		3.5%	0.6%	3.5%	3.1%	4.3%	-2.4%	-6.4%	4.2%	8.0%	-1.6%
SB Growth-Value Score	-1.6%		5.6%	-1.5%	3.1%	-8.7%	-2.7%	-0.3%	-2.7%	-7.7%	4.3%	1.5%
One Year Sales Growth	-0.8%		3.5%	-2.5%	-0.6%	-10.6%	1.1%	2.8%	-7.7%	7.3%	-8.5%	7.8%
Long Term Earnings Growth	-2.9%		1.2%	-3.8%	-2.3%	-3.6%	-5.8%	0.6%	-4.9%	0.3%	1.0%	3.0%
One Year EPS Growth	-2.0%		-1.7%	-3.5%	-2.7%	-3.3%	-5.4%	-3.0%	-1.4%	3.8%	4.8%	-5.3%
One Year DPS Growth (based on LTM)	-0.7%		3.2%	-0.6%	-1.5%	-0.7%	-4.4%	-0.3%	-6.8%	0.7%	2.7%	-0.2%
Low Risk	-3.2%	-0.7%	1.2%	-2.9%	-2.0%	-11.2%	-5.0%	-2.7%	-1.9%	0.6%	-3.6%	-3.4%
Debt to Equity (Inverted)	-0.9%		-1.1%	3.0%	1.4%	-8.7%	-3.8%	-2.6%	2.8%	-6.4%	-5.4%	-6.1%
Earnings Stability	-2.3%		1.0%	-4.9%	-2.0%	-7.2%	0.1%	-5.0%	-3.6%	-5.2%	2.5%	-0.9%
Beta against MSCI AC World	-3.9%		-1.3%	-6.9%	-3.3%	-12.3%	-8.2%	-0.8%	0.5%	3.1%	-6.0%	-3.5%
Beta against MSCI Country Index	-4.5%		0.8%	-4.2%	-4.4%	-11.0%	-8.8%	1.6%	-2.5%	4.3%	-2.9%	-0.7%
Size (Market Cap)	-0.7%	-1.3%	-1.1%	-1.3%	-2.0%	-4.9%	-4.4%	0.8%	2.5%	-6.7%	-0.2%	5.0%
Quality	-2.7%	-2.5%	-2.5%	-5.5%	-1.4%	-7.1%	-3.8%	-1.1%	1.6%	-5.5%	-3.9%	-2.5%
Earnings Certainty	-4.3%		-1.8%	-3.1%	-4.5%	-12.3%	-6.3%	-0.2%	-3.1%	-5.1%	-0.4%	-5.2%
Return on Equity	-3.5%		0.3%	-5.8%	-2.2%	-14.4%	-4.1%	-5.8%	-0.7%	-6.0%	1.0%	-1.0%
Net Profit Margin on Sales	-4.5%		0.6%	-3.5%	-2.3%	-14.3%	-5.0%	-0.6%	-3.1%	-9.1%	-2.8%	-5.5%
Margin Growth	-0.9%		3.9%	-2.5%	-4.7%	-4.3%	-3.6%	0.8%	-1.6%	-2.6%	-1.8%	0.4%
Earnings Quality (Accruals) (Inverted)	0.3%		-0.6%	4.0%	-0.0%	5.9%	-3.2%	-0.6%	1.2%	4.1%	-1.7%	6.9%
Balance Sheet Quality (NOA) (Inverted)	2.0%		0.6%	4.0%	-0.9%	3.8%	2.0%	-6.0%	5.7%	1.0%	3.5%	-0.2%
Price Momentum	2.1%	1.3%	3.4%	4.3%	-3.1%	6.0%	0.2%	4.5%	-7.3%	-6.3%	8.7%	0.8%
3 months	-0.4%		-0.4%	6.5%	-1.4%	-0.1%	-4.3%	0.8%	-3.3%	-1.1%	3.4%	-3.2%
12 months	2.7%		5.2%	2.8%	-1.9%	8.4%	-1.0%	1.0%	-8.2%	-7.1%	7.4%	0.8%
First 11 months	3.0%		4.5%	4.4%	-2.3%	10.5%	-0.9%	1.6%	-6.7%	-6.9%	5.5%	0.8%
Estimates Momentum	0.8%	-0.2%	4.2%	1.3%	-2.0%	0.5%	-3.5%	0.6%	-4.2%	-0.3%	0.9%	2.2%
1 Month Change in Earnings Forecast	2.0%		3.4%	1.4%	-1.3%	-1.6%	-2.3%	-0.7%	-4.4%	1.5%	5.6%	-0.0%
Earnings Revision	0.6%		2.9%	3.4%	-2.4%	-0.5%	-2.4%	-0.5%	-0.1%	-2.9%	0.4%	1.7%
Sales Revisions	2.2%		6.4%	5.6%	1.0%	1.1%	-5.3%	0.9%	-3.1%	-0.6%	1.5%	-4.0%
Cash Revisions	-0.1%		1.1%	2.3%	-3.2%	-1.5%	-8.3%	-3.0%	2.8%	-1.8%	5.7%	2.9%

Source: Citi Research, MSCI, IBES, Worldscope, Datastream

Note: That Quantile performance refers to the spread of returns between the top and bottom quintile of styles, while the Pure performance refers to style performance where others sources of risk exposure such as Country, Sector and other style exposure have been removed. Baskets with less than 5 stocks have been removed. See appendix for more information.

Last 12 Months Style Leaders and Laggards

Figure 10. Performance Spread Between High (Top 20%) and Low (Bottom 20%), and Pure Factor Portfolios, Last 12 Months

	Quantile Perf.	Pure Perf.	China	South Korea	Taiwan	India	Malaysia	Hong Kong	Thailand	Indonesia	Singapore	Philippines
Valuation	20.1%	10.0%	2.2%	59.3%	17.2%	41.2%	27.3%	2.9%	23.0%	68.7%	1.8%	-11.7%
Earnings Yield - 12 month forward	12.6%		4.8%	43.8%	-1.7%	36.8%	21.3%	2.1%	17.3%	30.5%	-3.8%	-2.4%
Earnings Yield- 12 month historical	12.7%		0.9%	22.8%	0.5%	18.8%	20.4%	13.7%	10.0%	25.1%	-3.3%	-10.0%
Cash Flow To Price	26.6%		14.3%	39.1%	10.5%	49.0%	18.9%	13.4%	18.7%	36.2%	21.1%	-8.4%
Dividend Yield	17.7%		3.3%	30.3%	6.2%	19.5%	7.2%	-10.2%	1.2%	85.3%	-22.4%	-14.9%
Book to Price Ratio	22.1%		13.5%	65.1%	8.0%	33.4%	14.3%	4.0%	40.5%	46.2%	-0.1%	18.5%
Sales to Price Ratio	19.8%		9.5%	54.8%	9.8%	57.2%	20.3%	-3.9%	39.2%	46.8%	-2.9%	2.8%
EBITDA / EV	24.9%		22.6%	26.1%	12.6%	10.7%	14.6%	2.1%	14.3%	65.1%	-10.7%	-8.0%
Sales / EV	18.5%		21.3%	51.7%	5.6%	46.5%	5.1%	-0.2%	23.9%	90.8%	-7.9%	-1.7%
Growth	-10.3%	-0.1%	-5.5%	-22.6%	-2.8%	-19.1%	-6.9%	-17.7%	-6.4%	-4.0%	17.1%	1.6%
Earnings Growth (12 month forward)	-0.3%		-7.9%	4.3%	-7.6%	8.6%	11.4%	-9.9%	9.8%	-19.3%	6.7%	5.5%
SB Growth-Value Score	-15.9%		1.6%	-27.3%	1.5%	-29.1%	-12.6%	3.9%	-27.1%	-26.2%	14.1%	10.2%
One Year Sales Growth	-13.8%		-2.1%	-25.6%	-7.1%	-26.1%	-4.2%	-26.0%	-18.2%	14.3%	-9.6%	-3.6%
Long Term Earnings Growth	-15.0%		-8.7%	-9.4%	7.0%	-23.3%	-12.7%	-5.2%	-14.3%	1.7%	-3.8%	6.0%
One Year EPS Growth	-4.2%		-0.6%	-14.6%	0.9%	-3.9%	-2.7%	-18.5%	-0.9%	-6.2%	23.8%	12.2%
One Year DPS Growth (based on LTM)	-3.9%		-3.1%	-13.6%	4.7%	-14.5%	7.6%	-26.3%	-13.3%	39.8%	-6.5%	10.5%
Low Risk	-19.4%	-6.7%	0.3%	-34.8%	-17.5%	-35.5%	-8.4%	-30.5%	-35.5%	4.0%	-10.8%	2.9%
Debt to Equity (Inverted)	-12.6%		0.1%	-26.0%	1.3%	-27.1%	-20.7%	-5.6%	-33.5%	0.6%	3.7%	-12.9%
Earnings Stability	-3.7%		8.6%	-19.2%	-13.2%	-26.2%	-4.7%	-1.4%	-2.4%	-7.1%	-5.4%	-6.0%
Beta against MSCI AC World	-22.1%		-1.8%	-32.6%	-15.7%	-37.0%	-11.2%	-37.4%	-33.8%	-13.0%	-8.6%	-2.3%
Beta against MSCI Country Index	-21.6%		-6.3%	-30.0%	-18.5%	-20.6%	-18.0%	-31.3%	-11.7%	-8.1%	-1.5%	-7.0%
Size (Market Cap)	-0.2%	0.1%	-7.4%	-8.2%	9.9%	-20.8%	-5.4%	-3.5%	3.0%	-7.9%	10.7%	-8.2%
Quality	-12.0%	-4.8%	-4.5%	-26.0%	-7.0%	-30.5%	2.5%	-27.4%	-23.6%	-19.0%	-3.9%	-19.7%
Earnings Certainty	-12.2%		-1.1%	-19.6%	-11.9%	-34.8%	-1.6%	-19.3%	-19.7%	17.5%	-10.2%	-7.8%
Return on Equity	-9.6%		2.3%	-30.3%	-2.9%	-31.1%	4.3%	2.3%	-36.4%	-21.9%	-3.3%	-13.0%
Net Profit Margin on Sales	-16.3%		17.4%	-34.8%	-0.5%	-41.9%	6.9%	-16.5%	-35.7%	-24.9%	-4.8%	-13.3%
Margin Growth	-11.5%		7.2%	-7.8%	-22.0%	-14.2%	1.3%	-13.1%	2.3%	-27.6%	0.4%	-1.5%
Earnings Quality (Accruals) (Inverted)	13.7%		36.3%	19.0%	10.6%	28.6%	-0.1%	-31.1%	8.1%	-16.0%	25.3%	3.1%
Balance Sheet Quality (NOA) (Inverted)	3.9%		16.9%	2.0%	1.0%	4.5%	2.6%	-7.6%	-19.4%	-4.4%	-9.6%	-22.3%
Price Momentum	-10.7%	-2.0%	0.6%	-17.7%	-14.6%	-2.6%	-10.1%	-9.7%	-5.8%	-14.0%	-7.2%	18.8%
3 months	-5.9%		-9.4%	-17.3%	-9.6%	8.1%	2.1%	1.7%	-1.9%	-4.8%	15.3%	-8.4%
12 months	-10.8%		11.0%	-16.9%	-11.7%	-4.5%	-13.1%	-19.8%	-5.7%	-17.8%	-11.3%	20.7%
First 11 months	-9.8%		7.6%	-14.3%	-9.5%	-8.0%	-16.1%	-21.2%	-6.5%	-14.2%	-8.6%	21.3%
Estimates Momentum	-5.6%	-0.5%	-3.2%	-13.6%	-5.1%	10.2%	-22.6%	-8.5%	-8.4%	-10.1%	-21.3%	-0.8%
1 Month Change in Earnings Forecast	-4.7%		-6.2%	-8.5%	-7.0%	11.7%	-14.1%	-6.7%	4.2%	-14.7%	-17.8%	-6.3%
Earnings Revision	-5.4%		1.2%	-7.9%	-3.4%	-4.9%	-17.4%	-2.2%	9.7%	8.2%	-15.3%	1.9%
Sales Revisions	-4.2%		13.5%	-17.7%	-2.1%	-3.2%	-20.4%	-3.3%	4.8%	18.3%	-3.1%	-19.5%
Cash Revisions	-5.6%		-7.2%	-3.4%	-9.1%	17.3%	-15.9%	-22.8%	11.2%	3.8%	-21.0%	4.2%

Source: Citi Research, MSCI, IBES, Worldscope, Datastream

Note: That Quantile performance refers to the spread of returns between the top and bottom quintile of styles, while the Pure performance refers to style performance where others sources of risk exposure such as Country, Sector and other style exposure have been removed. Baskets with less than 5 stocks have been removed. See appendix for more information.

Macro Factor Sensitivities¹

Figure 11. GDP Weighted Global Bond Yield (G10)

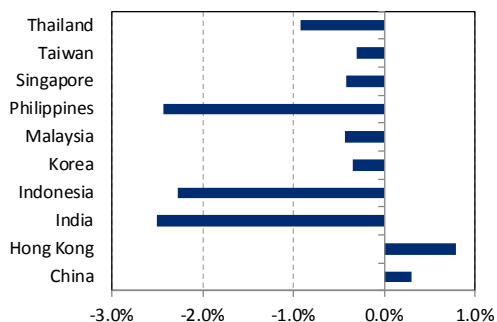


Figure 12. Oil

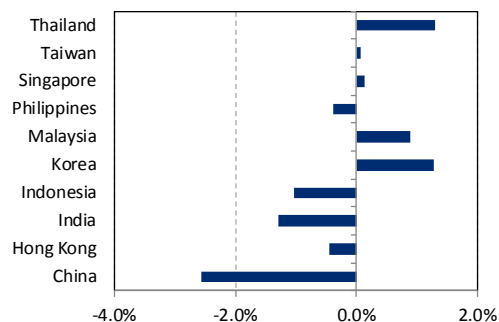


Figure 13. Commodities (GSCI)

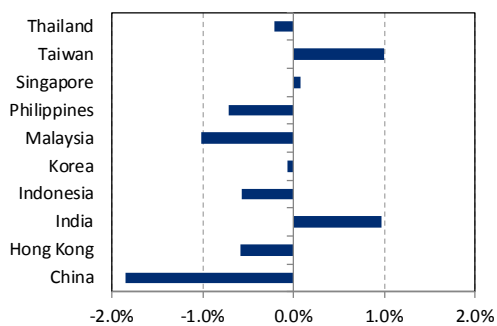


Figure 14. EUR per USD

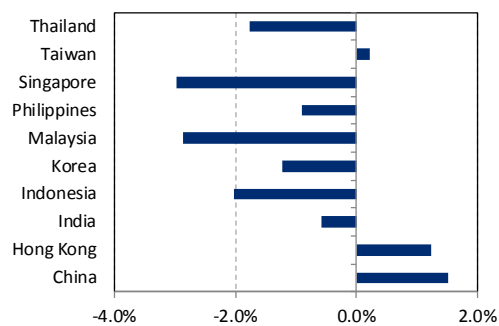


Figure 15. YEN per USD

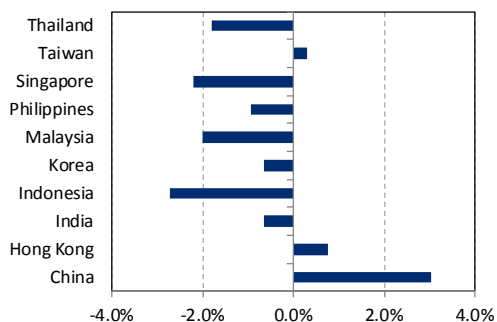


Figure 16. Emerging Market Sovereign Bond Yield

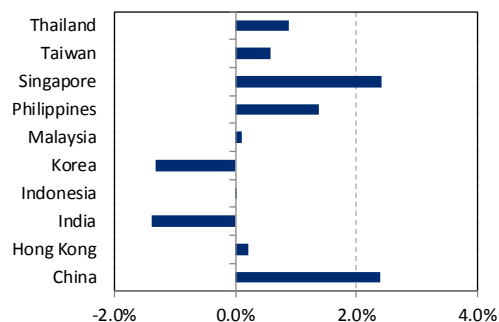


Figure 17. Credit Spreads

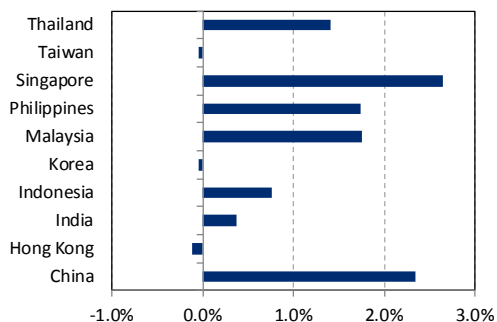
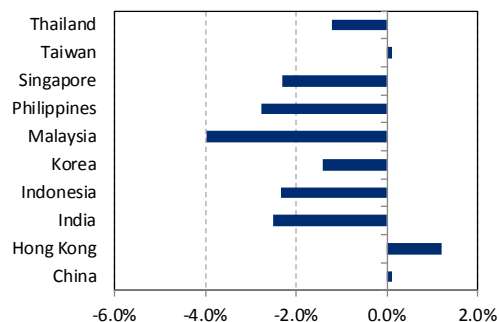


Figure 18. Market (MSCI AC World)



Source: Citi Research, MSCI

¹ The above charts illustrate predicted *relative returns* from our proprietary risk model (Global RAM) for a one standard deviation change in the underlying macroeconomic factor.

Asia ex Japan Sectors

Last Month's Style Leaders and Laggards

Figure 19. Performance Spread Between High (Top 20%) and Low (Bottom 20%), and Pure Factor Portfolios, Last Month

	Quantile Perf.	Pure Perf.	Cons Disc	Cons Staples	Energy	Financials	Health Care	Industrial s	Info Tech	Materials	Telcos	Utils
Valuation	1.5%	0.5%	-1.1%	5.5%	0.2%	0.9%	5.3%	-0.2%	-4.2%	-2.4%	5.8%	0.8%
Earnings Yield - 12 month forward	-0.7%		-5.5%	0.8%	2.7%	-2.0%	1.9%	-0.9%	-1.8%	-2.4%	-8.1%	1.6%
Earnings Yield- 12 month historical	-1.5%		-6.5%	0.3%	0.3%	-0.9%	3.0%	-2.3%	-4.8%	-7.5%	-2.2%	-1.8%
Cash Flow To Price	3.0%		2.3%	3.5%	4.2%		3.3%	1.6%	-3.2%	-0.3%	11.6%	-2.6%
Dividend Yield	-2.1%		-3.9%	-1.9%	-3.1%	-1.2%	5.1%	-1.7%	-3.6%	-10.2%	-0.5%	-2.6%
Book to Price Ratio	3.2%		2.4%	5.8%	7.3%	4.0%	5.4%	-0.7%	1.2%	5.4%	9.9%	-4.1%
Sales to Price Ratio	3.0%		4.1%	5.8%	5.1%		2.9%	0.2%	-3.0%	5.6%	11.2%	3.4%
EBITDA / EV	3.4%		2.0%	3.4%	1.0%		5.8%	-2.7%	1.1%	-10.1%	9.4%	1.3%
Sales / EV	3.8%		4.2%	6.3%	2.8%		3.0%	0.6%	-2.9%	2.1%	11.2%	5.3%
Growth	-1.9%	0.4%	1.7%	-0.5%	-3.6%	-0.6%	-9.1%	-3.2%	5.1%	1.6%	-7.4%	4.5%
Earnings Growth (12 month forward)	2.3%		5.8%	-2.5%	5.0%	-1.9%	-1.4%	1.7%	6.7%	7.5%	-8.2%	4.0%
SB Growth-Value Score	-1.6%		3.0%	-4.4%	-2.8%	-1.1%	-5.4%	-1.2%	3.2%	-7.4%	-7.9%	6.2%
One Year Sales Growth	-0.8%		-1.4%	0.7%	-4.2%		-4.2%	0.2%	3.9%	1.2%	16.7%	-1.4%
Long Term Earnings Growth	-2.9%		-1.5%	-4.8%	-2.7%	1.6%	-2.4%	-6.6%	-1.7%	-3.4%	-5.3%	2.2%
One Year EPS Growth	-2.0%		-0.5%	1.1%	-7.1%	1.5%	3.3%	-3.8%	0.8%	-4.9%	-1.3%	-4.7%
One Year DPS Growth (based on LTM)	-0.7%		0.2%	-0.2%	-6.0%	0.5%	-5.0%	-0.8%	1.1%	2.7%	0.4%	-1.3%
Low Risk	-3.2%	-0.7%	2.7%	0.4%	-11.2%	-2.1%	-3.2%	-2.3%	-6.3%	-11.6%	-8.6%	1.6%
Debt to Equity (Inverted)	-0.9%		2.9%	1.9%	-3.2%		-6.7%	0.4%	-2.9%	-10.5%	-7.0%	1.3%
Earnings Stability	-2.3%		-0.6%	-4.8%	0.1%	1.0%	2.9%	0.1%	-7.3%	-3.1%	-6.3%	3.5%
Beta against MSCI AC World	-3.9%		-4.1%	1.0%	-9.2%	-3.1%	-6.5%	-2.7%	-4.8%	-7.9%	-4.2%	-1.7%
Beta against MSCI Country Index	-4.5%		0.8%	3.1%	-7.1%	-0.7%	-1.9%	-4.5%	-4.8%	-10.3%	2.0%	0.7%
Size (Market Cap)	-0.7%	-1.3%	-2.5%	-1.1%	-8.0%	-1.4%	-3.2%	-1.8%	1.9%	-2.7%	-12.8%	-0.6%
Quality	-2.7%	-2.5%	-9.0%	-3.2%	-7.9%	-1.7%	4.2%	-0.4%	1.1%	-7.1%	-10.7%	0.0%
Earnings Certainty	-4.3%		-8.4%	-2.0%	-5.1%	-1.2%	3.1%	-1.7%	-6.4%	-8.2%	-8.2%	3.4%
Return on Equity	-3.5%		-5.4%	-3.8%	-7.5%	-3.1%	1.8%	-0.1%	-3.2%	-8.2%	0.1%	3.6%
Net Profit Margin on Sales	-4.5%		-6.9%	-3.1%	-6.3%		-1.6%	-1.4%	-0.0%	-10.9%	-3.6%	-5.8%
Margin Growth	-0.9%		-1.2%	-4.8%	0.4%	0.4%	3.7%	-0.8%	-2.6%	-0.1%	-7.4%	-1.4%
Earnings Quality (Accruals) (Inverted)	0.3%		-4.1%	-1.6%	2.8%		1.5%	2.3%	2.0%	12.5%	-4.1%	-4.3%
Balance Sheet Quality (NOA) (Inverted)	2.0%		0.4%	6.4%	0.3%		0.6%	0.3%	3.3%	-1.7%	-0.0%	3.7%
Price Momentum	2.1%	1.3%	0.7%	-1.4%	3.3%	-1.8%	3.9%	1.7%	5.7%	7.8%	-12.9%	-0.5%
3 months	-0.4%		-0.7%	0.4%	-6.8%	-0.5%	-4.8%	-0.8%	-3.3%	-0.6%	-1.2%	-4.1%
12 months	2.7%		-0.2%	-3.3%	6.4%	-0.5%	4.3%	0.4%	8.3%	11.7%	-8.3%	3.9%
First 11 months	3.0%		0.5%	-5.3%	10.0%	1.4%	1.7%	1.9%	9.5%	11.2%	-8.3%	2.2%
Estimates Momentum	0.8%	-0.2%	2.0%	-1.3%	2.2%	0.3%	-0.7%	-2.4%	2.3%	9.6%	-12.6%	0.5%
1 Month Change in Earnings Forecast	2.0%		5.1%	-0.6%	6.3%	0.1%	0.3%	-1.8%	0.2%	8.8%	-13.4%	0.7%
Earnings Revision	0.6%		1.0%	-3.5%	1.9%	0.9%	-0.1%	-1.6%	-1.4%	5.5%	-7.1%	1.4%
Sales Revisions	2.2%		2.4%	-1.7%	-2.7%		1.6%	-0.8%	2.4%	10.2%	-9.2%	-0.1%
Cash Revisions	-0.1%		0.3%	-1.3%	4.9%		2.2%	-5.4%	0.2%	0.6%	-8.6%	-4.3%

Source: Citi Research, MSCI, IBES, Worldscope, Datastream

Note: That Quantile performance refers to the spread of returns between the top and bottom quintile of styles, while the Pure performance refers to style performance where others sources of risk exposure such as Country, Sector and other style exposure have been removed. Baskets with less than 5 stocks have been removed. See appendix for more information.

Last 12 Months Style Leaders and Laggards

Figure 20. Performance Spread Between High (Top 20%) and Low (Bottom 20%), and Pure Factor Portfolios, Last 12 Months

	Quantile Perf.	Pure Perf.	Cons Disc	Cons Staples	Energy	Financials	Health Care	Industrials	Info Tech	Materials	Telcos	Utils
Valuation	20.1%	10.0%	0.7%	43.8%	1.2%	17.2%	71.1%	10.9%	10.3%	22.9%	25.3%	-3.5%
Earnings Yield - 12 month forward	11.1%		-1.0%	23.4%	-15.6%	11.3%	60.2%	10.9%	-2.4%	12.4%	26.2%	9.8%
Earnings Yield- 12 month historical	11.4%		-8.4%	25.7%	-18.4%	14.7%	49.3%	-2.2%	8.9%	-2.0%	22.9%	2.5%
Cash Flow To Price	24.6%		2.2%	23.7%	17.8%		35.6%	12.4%	10.8%	25.3%	15.1%	-3.0%
Dividend Yield	17.6%		0.7%	35.6%	20.0%	12.7%	43.8%	3.6%	9.0%	-2.6%	27.0%	-27.4%
Book to Price Ratio	20.5%		-6.4%	14.9%	57.7%	15.9%	84.8%	11.3%	14.9%	36.9%	29.6%	-9.4%
Sales to Price Ratio	19.7%		-4.9%	33.4%	21.1%		36.3%	11.0%	-6.6%	60.2%	29.9%	15.6%
EBITDA / EV	22.1%		18.7%	33.0%	12.5%		49.3%	-5.7%	17.0%	-16.3%	24.5%	-4.3%
Sales / EV	16.8%		-3.8%	27.0%	24.1%		24.8%	8.6%	-9.8%	36.7%	31.6%	16.9%
Growth	-10.4%	-0.1%	-3.0%	-14.8%	-29.6%	-6.7%	-25.1%	-10.4%	-0.2%	-3.7%	11.7%	9.1%
Earnings Growth (12 month forward)	1.1%		25.4%	-4.1%	-34.8%	-2.6%	7.4%	9.0%	-17.3%	18.2%	14.4%	51.5%
SB Growth-Value Score	-15.4%		2.7%	-14.6%	-27.1%	-6.0%	-9.6%	-14.6%	9.0%	-35.2%	-9.9%	11.9%
One Year Sales Growth	-11.5%		-6.7%	-5.6%	-6.4%		-14.2%	-0.1%	-12.5%	0.3%	1.7%	4.9%
Long Term Earnings Growth	-15.8%		-12.1%	-32.2%	-30.3%	-5.5%	-15.3%	-6.2%	3.7%	-20.8%	9.6%	0.4%
One Year EPS Growth	-5.6%		-4.3%	-9.7%	-29.1%	2.6%	9.2%	-3.7%	10.2%	-11.8%	6.4%	-9.9%
One Year DPS Growth (based on LTM)	-3.8%		-1.1%	-11.4%	-10.4%	-2.7%	-31.3%	-8.0%	15.5%	18.0%	19.5%	-11.3%
Low Risk	-19.5%	-6.7%	-21.4%	-6.5%	23.7%	-12.4%	-15.5%	-19.2%	-19.9%	-39.0%	19.7%	-4.6%
Debt to Equity (Inverted)	-13.1%		-7.6%	-6.0%	4.8%		-29.8%	-6.1%	-0.9%	-54.1%	14.5%	-19.0%
Earnings Stability	-3.4%		0.5%	1.1%	36.9%	0.6%	29.4%	2.7%	-10.7%	-3.0%	4.3%	29.7%
Beta against MSCI AC World	-22.3%		-33.4%	1.0%	-23.5%	-14.0%	-26.5%	-16.7%	-4.6%	-35.8%	19.2%	-9.1%
Beta against MSCI Country Index	-21.8%		-33.1%	3.0%	13.8%	-8.4%	-16.0%	-20.7%	-16.8%	-10.6%	30.2%	-14.7%
Size (Market Cap)	-0.2%	0.1%	6.0%	10.3%	-23.5%	1.6%	-13.9%	-20.3%	3.5%	-15.1%	1.1%	-14.6%
Quality	-12.0%	-4.8%	-23.8%	-9.9%	-10.8%	-4.0%	-15.1%	-5.1%	-2.0%	-38.3%	-9.8%	-16.4%
Earnings Certainty	-13.6%		-16.1%	0.6%	-21.9%	-5.2%	30.9%	-7.4%	-12.6%	-33.9%	4.5%	-11.7%
Return on Equity	-11.6%		-1.6%	-1.7%	-26.5%	-1.7%	-15.8%	-10.5%	-0.4%	-27.1%	-4.6%	-2.9%
Net Profit Margin on Sales	-18.3%		-7.1%	-23.2%	-18.1%		-19.8%	-8.9%	11.7%	-53.7%	-23.3%	-11.5%
Margin Growth	-11.9%		-15.7%	-19.1%	-17.6%	-4.5%	-20.8%	-11.8%	-15.4%	-5.5%	-9.1%	12.5%
Earnings Quality (Accruals) (Inverted)	13.7%		-6.0%	10.4%	50.8%		0.3%	6.1%	40.2%	4.4%	15.0%	-13.3%
Balance Sheet Quality (NOA) (Inverted)	4.0%		-7.2%	10.3%	21.4%		-8.7%	-3.6%	1.2%	-12.8%	3.6%	-4.8%
Price Momentum	-10.5%	-2.0%	-17.4%	-12.3%	-11.7%	-17.6%	-5.9%	-20.2%	6.0%	-6.7%	-10.6%	-3.3%
3 months	-5.6%		-1.5%	-2.9%	-5.5%	-8.1%	27.0%	-14.2%	-8.0%	0.6%	-9.1%	-15.4%
12 months	-10.7%		-14.6%	-10.8%	-19.2%	-18.3%	-14.0%	-16.9%	7.9%	-5.6%	-0.4%	-9.8%
First 11 months	-9.9%		-11.7%	-8.7%	-12.4%	-18.2%	-16.6%	-14.7%	18.4%	-11.2%	-8.1%	4.6%
Estimates Momentum	-5.4%	-0.5%	-7.5%	-19.0%	-5.2%	-10.3%	4.4%	-21.4%	1.3%	26.0%	-15.0%	-7.1%
1 Month Change in Earnings Forecast	-4.6%		-8.2%	-5.6%	-23.3%	-12.1%	-4.3%	-14.7%	-7.1%	13.0%	-19.9%	10.8%
Earnings Revision	-5.9%		-2.5%	-23.0%	8.9%	-11.0%	-10.3%	-12.4%	-1.5%	20.8%	-1.0%	-16.8%
Sales Revisions	-5.0%		-3.7%	-9.1%	-20.0%		4.8%	-16.0%	7.9%	17.4%	-8.5%	-1.4%
Cash Revisions	-4.2%		-13.1%	-13.5%	6.6%		26.8%	-18.6%	0.9%	16.0%	10.0%	-13.5%

Source: Citi Research, MSCI, IBES, Worldscope, Datastream

Note: That Quantile performance refers to the spread of returns between the top and bottom quintile of styles, while the Pure performance refers to style performance where others sources of risk exposure such as Country, Sector and other style exposure have been removed. Baskets with less than 5 stocks have been removed. See appendix for more information.

Macro Factor Sensitivities²:

Figure 21. GDP Weighted Global Bond Yield (G10)

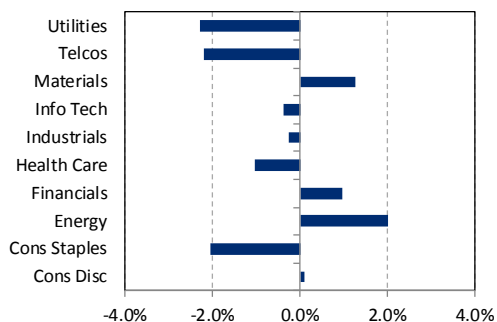


Figure 22. Oil

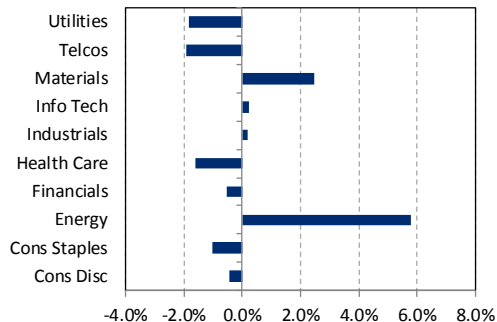


Figure 23. Commodities (GSCI)

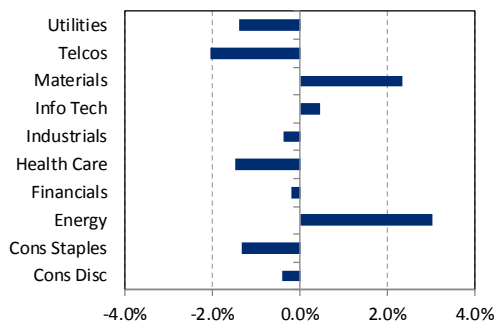


Figure 24. EUR per USD

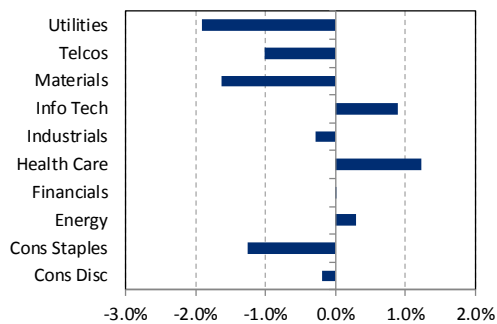


Figure 25. YEN per USD

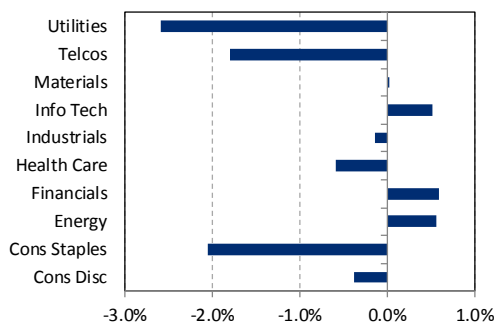


Figure 26. Emerging Market Sovereign Bond Yield

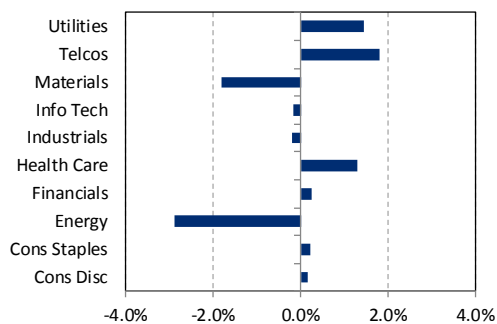


Figure 27. Credit Spreads

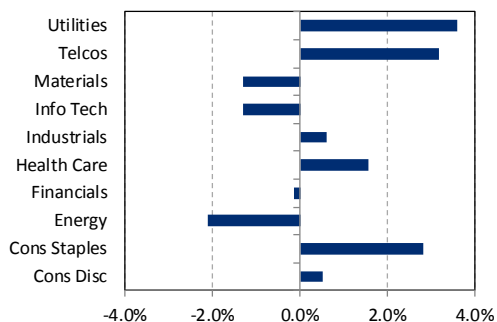
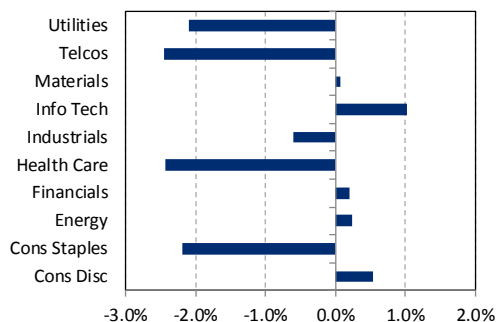


Figure 28. Market (MSCI AC World)



Source: Citi Research, MSCI

² The above charts illustrate predicted *relative returns* from our proprietary risk model (Global RAM) for a one standard deviation change in the underlying macroeconomic factor.

Asia ex Japan Styles

Macro Factor Sensitivities³

Figure 29. GDP Weighted Global Bond Yield (G10)

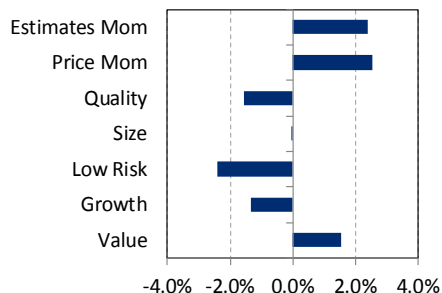


Figure 30. Oil

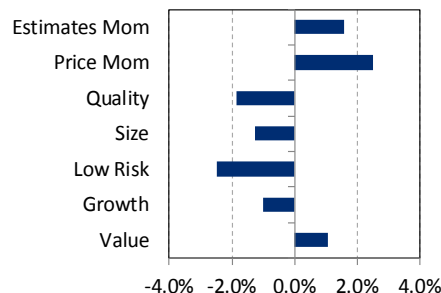


Figure 31. Commodities (GSCI)

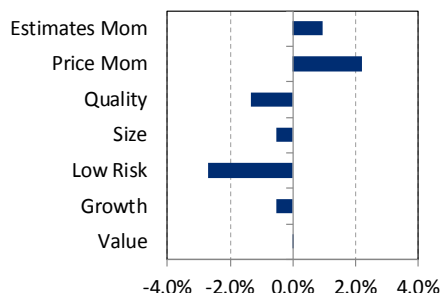


Figure 32. EUR per USD

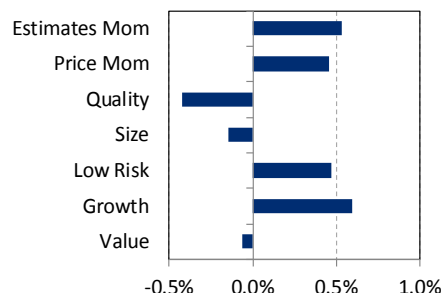


Figure 33. YEN per USD

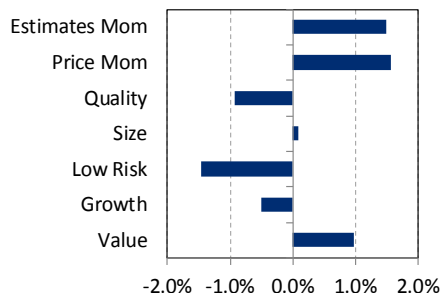


Figure 34. Emerging Market Sovereign Bond Yield

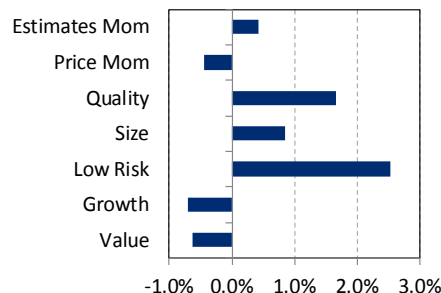


Figure 35. Credit Spreads

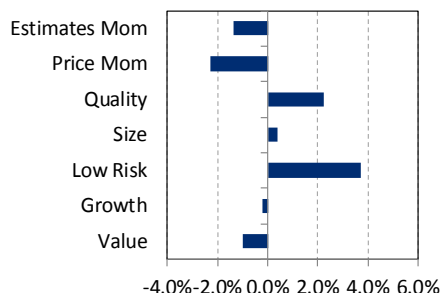
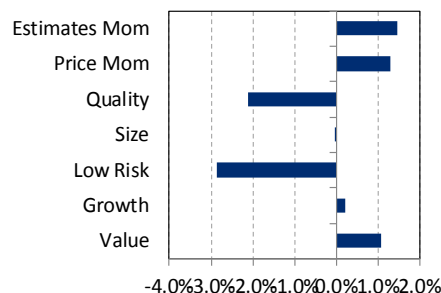


Figure 36. Market (MSCI AC World)



Source: Citi Research, MSCI, IBES, Worldscope, Datastream

³ The above charts illustrate predicted *long/short style returns* from our proprietary risk model (Global RAM) for a one standard deviation change in the underlying macroeconomic factor.

Country Composition

Figure 37. Estimates Momentum

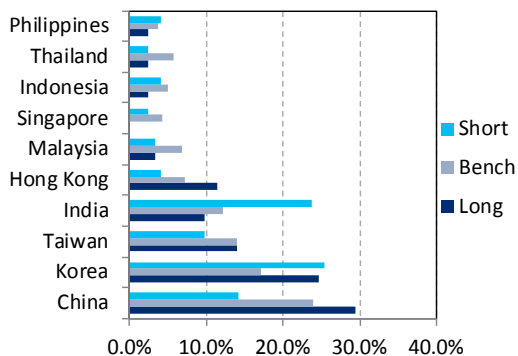


Figure 38. Growth

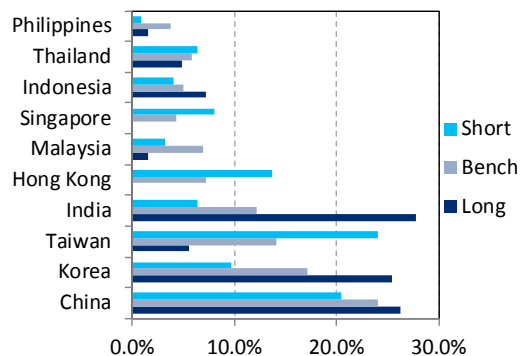


Figure 39. Value

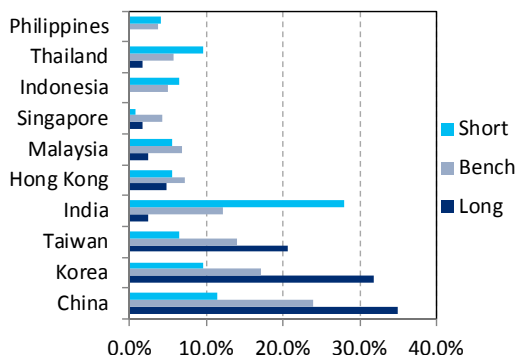


Figure 40. Low Risk

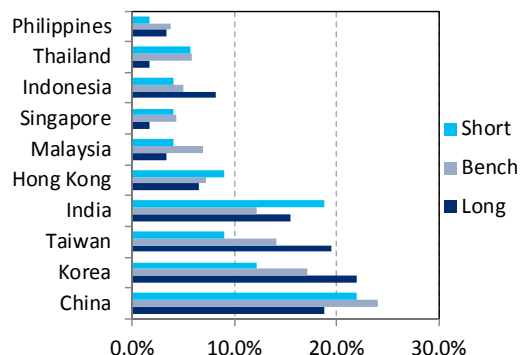


Figure 41. Size

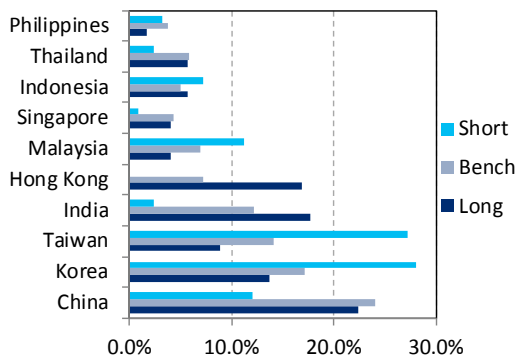


Figure 42. Price Momentum

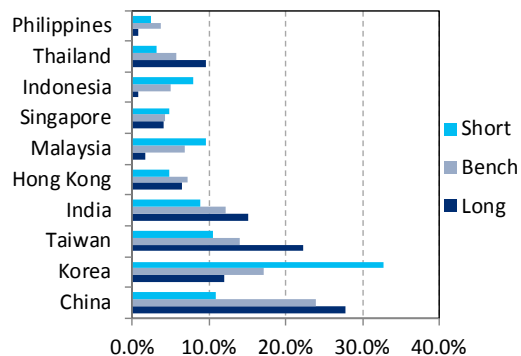
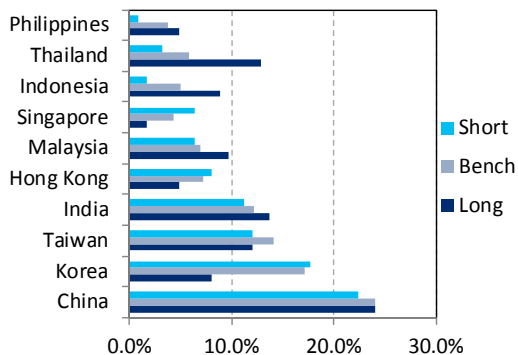


Figure 43. Quality



Style composition is defined as the proportion of each of the long and short style portfolios coming from the relevant regions, country or sector.

Source: Citi Research, MSCI, IBES, Worldscope, Datastream

Sector Composition

Figure 44. Estimates Momentum

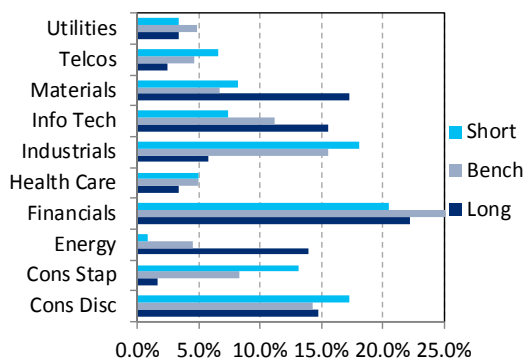


Figure 45. Growth

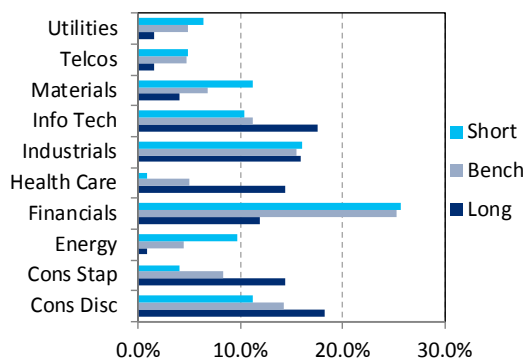


Figure 46. Value

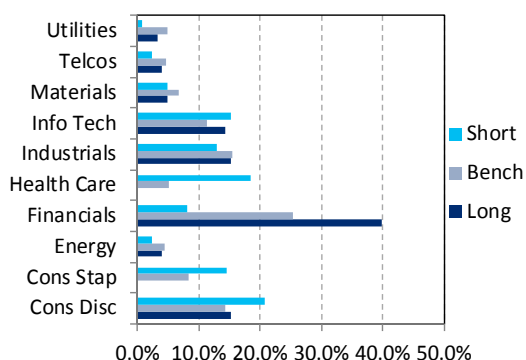


Figure 47. Low Risk

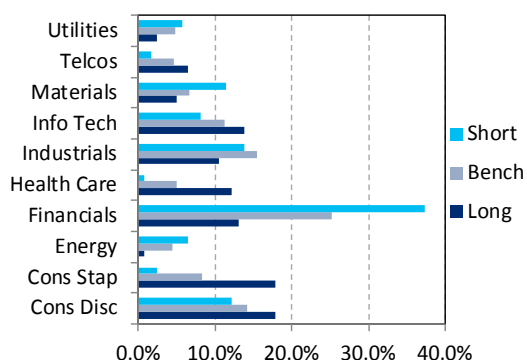


Figure 48. Size

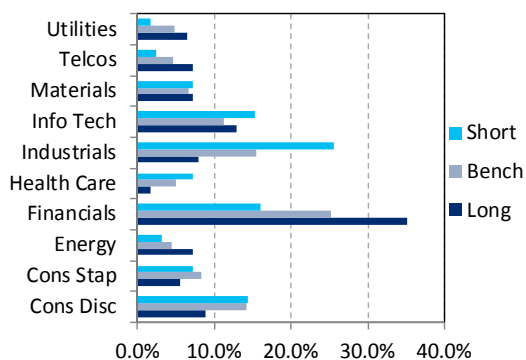


Figure 49. Price Momentum

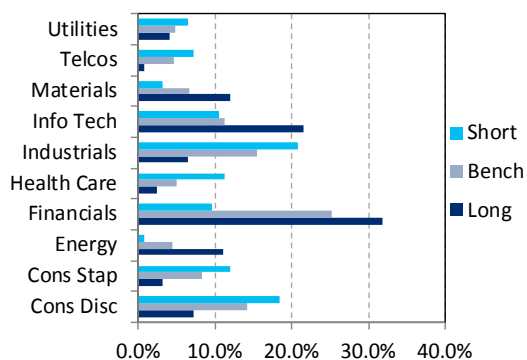
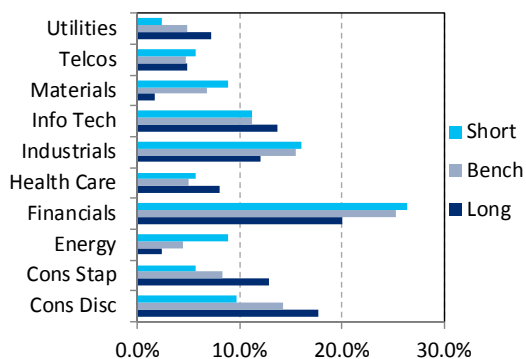


Figure 50. Quality



Style composition is defined as the proportion of each of the long and short style portfolios coming from the relevant regions, country or sector.

Source: Citi Research, MSCI, IBES, Worldscope, Datastream

Relative Style Valuations

Figure 51. Estimates Momentum

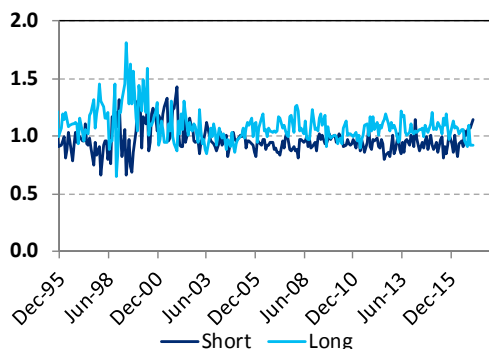


Figure 52. Growth

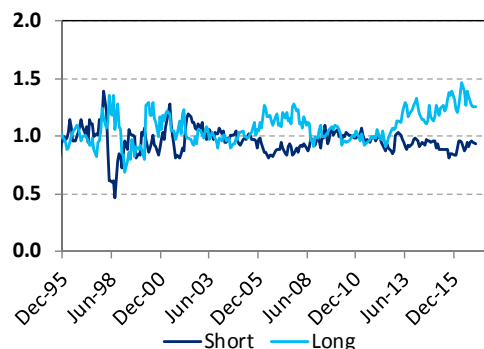


Figure 53. Value

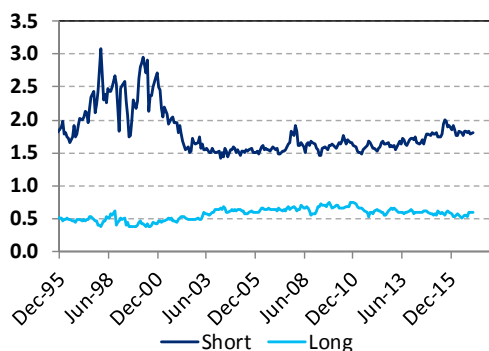


Figure 54. Low Risk

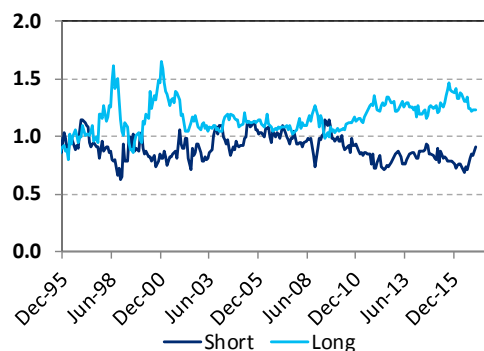


Figure 55. Size

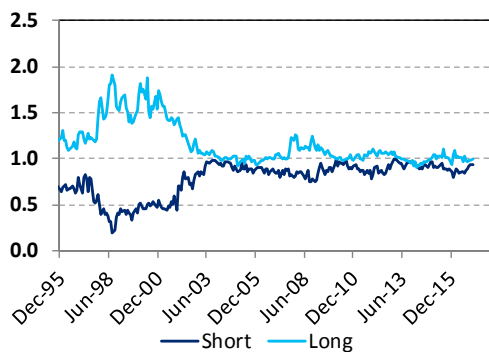


Figure 56. Price Momentum

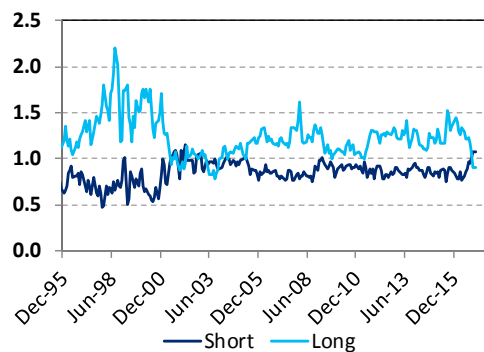
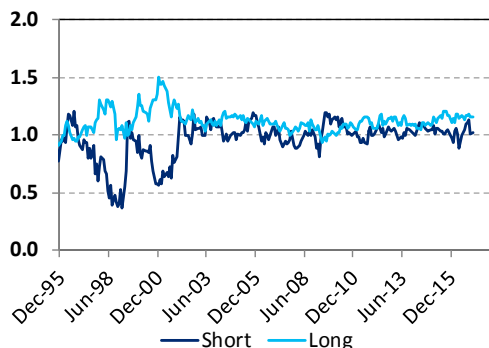


Figure 57. Quality



Relative style valuations calculated using median 12 month forward P/E of the respective long and short style quintiles relative to the benchmark median.

Source: Citi Research, MSCI, IBES, Worldscope, Datastream

Appendix: Interactive Tool

In response to client needs, we have developed an interactive style backtesting product to complement this publication. The tool comes in the form of an excel add-in that clients can easily install on their desktop. The tool offers:

- Access to over 10,000 univariate backtests covering 50 factors and 16 broad investing universes.
- Flexibility in deciding which time period to use to calculate style returns (earliest start date is January 1995).
- Returns are total return based and are available in various currencies.
- Ability to look at the analysis in a number of methods — Simple Returns, Annualised Returns, Information Ratios, Hit Rates and Factor Correlations.
- Individual factor in depth analysis.
- Downloadable factor return series in a user-defined manner.
- Analysis down to sector level.

Please contact the European Quantitative Research team (gqrlondon@citi.com) if you wish to receive this tool.

Figure 58. Citi Quant Style Add-in

	MSCI World	MSCI Europe	MSCI North America	MSCI United States	MSCI Europe ex UK	MSCI United Kingdom	MSCI Nordie	MSCI Japan	MSCI Pacific	MSCI ex Japan
Valuation										
Simple Returns using High-Low Basket return series in USD										
Universe Returns										
MCap Weighted	14.22	15.83	17.82	10.75	10.75	23.87	24.37	22.22	25.54	2.62
Equally Weighted	14.75	18.80	17.17	10.52	9.89	28.50	28.13	26.36	33.84	-0.27
Growth										
Earnings Yield - 12 month forward	11.84	5.06	16.31	5.46	4.28	-1.92	4.53	-10.55	-1.51	9.22
Earnings Yield - 12 month historical	13.07	9.04	17.62	7.00	6.95	2.06	6.88	-9.32	8.07	7.32
Cash Flow To Price	9.16	6.39	8.13	9.82	9.25	4.13	5.37	4.27	4.90	17.46
Dividend Yield	16.63	11.76	20.20	7.75	10.80	8.24	9.77	6.08	11.78	15.92
Book to Price Ratio	4.94	8.53	1.95	8.74	9.09	6.16	7.24	6.25	8.86	16.39
Sales to Price Ratio	9.22	16.39	6.22	11.25	12.47	15.15	16.79	12.91	20.63	2.64
EBITDA / EV	16.56	14.74	17.36	9.39	10.62	10.20	9.44	10.35	18.24	20.47
Sales / EV	9.10	14.36	3.08	10.67	12.28	10.86	11.56	10.89	12.53	4.79
Risk										
Value Composite	17.12	15.08	15.57	8.77	9.39	3.60	6.07	-2.09	12.07	17.09
Earnings Growth (12 month forward)	-7.60	-8.73	-7.78	-5.11	-5.86	-8.72	-8.56	-7.39	-10.45	-4.87
SB Growth Value Score	-6.71	-5.67	-4.81	-10.10	-10.55	-4.83	-1.93	-14.36	-3.86	-10.28
One Year Sales Growth	-7.82	-12.36	-4.48	-10.73	-14.48	-8.32	-7.37	-8.53	-4.62	-6.82
Long Term Earnings Growth	-13.76	-5.06	-18.97	-6.27	-9.26	1.57	1.15	-4.52	-3.70	-5.16
One Year EPS Growth	-1.92	-1.63	-1.04	-6.98	-7.80	-3.55	-0.02	-14.57	2.49	6.80
One Year DPS Growth	-1.71	-1.81	-2.21	-2.52	-2.44	-0.94	-0.75	-7.01	-3.59	0.87
Growth Composite	-7.87	-7.87	-7.37	-9.84	-12.82	-8.13	-8.22	-10.81	-10.21	-2.25
Deviation from Fair P/E	2.37	1.77	1.96	3.19	5.03	0.97	2.97	-7.23	-2.06	7.14
Deviation from Fair P/B	4.86	3.42	4.96	6.56	6.21	0.45	2.58	-7.82	-0.62	12.78
Deviation from Fair P/S	6.96	8.12	5.98	8.01	9.67	8.61	8.68	11.95	3.37	3.24
Deviation from Fair P/CF	6.51	4.94	6.01	7.48	7.44	6.50	6.28	5.97	-0.89	15.64
P/E (Inverted)	-2.10	-4.54	-2.93	-1.01	-2.57	-6.47	-4.15	-14.82	-8.21	0.12
Low Risk										
GARP Composite	3.40	1.67	2.39	4.75	4.52	-1.03	1.25	-7.60	-2.68	10.42
Debt to Equity (Inverted)	-7.20	-7.54	-6.82	-7.45	-7.49	-8.46	-6.43	-9.41	-6.20	3.90
Earnings Stability	-4.34	-8.68	0.39	-5.51	-5.69	-3.85	-5.01	-3.06	-11.46	-0.42
Beta against MSCI AC World (Low/High)	-2.71	1.48	-5.99	2.47	3.54	9.71	10.20	8.96	13.56	9.91
Beta against MSCI Country Index (Low/High)	6.75	5.61	8.85	3.42	4.78	11.89	11.80	5.58	13.77	6.30

Source: Citi Research

Appendix: Construction Style Indices and Calculation of Style Performance

The first step involves the identification of the most important systematic drivers of risk and return across global markets over the long term. Using results from the extensive style performance research published by the Citi Global Quantitative Research team together with empirics documented within the Academic literature we arrive at the following styles: Size, Value, Growth, Low Risk, Quality, Price Momentum and Estimates Momentum.

For each style factor, we then select a list of descriptors that best represent that specific attribute. For example we use a range of defensive and cyclical price based ratios to describe the Value attribute. These descriptors are then combined to arrive at a style factor loading for each stock in a given MSCI universe.

Style Descriptors

The basis for our style classification and choice of style descriptors comes from the Citi Style Addin Software⁴. Stock universes are based on MSCI indices and we have a complete history of styles/factors back to 1995. Figure 2 lists the styles that we cover together with the descriptors used in the construction of each index. One notable absence from our style classification is GARP. We chose not to include this style because as a distinct style, this could be constructed from combining Value and Growth.

Figure 59. Style Factors and Descriptors

Style Index	Descriptors	
Size	Market Capitalisation (log)	
Value	Earnings Yield (12 month forward)	Earnings Yield (12 month historical)
	Cash Flow To Price	Dividend Yield
	Book to Price Ratio	Sales to Price Ratio
	EBITDA / EV	Sales / EV
Growth	Earnings Growth (12 month forward)	S&P Growth-Value Score
	One Year Sales Growth	Long Term Earnings Growth
	One Year EPS Growth	One Year DPS Growth
Low Risk	Debt to Equity (Inverted)	Earnings Stability
	Beta against MSCI AC World (Low-High)	Beta against MSCI Country Index (Low-High)
Quality	Earnings Certainty	Return on Equity
	Net Profit Margin on Sales	Margin Growth
	Earnings Quality (Accruals) (Inverted)	Balance Sheet Quality (NOA) (Inverted)
Price Momentum	3 Month Volatility Adjusted Price Trend	12 Month Volatility Adjusted Price Trend
	First 11 Month Volatility Adjusted Price Trend	
Estimates	1 Month Change in Earnings Forecast	Earnings Revision
	Sales Revisions	Cash Revisions

Source: Citi Research

When we building our style factor loading we start by winzorising the descriptor data to eliminate outliers. After this we normalise this data and combine together on an equal weighted basis to form the style composite factor.

⁴ For more information on the Citi Style Addin please see Appendix of the this document. Or alternatively to down the addin go to the [Citi Velocity](#) web page.

Calculation of Raw Style Performance

We calculate raw style performance using the standard factor mimicking approach. In each universe stock are ranked using each composite

Construction of Pure Style Indices

Using the same style data that

For a point in time, given the style factor loadings, country/sector membership dummies and our desired orthogonal style exposures, we then employ a simple matrix inversion to compute a set of orthogonal style factor portfolios. The last step involves a simple linear combination of the monthly style factor portfolios with the next-period returns of each constituent stock measured over a monthly or daily periodicity to generate an index of style returns. The result is that each index has a unit exposure to any one style and zero exposure to all other styles, at the time of the monthly rebalance.

Calculating the Style Betas

In order to calculate the betas we are effectively constructing the style portfolios. Following this, the style portfolio exposures are function of the style loadings and their corresponding betas. In matrix notation (simplified version):

$$Y = B'F$$

Where (the equation above is contemporaneous, hence ignoring the time subscript):

Y = matrix (m,m) factor portfolio exposures;

B = matrix (n,m) of style portfolio weights (betas);

F = matrix (n,m) stock exposures to style/country/sectors;

n = number of stocks;

m = number of styles, country and sectors.

Given our desire for set of linearly independent style portfolios, Y can take the form of an identity matrix, F is our style factor loadings so we are therefore solving for B .

$$B = \left((F'F)^{-1} F' \right) Y$$

The result of B is a set of stock level weights (or betas) for each style that multiplied with the style factor loadings produces orthogonal style exposures⁵. Or in other words, each style portfolio has a unit exposure to itself and zero exposure to all other styles.

⁵ We also constrain the weighted sum of the sectors to be zero.

Construction of Style Return Indices

As part of the construction of the style portfolio exposures, at a point in time, we are left with a set of style portfolios and their corresponding long-short stock weights. Bringing this part of the style index construction to return space (i.e. the B matrix), we assume that cross-sectional stock returns over any period can be expressed with the following equation:

$$P_t = R_t B_{t-1}$$

Where:

P_t = a row vector $(1, m)$ of pure style portfolio returns from time $t-1$ to time t

R_t = a column vector $(n, 1)$ of stock returns from time $t-1$ to t

B_{t-1} = matrix (n, m) of style portfolio weights formed at time $t-1$

Given we know R_t and we have calculated B_{t-1} , the product of these two matrices is P_t , the return of each pure systematic factor (in total, m) at time t .

Appendix: Style Definitions

Most of the style descriptors we use are self-explanatory. Data is primarily sourced from either Worldscope or Thomson IBES. However there are some style descriptors that warrant further explanation:

- **S&P Global BMI Growth-Value Score** — this is a score between 0 (pure value) and 1 (pure growth) is assigned to each stock and is calculated by S&P. For more information on the methodology that is employed to calculate the score, please see the S&P [website](#) and click on the “Methodology” section.
- **Earnings Stability** — calculated as the R-squared from a regression of five annual EPS values (three historical and two forecast) against a time trend. (For more details, see our report *Searching for Alpha: Focus on Earnings Stability*, Citi Research, February 2003.
- **Price Momentum** — for each respective daily time period, price momentum is calculated as the t-statistic of the slope coefficient, derived from a regression of the log of daily prices (in local currency) on a time trend.
- **Earnings, Sales, Cash Revisions** — this is the time-weighted average of analyst upgrades less downgrades scaled by the total number of estimates for fiscal years 1 and 2.
- **Earnings Certainty** — measured as the inverse of the coefficient of variation in the next 12-month EPS estimates (stocks are excluded if there are less than five estimates or EPS is less than one cent). This is the same as the inverse of our EPS dispersion measure and more detail can be found in *Searching for Alpha: Sell When Analysts Disagree*, Citi Research, December 2003.
- **Earnings Quality** — calculated as the year-on-year change in net operating assets or the difference between accounting and cash earnings (accruals). For more details, see our reports. [Searching for Alpha - Accruals Volatility – A New Approach to Quality Investing](#), *Searching for Alpha: Quantifying Earnings Quality*, Citi Research, October 2004.
- **Balance Sheet Quality** — this is the level of net operating assets. NOA incorporates all the changes in NOA and can be used as proxy for cumulated accruals. Since accumulation of earnings without cash flow is unsustainable in the long term, having high net operating assets is a sign of balance sheet bloat. For more details, *Searching for Alpha: Quantifying Earnings Quality*, European Quantitative Strategy, October 2004.

Previously Published Research

Figure 60. Research Reports (since 2009)

Report	Date Published
Searching for Alpha: Competitive Advantage: Survival of the Fittest	19-Sep-2016
Searching for Alpha: Financial Strength Redux	09-Sep-2016
Searching for Alpha: Dynamic Style Weighting – Risk-Based Equity Style Allocation	14-Apr-2016
No Shorts Please: Long-Only Pure Style Portfolios	4-Mar-2016
Industry Alpha insights: Banks – One Size Does Not Fit All	18-Feb-2016
Under the Microscope: Stock Momentum Conflation	21-Sep-2015
Searching for Alpha: Macro Moves Markets	15-Sep-2015
Global Quantitative Research Conference: 2015 Conference Proceedings	26-Jun-2015
Searching for Alpha: Style Performance, Trading Volumes and Investor Agreement	23-Mar-2015
World Radar Screen: Refining Our Global Search for Alpha	13-Mar-2015
Searching for Alpha: Networking with Analysts: Modelling Analyst Forecast Dependence	18-Feb-2015
The Rise of Low Risk Investing: Is it Getting Crowded Out There	01-Oct-2014
Global Quantitative Research Conference: 2014 Conference Proceedings	26-Jun-2014
Under the Microscope: Five Innovations in Momentum Investing	27-Mar-2014
Searching for Alpha: Timing Price Momentum	07-Mar-2014
Equity Risk Premia Investing: A New Methodology For Monitoring Style Performance	27-Nov-2013
Stock Market Country Selection: Changes to a Well Established Model	23-Jul-2013
Searching for Alpha: Digging for Dividends – QUARI Quality with A Reliable Income	02-Jul-2013
Global Theme Machine: An Objective Way of Identifying Attractive Investment Themes	24-Jun-2013
Searching for Alpha: Purifying Analyst Recommendations – Removing Beta to get to the Alpha	25-Mar-2013
Searching for Alpha: Tangible Benefits of Intangibles – Brand, Respect & Intellectual Capital	06-Nov-2012
Global Quantitative Research Conference: 2012 Conference Proceedings	26-Sep-2012
Low-Risk Portfolio Strategies: Sharpe Ratio Maximisation and Multi-Asset Applications	09-Mar-2012
Macro Risk and Style Rotation: A Guide Rather than a Prescription	28-Feb-2012
Global Quantitative Research Conference: 2011 Conference Proceedings	27-Sep-2011
Searching for Alpha: Accruals Volatility – A New Approach to Quality Investing	14-Sep-2011
Industry Alpha Insights: Four Approaches to Tactical Industry Selection	24-Aug-2011
Industry Alpha Insights: Quantifying Industry Specific Fundamentals	17-Mar-2011
Low-Risk Equity Portfolios: More than just Minimum Variance	18-Nov-2010
Under the Microscope: Measuring Systemic Risk – The Absorption Ratio	15-Nov-2010
Global Quantitative Research Conference: 2010 Conference Proceedings	21-Sep-2010
Under the Microscope: Optionality in Valuation	14-Jun-2010
Searching for Alpha: Earnings Surprise – Still Profiting from Surprises	31-Mar-2010
Global Quantitative Research Conference: 2009 Conference Proceedings	29-Sep-2009
Searching for Alpha: Optimising Style Rotation Strategies	15-Oct-2009
Source: Citi Research	

Figure 61. What Works in Equity Markets

Report	Date Published
Waiting for Earnings Delivery	27-Jan-2017
Style Purification – Does it Help?	24-Jan-2016
Single Factor or Multi-Factor Investing	22-Jul-2016
Are Spin-Offs Money Spinners?	10-May-2016
Income and Low Risk Crowding	25-Apr-2016
Look for Persistent Earnings Leadership	24-Feb-2016
Macro Influence: Are Spreads Getting the Credit They Deserve?	09-Feb-2016
Protection from Macro Volatility: Stock Specific Risk	08-Jan-2016
Quant Road Ahead 2016	10-Dec-2015
Brand Value Powers On	08-Dec-2015
Can Small-Caps be Reignited?	28-Oct-2015
Quality Works, most of the time...	16-Sep-2015
Macro Still Matters, But Move Towards Micro	27-Jul-2015
Price Momentum: What's Trending?	03-Jul-2015
A Systematic Approach to Timing Theme Interest	03-Jun-2015
Source: Citi Research	

Citi Quantitative Teams

Figure 62. Citi Quantitative Teams

For Informational Purposes Only

Global Quantitative Research		
Chris Montagu ¹	+44-20-7986-3958	chris.montagu@citi.com
Liz Dinh ⁴	+61-2-8225-4896	liz.dinh@citi.com
Helen Krause ¹	+44-20-7986-8653	helen.krause@citi.com
Chris Ma ²	+852-2501-2404	chris.ma@citi.com
James Murray ¹	+44-20-7986-4579	james.murray@citi.com
David Chew ¹	+44-20-7986-7698	david.chew@citi.com
Zee Yusuf ¹	+44-20-7986-4228	zee.yusuf@citi.com
Equity Quantitative Strategy (Sales and Trading Team, please see note below)		
Hong Li	+1-212-723-2881	hong.li@citi.com
Jason Li	+1-212-816-6033	jason.li@citi.com
Puneet Singh	+65-6432-1172	puneet.singh@citi.com
Tiffany Zhou	+1-212-816-4659	tiffany.zhou@citi.com
Richard Schlatter	+1-212-816-6279	richard.w.schlatter@citi.com
Tushar Mandal	+65-6432-1154	tushar.mandal@citi.com
Tan Si An	+65-6432-1163	si.an.tan@citi.com

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Appendix A-1

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<i>% of companies in each rating category that are investment banking clients</i>	65%	61%	60%	72%	63%	50%
Citi Research Quantitative World Radar Screen Model Coverage	30%	40%	30%			
<i>% of companies in each rating category that are investment banking clients</i>	40%	35%	32%			
Citi Research Asia Quantitative Radar Screen Model Coverage	20%	60%	20%			
<i>% of companies in each rating category that are investment banking clients</i>	38%	30%	22%			
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