



Asia  
Pan-Asia

Quantitative Strategy  
**Quantfucius**

Date  
22 February 2016

## Waves of market turmoil

### Investors have flocked to safe havens...

Global markets have been in turmoil since the beginning of 2016. Risky assets such as oil have been slumping to recent lows, followed by a market rebound last week. Recent waves of risk-off/risk-on episodes have led to a soar in market volatility. Our global risk aversion indicator has risen to its 86-th percentile, and our risk aversion proxies in the financial sector, the commodity, bond and currency markets are all extremely high even compared with the GFC and the Asian crisis.

**Our trend-filtered risk parity portfolio has positive implied returns for “risk-off” assets such as US treasuries and the Japanese Yen.**

We see a clear relationship between the riskiness of an asset and its implied returns derived from our risk parity portfolio holdings: the more an asset is correlated with the MSCI World (i.e. more “risky” like Oil and equities), the more negative its implied returns. The US treasuries and the Japanese Yen, “traditional” risk-off assets, are negatively correlated with the MSCI World, and have positive implied returns. Nevertheless, our Bubble model has indicated signs of a possible regime change for US Treasuries.

**At the stock level, investors have paid a premium for Defensives; high quality and high yielding names. But reversal has kicked in.**

In both Japan and Asia ex-Japan, Defensives have commanded the highest premium in the recent sell-off. In Japan, Financials are deeply discounted following the BoJ's introduction of negative rates. Nonetheless, investors have started to prefer short term underperformers and past 1 year winners have been sold. Although value factors have performed well in recent weeks, it is too early to confirm if investors are comfortable with discounted stocks as stocks trading at higher multiples continue to underperform markedly.

### Our diversified multi-factor model in Asia continues to add value

We have been proponent of diversified models to cope with the ever-changing market environment. Our composite model's favorite picks include the likes of Indian Oil, Bharat Petroleum and Pegatron Corporation in Asia and Toyota Motor, Mitsubishi Electric and Itochu Corp in Japan.



Source: gettyimages.com

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Khoi Lebinh  
khoi.lebinh@db.com

Ada Lau  
ada-cy.lau@db.com

Hemant Sambatur  
hemant.sambatur@db.com

Vincent Zoonekynd  
vincent.zoonekynd@db.com

North America: +1 212 250 8983  
Europe: +44 20 754 71684  
Asia: +852 2203 6990



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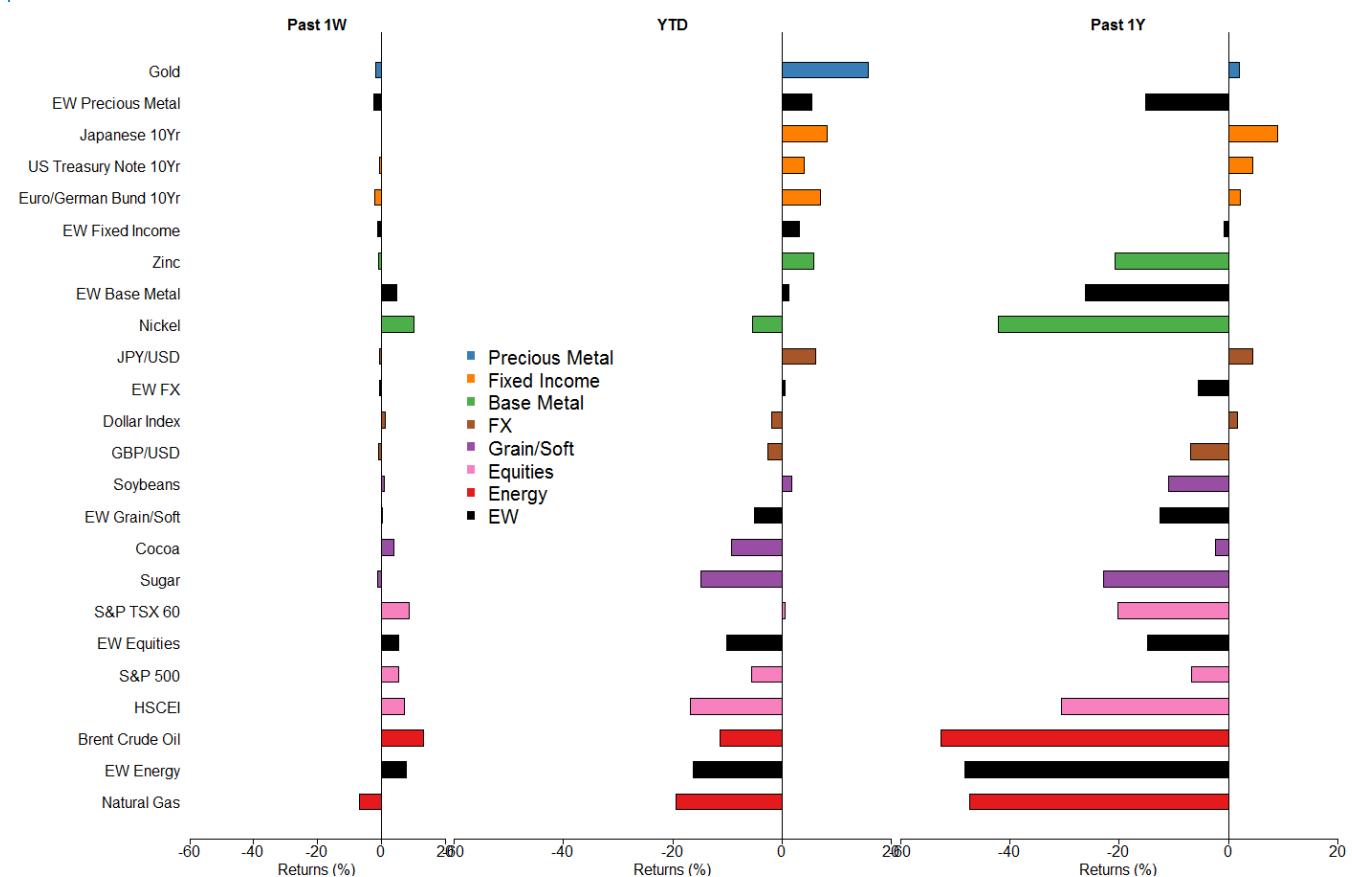


# A letter to our readers

## Investors flocking to safe havens

Global markets have been in turmoil since the beginning of 2016. Traditional risky assets, such as oil, the S&P 500, and the commodity-linked currencies (e.g. AUD, CAD) have all been slumping to recent lows, followed by a market rebound last week which was mainly led by oil and the banks. On the other hand, "safer" assets like US Treasuries have climbed steadily during the market sell-off, and Gold has rallied by almost 20% since January.

Figure 1: Asset performances – Sorted by asset class year to date returns in USD (as of 2016-02-19)



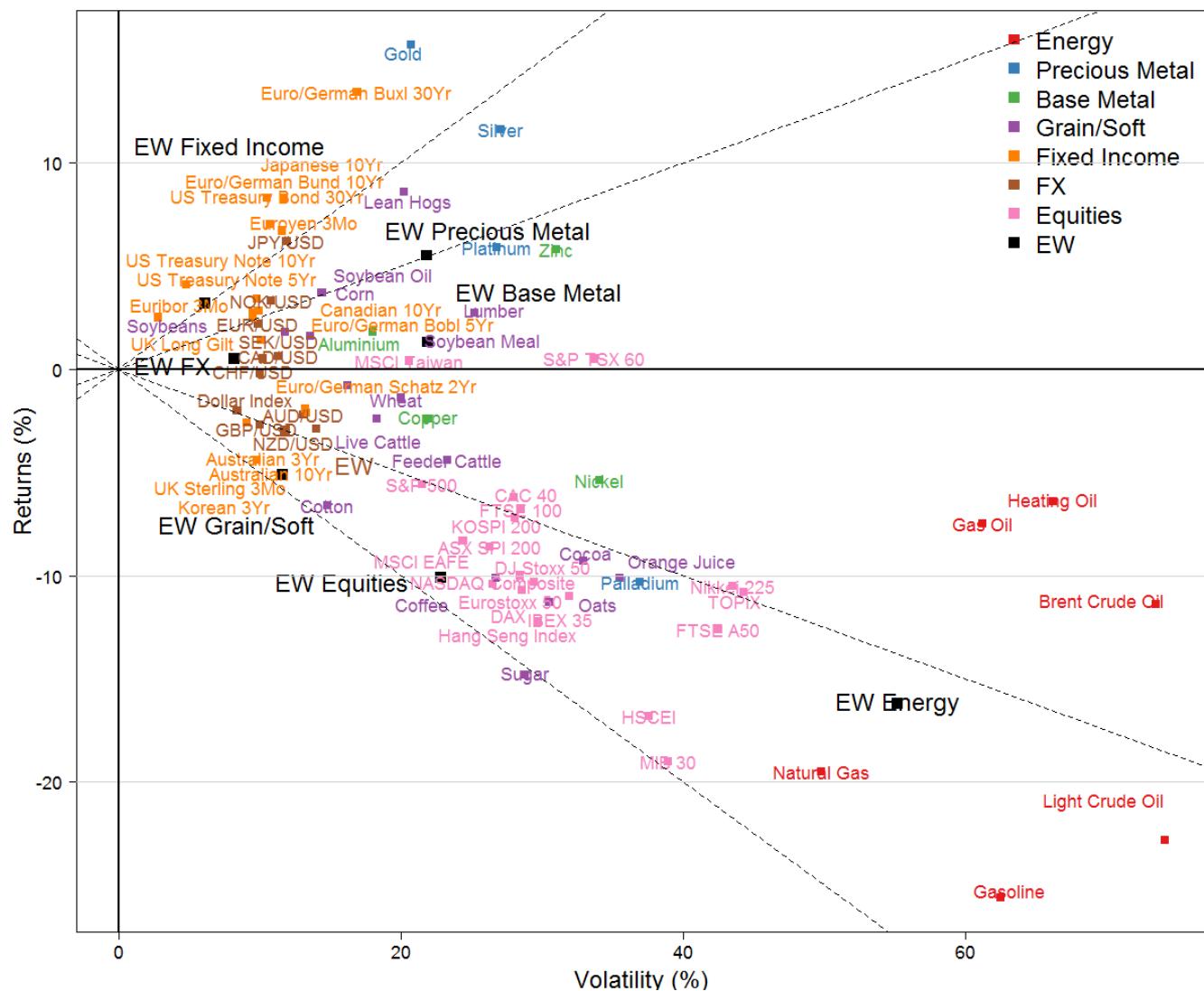
Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

Looking at the risk-return profile of cross-asset futures since the beginning of the year, we clearly see that risky assets have been tumbling. For instance, oil and gas are at the most volatile corner with the worst returns. Equities come second to last in terms of performance, with the HSCEI and the FTSE A50 diving deeply due to poor economic outlook in China and the sharp depreciation of the Yuan.

Fixed income assets, especially long-dated government bonds in the US, Europe and Japan, have delivered an outstanding IR of around 0.5 since investors have started flocking towards these safer instruments.



Figure 2: Year-to-date risk-return profiles in USD. Dotted lines are IR of +/- 0.25 and +/- 0.5 respectively. EW FX includes all the currency pairs against the USD, and EW ("Equal Weight") includes all the cross-asset futures (as of 2016-02-19)

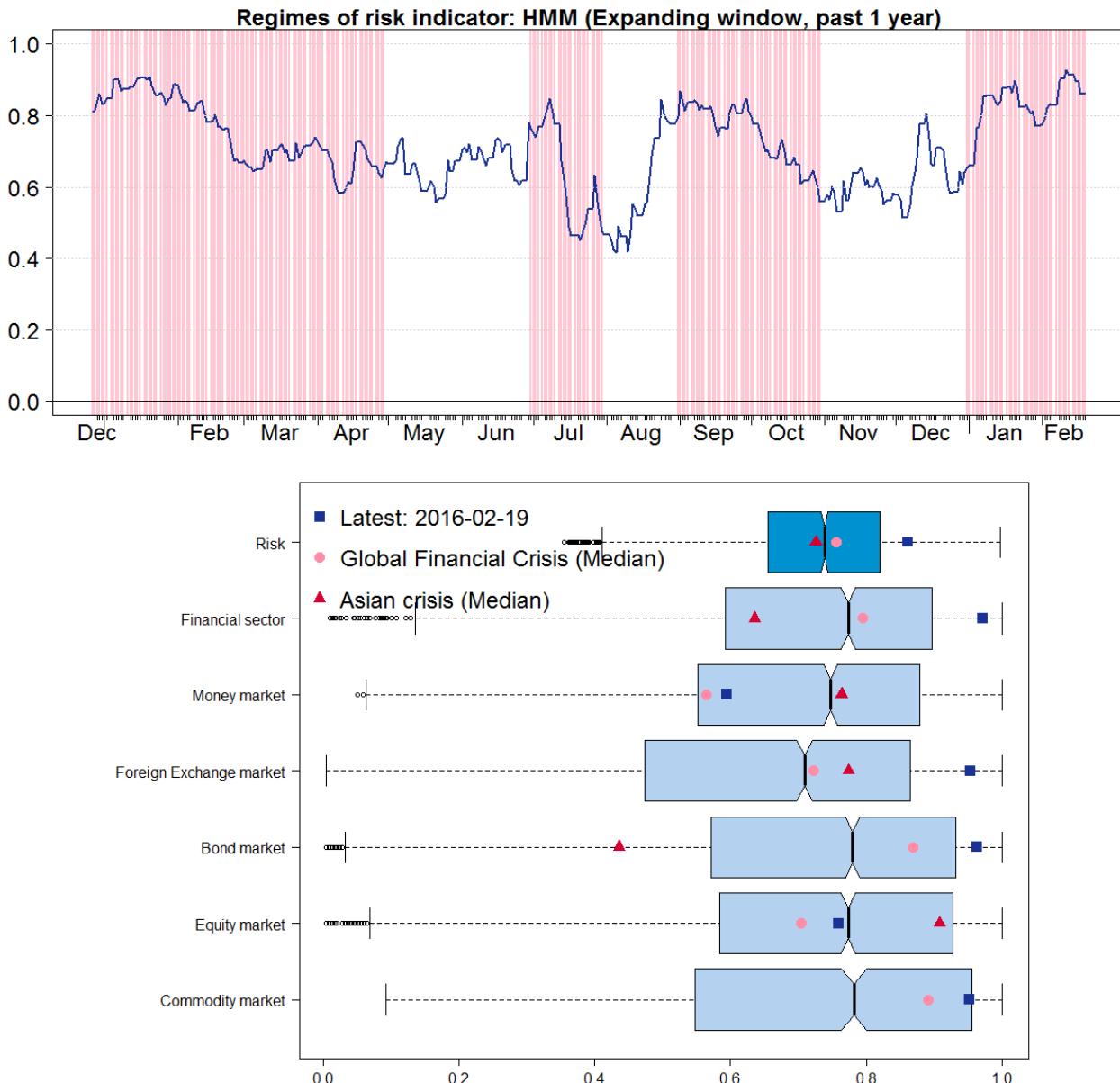


Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Recent waves of risk-off/risk-on episodes have led to a soar in market volatility, and hence it is unsurprising to see that our global risk aversion indicator has risen to its 86-th percentile. We have been in a risk-off regime since the start of the year, and risk aversion proxies in the financial sector, the commodity market, the bond market and the currency market are all extremely high even compared with the median levels observed during the GFC and the Asian crisis<sup>1</sup>.

Figure 3: Our global risk aversion indicator and all sector risk aversion proxies, except for the money market, are beyond their 75-th percentiles (as of 2016-02-19)



<sup>1</sup> We define the period of GFC from 2008-08-29 to 2009-03-30, and the period of Asian crisis from 1996-12-31 to 1998-02-26



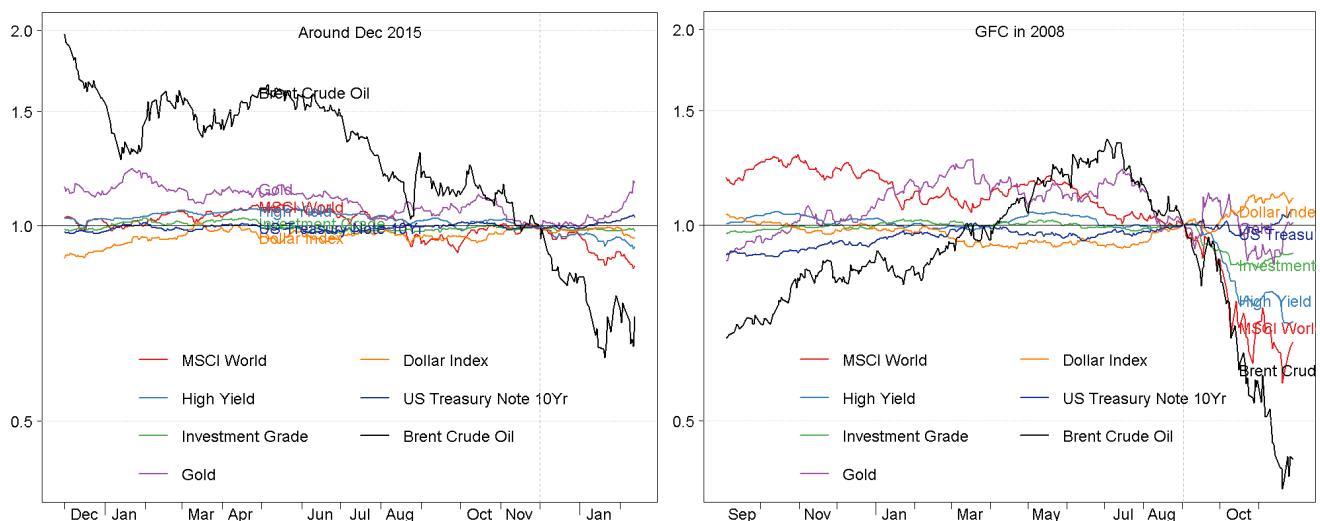
## How does the recent sell-off compare with the GFC?

Investors have recently been worried about the uncertainties surrounding the global economy, where the US and China are under the spotlight: The slowdown of the Chinese economy, a significant depreciation of the Yuan, falling commodity prices and a deteriorating prospect in US growth<sup>2</sup>, together with uncertainty surrounding Central Banks' policies, have all "hammered" investors' confidence.

The recent market sell-off since last December is (so far) however quite different from the Global Financial Crisis:

- Asset corrections during the GFC had been much deeper, with oil price slashed by over 50% in two months. In the recent case, oil has already been dropping significantly since its peak in mid 2014. The drop in MSCI World and high yields had also been more severe during the GFC.
- In the latest sell-off, gold has climbed steeply; but back in GFC it only rose temporarily before falling together with other assets.
- The US dollar had strengthened remarkably after the GFC, but recently has been softening due to lower probabilities of rate hikes this year.

Figure 4: Comparing the current market corrections with the GFC sell-off



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

<sup>2</sup> Our US economist has revised down the 2016 real GDP growth (Q4 over Q4) from 2% to 1.3%.



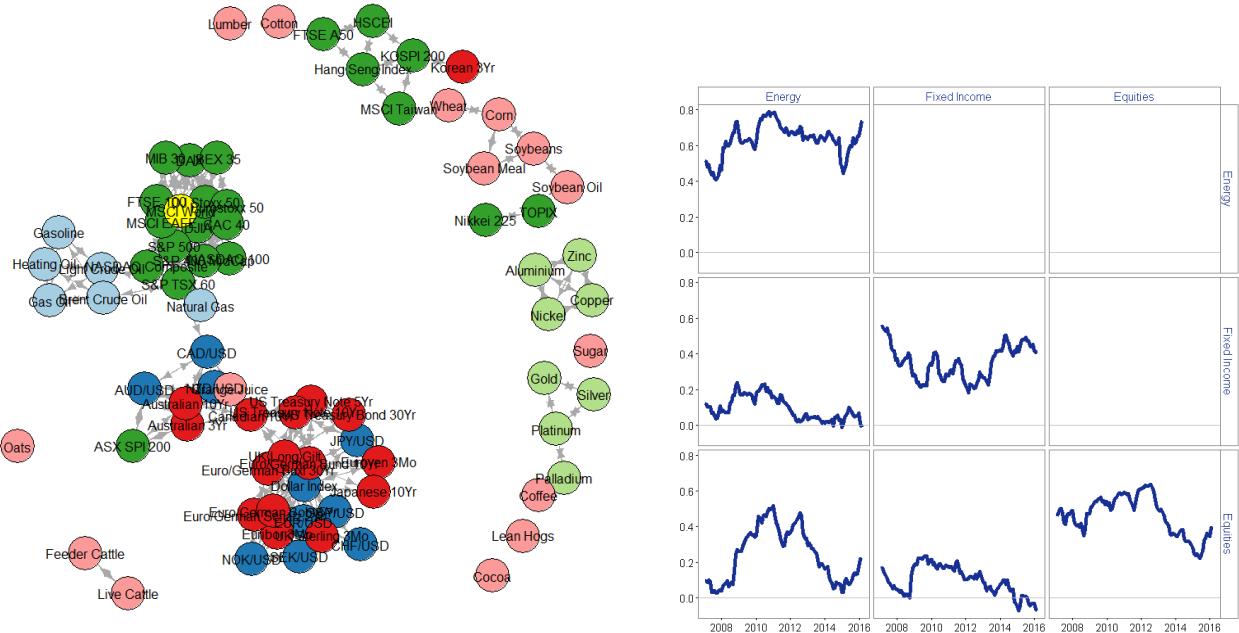
## Asset correlations and the risk parity solution

During “Risk-off” regimes (as identified for example by our model), asset correlations tend to surge and risky assets tend to move in tandem. This is not a situation welcomed by cross-asset investors whose intention is to build well diversified portfolios.

In the current market swoon, U.S. and European equities have been highly correlated with oil and gas (but Asian equities such as the Nikkei have relatively been less correlated with oil).

If we look at the variation of asset correlations over time, current correlations among equity indices are rising but have not yet reached the highs experienced during the GFC. Also, equities and fixed income had been slumping together after the GFC, but recently fixed income assets, perceived as “safe havens”, have been negatively correlated with equities.

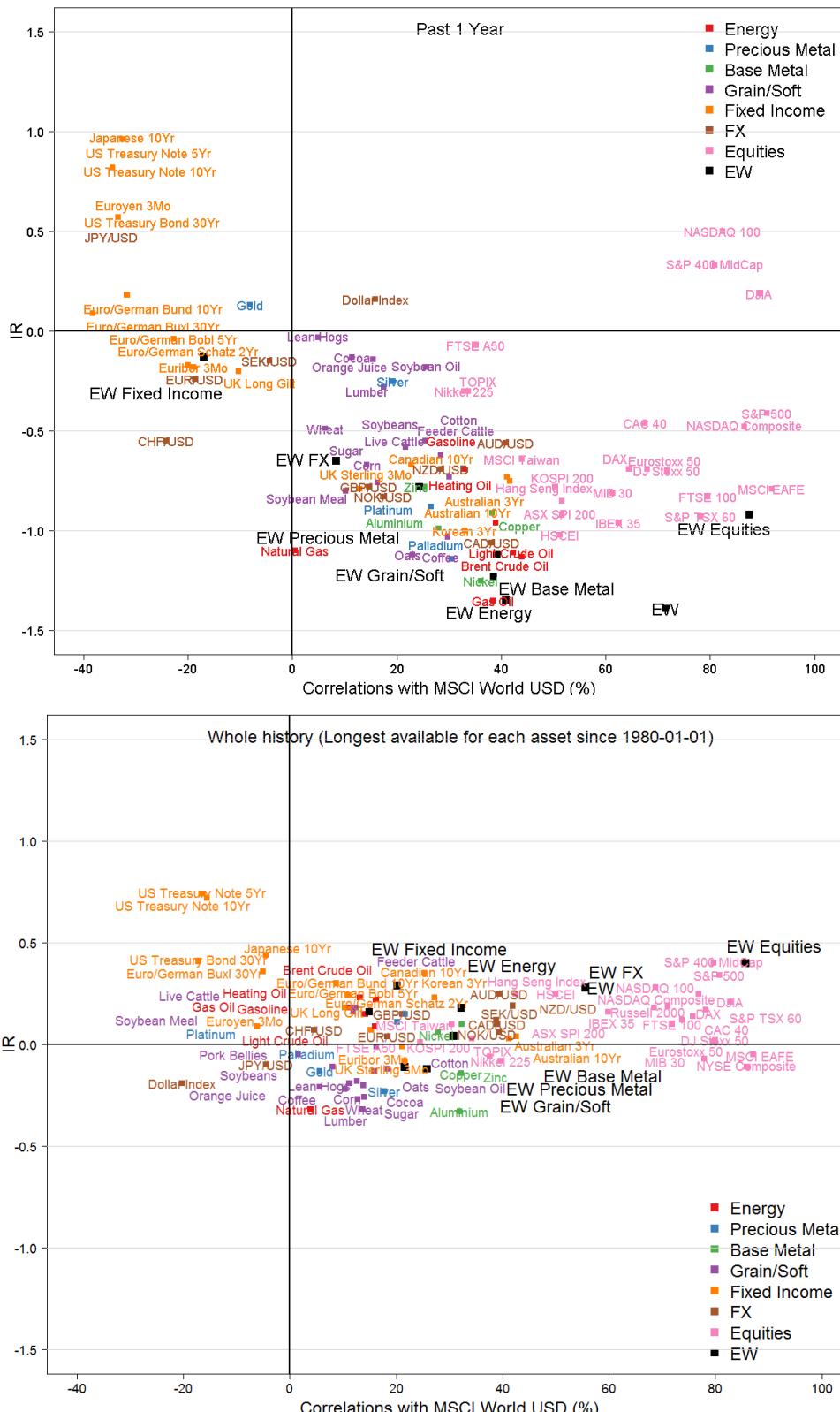
Figure 5: Latest asset correlations (Yellow circle is MSCI World in USD), and correlations over time since 2008



Using the MSCI World as a proxy for risky assets, one could think of assets with very positive correlations to the MSCI World as “risky” assets, and those with negative correlations as “safe havens”, or “risk-off” assets. In the past year, U.S., European and Japanese government bonds, together with the Japanese Yen, have shown a particularly strong risk-off flavor compared to their long term history. The US dollar used to be negatively correlated with MSCI World, but they have recently been correcting together.



Figure 6: Asset IR and correlations with MSCI World in the past year, compared with over whole history



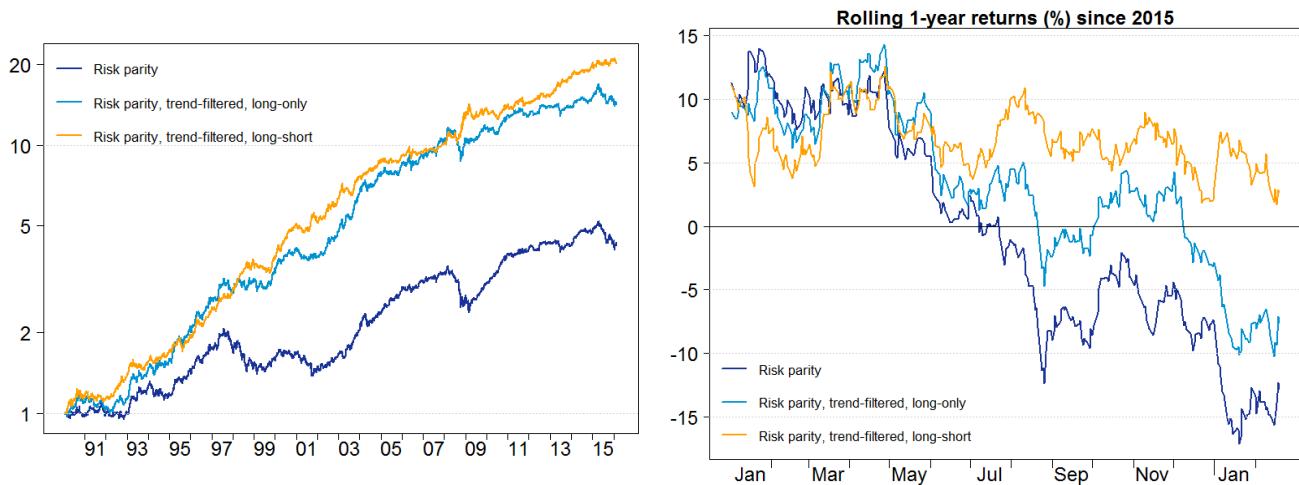
Source: S&amp;P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



The risk parity portfolio, which can be seen as a reasonable benchmark solution for cross asset investors, aims to deliver consistent returns in all market conditions by assigning the same risk budget to all asset classes. Risk parity portfolios are not insensitive to market turmoil, in particular when all assets "tank" together. Long-only risk parity portfolios have performed poorly since last summer.

We show that using momentum to filter out assets with a downward trend can help to mitigate the losses in the risk parity portfolio, whilst further allowing short positions has obviously been helpful in the past year, as seen from the positive returns of the long-short trend filtered risk parity portfolio<sup>3</sup>.

Figure 7: Risk parity portfolio performance (As of 2016-02-19)



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

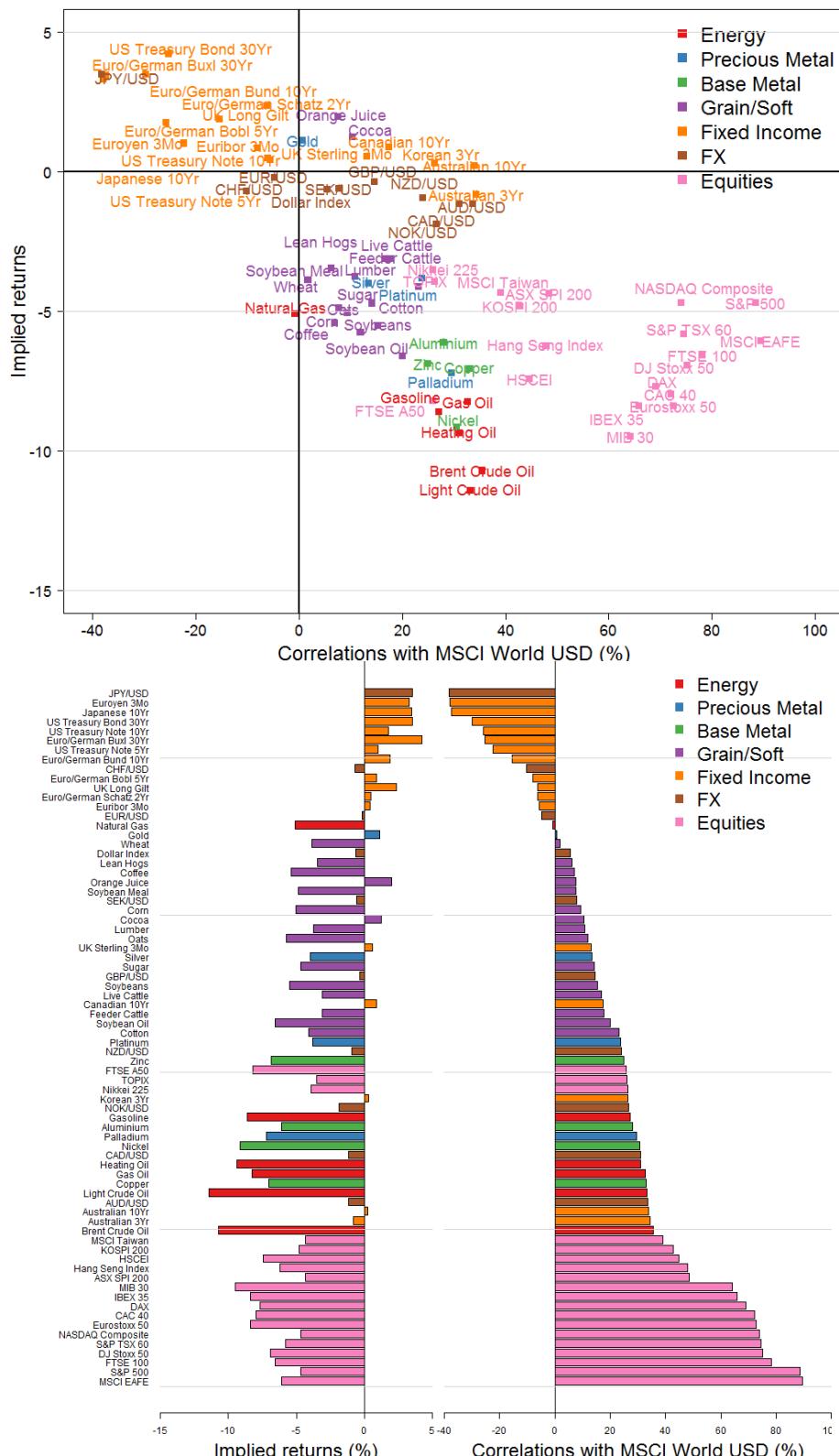
Are the positions of the long-short trend-filtered risk parity portfolio reflecting a risk-off view? To answer this question, we can look at the implied returns of the portfolio. Implied returns are derived from the weights of the portfolio, with the assumption of mean-variance efficiency.

Figure 9 shows the implied returns of our long-short trend-filtered risk parity portfolio. We see a clear relationship between the implied returns with the riskiness of the assets: the more an asset is correlated with the MSCI World (i.e. more risky), the more negative its implied returns. Conversely, the US treasuries and the Japanese Yen are risk-off assets that are negatively correlated with the MSCI World, and they have positive implied returns as reflected from the portfolio holdings. In other words, our risk parity portfolio has implicitly taken a risk-off attitude.

<sup>3</sup> For more details on the construction of risk parity portfolios, please contact us at DBEOS\_Asia@db.com



Figure 8: Implied returns of the assets and correlations with MSCI World (As of 2016-02-19)



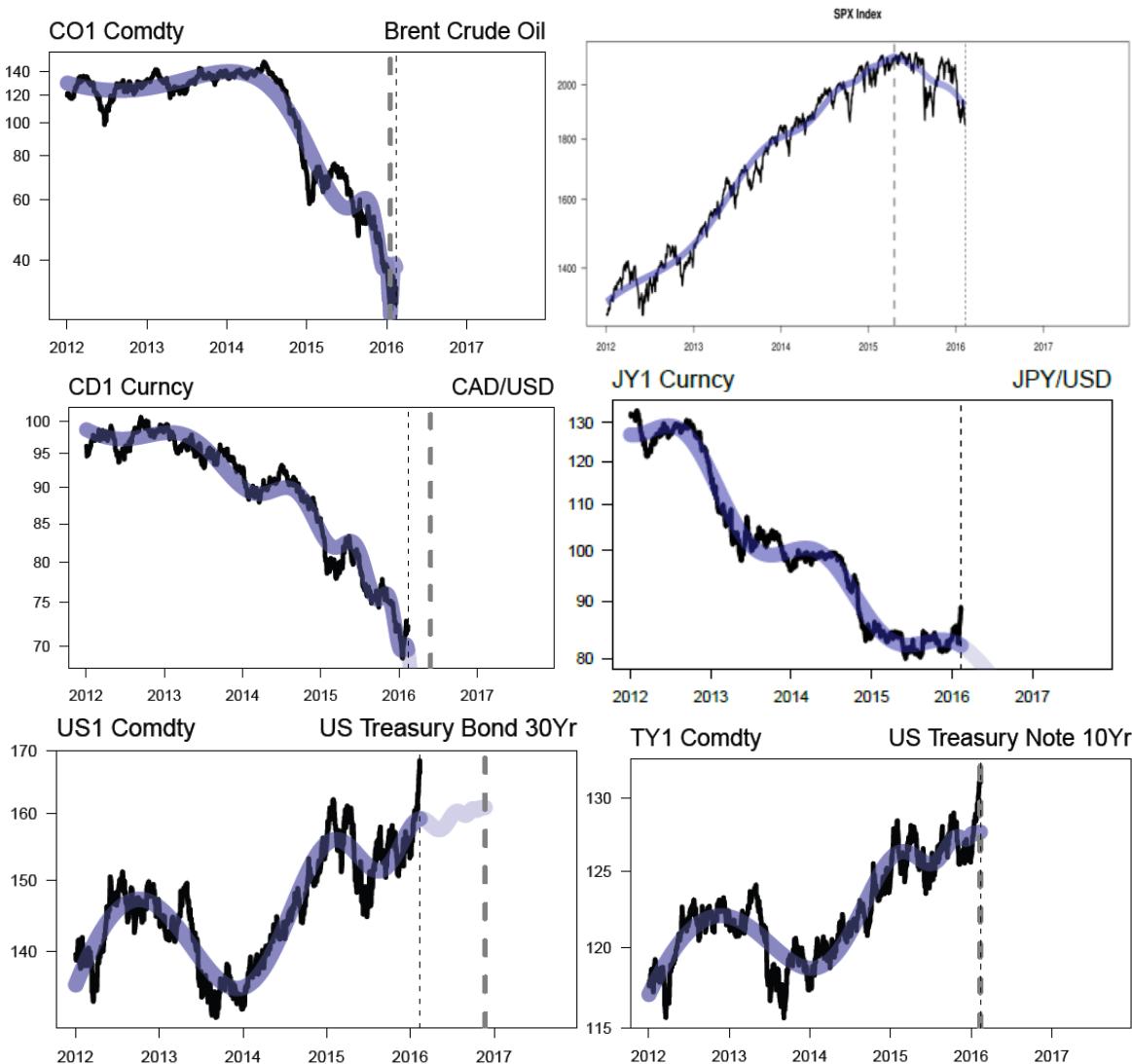
Source: S&amp;P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



## Will there be a regime change in the near future?

Risky assets like oil and equities have all tumbled in the recent sell-off, but it may happen that some of them will soon experience their own regime change according to our Bubble model. With the rebound of the Brent crude oil last week, we see signs that it may have moved to a new regime, and so does the S&P 500. The commodity-linked Canadian dollar may recover soon, while the safe haven currency, the Japanese Yen, seems to keep its downward trend despite the recent strengthening. With the comeback of risk assets together with a positive surprise on the US core CPI last Friday<sup>4</sup>, the upward trends in the US treasuries may end in the near future.

Figure 9: Will there be a regime change in the near future?



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

<sup>4</sup> US core CPI has climbed 0.3% in January, where the survey expected a 0.2% rise.



Our regular readers should be able to find their preferred charts in the subsequent sections of this report. We have made some efforts to improve some of them, notably in the section related to our risk aversion proxies. We have also added cross asset futures to the series analyzed by the "bubble model".

Furthermore, we have made some adjustments to the sections devoted to equity markets. The new color palettes will do little to reinforce the obvious. Investor sentiment has deteriorated, and market participants across Asia have been looking at reversal patterns. Looking at fundamental factors, we do not think that investors have yet found valuation levels reasonable enough to step in. Yes, value factors have performed better last week, but this is more a case of expensive / popular stocks being sold.

As always, we look forward to your insightful comments.

We wish you a prosperous year of the Monkey!

Yours sincerely,

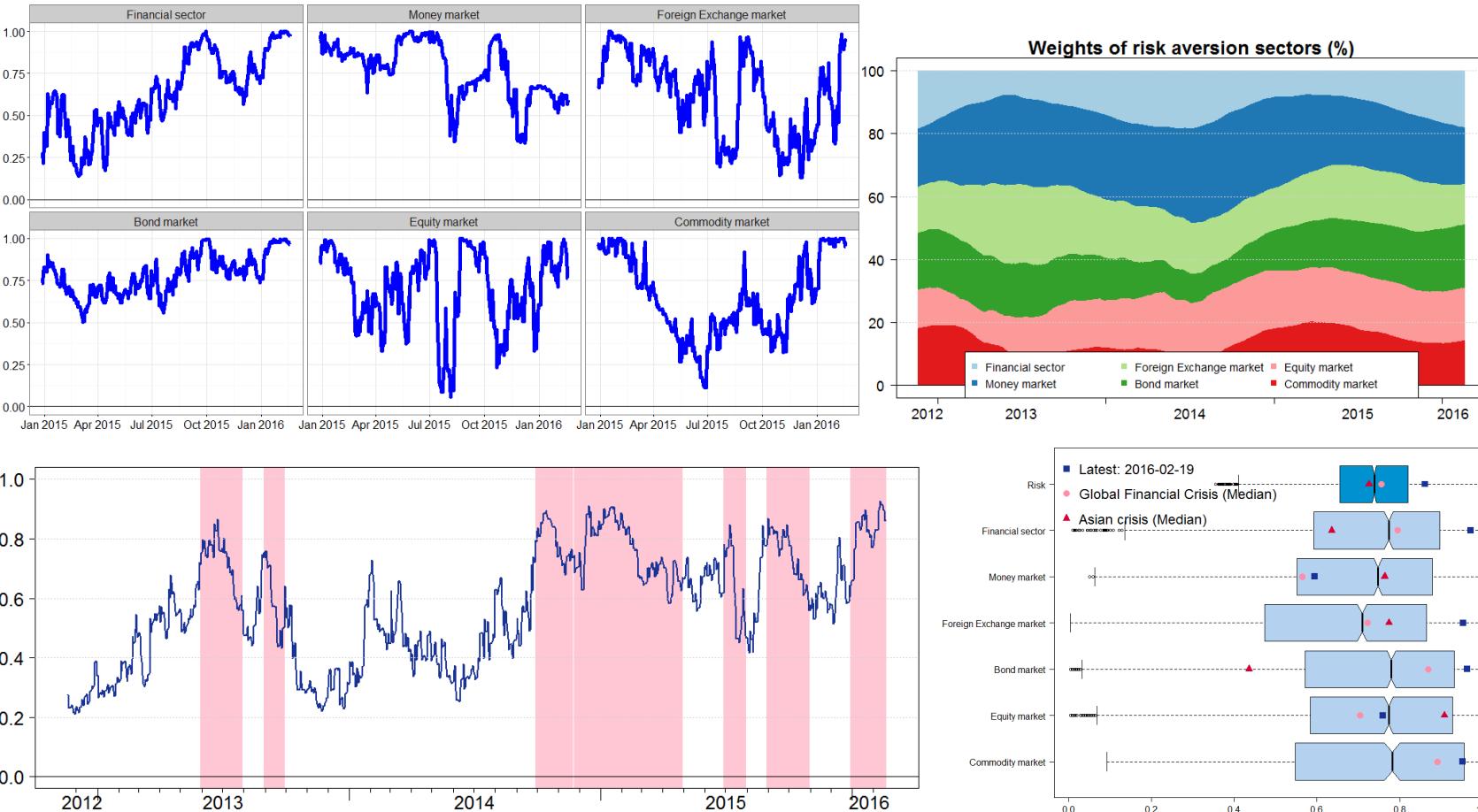
Ada, Hemant, Khoi & Vincent

**Deutsche Bank Asia Quantitative Strategy Team**

# Quantifying markets

## Risk aversion

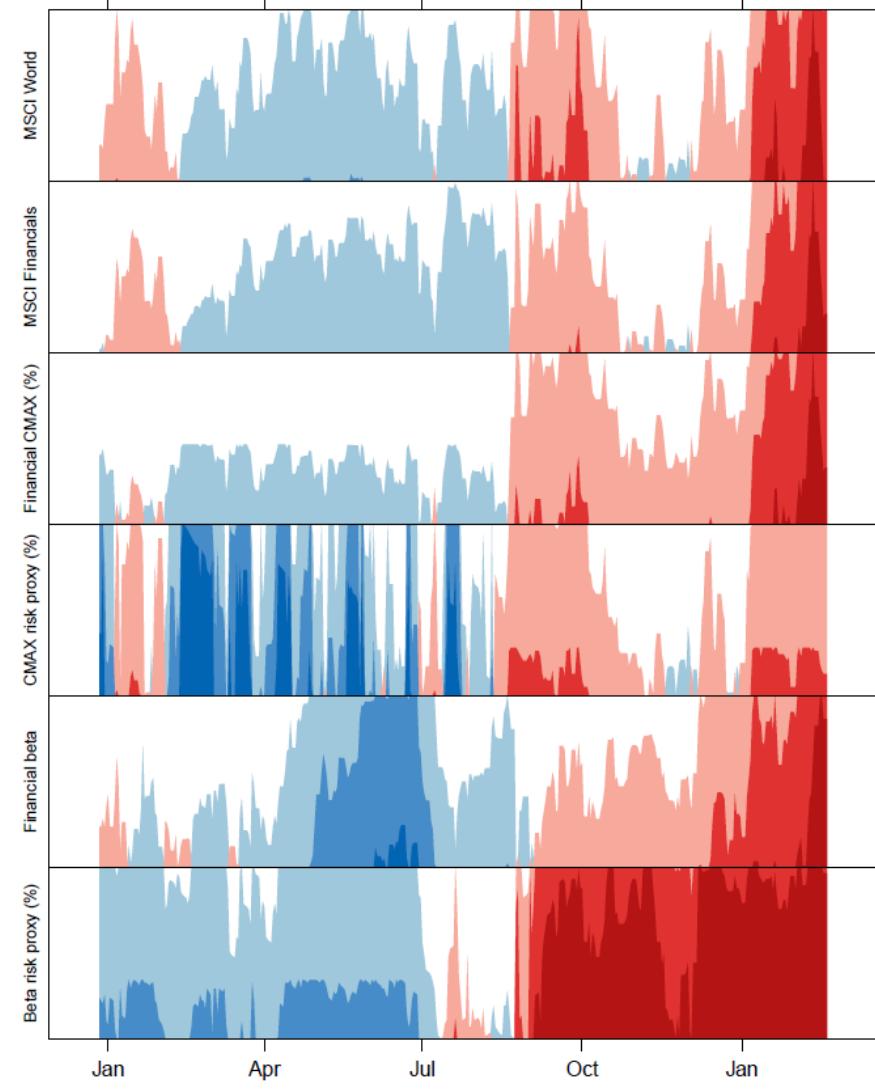
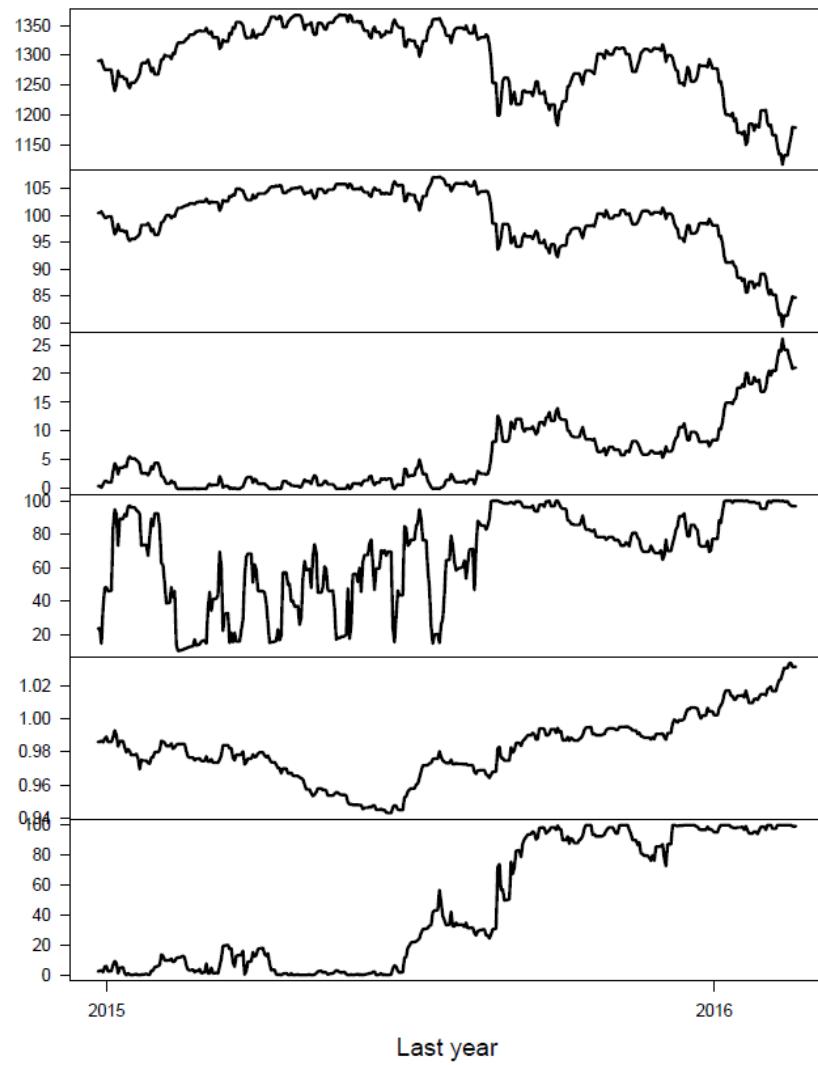
Figure 10: 1) Our global risk indicator has been elevated to an extremely high level (86-th percentile) since the beginning of February. 2). Almost all of the sectors (except the Money Market) are in a highly risk-off condition, where the indicators are all higher than the ones observed during the GFC and the Asian crisis. 3). The Foreign Exchange Market has experienced the sharpest increase in risk. (as of 2016-02-19)



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



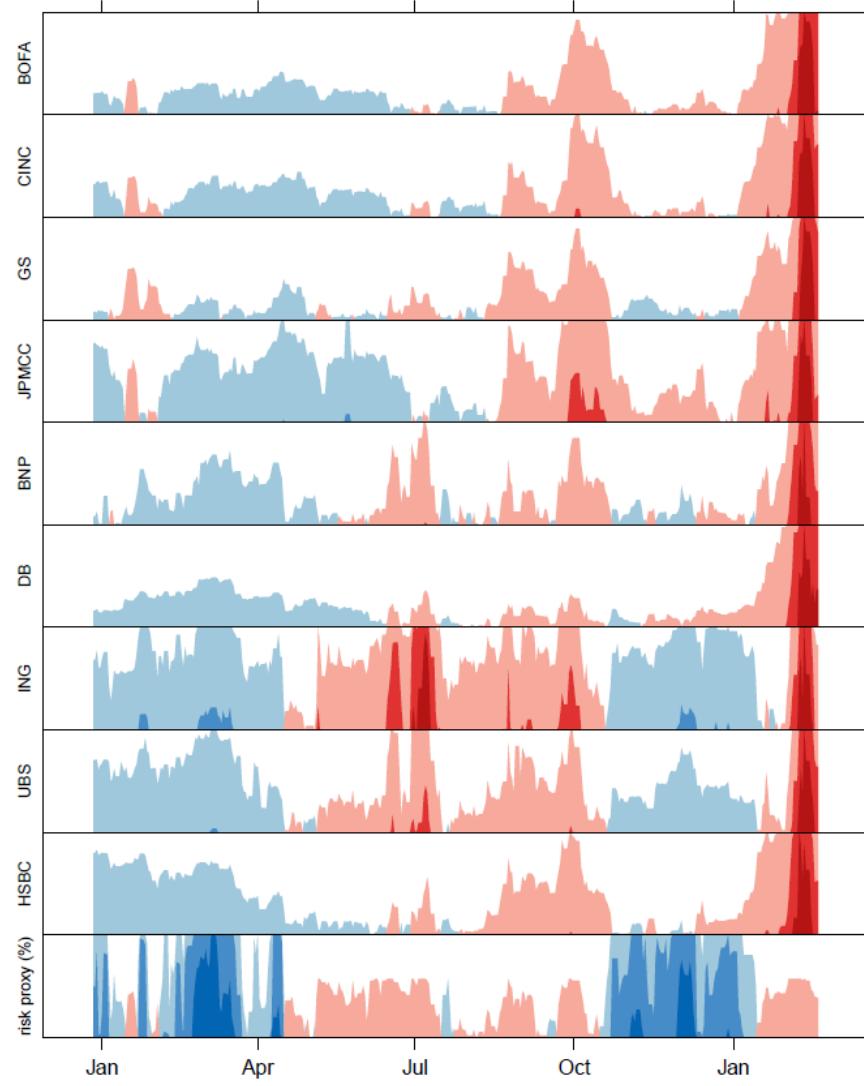
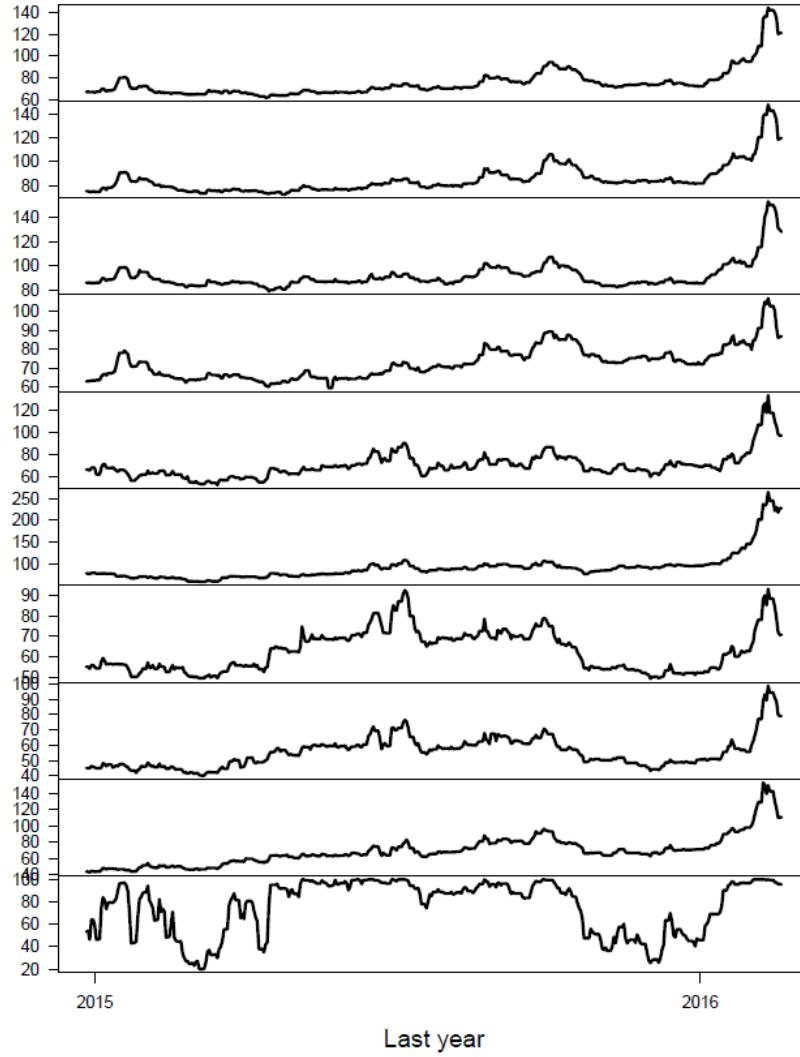
Figure 11: Both MSCI World and MSCI Financials have dropped significantly since the beginning of 2016, and Financial beta has continued to increase. Poor performance in the Financial sector leads to an increase in the Financial CMAX. The plot on the right hand side highlights the movement of the time series on the left hand side, where red (blue) indicates that the level is higher (lower) from the median over the past year.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



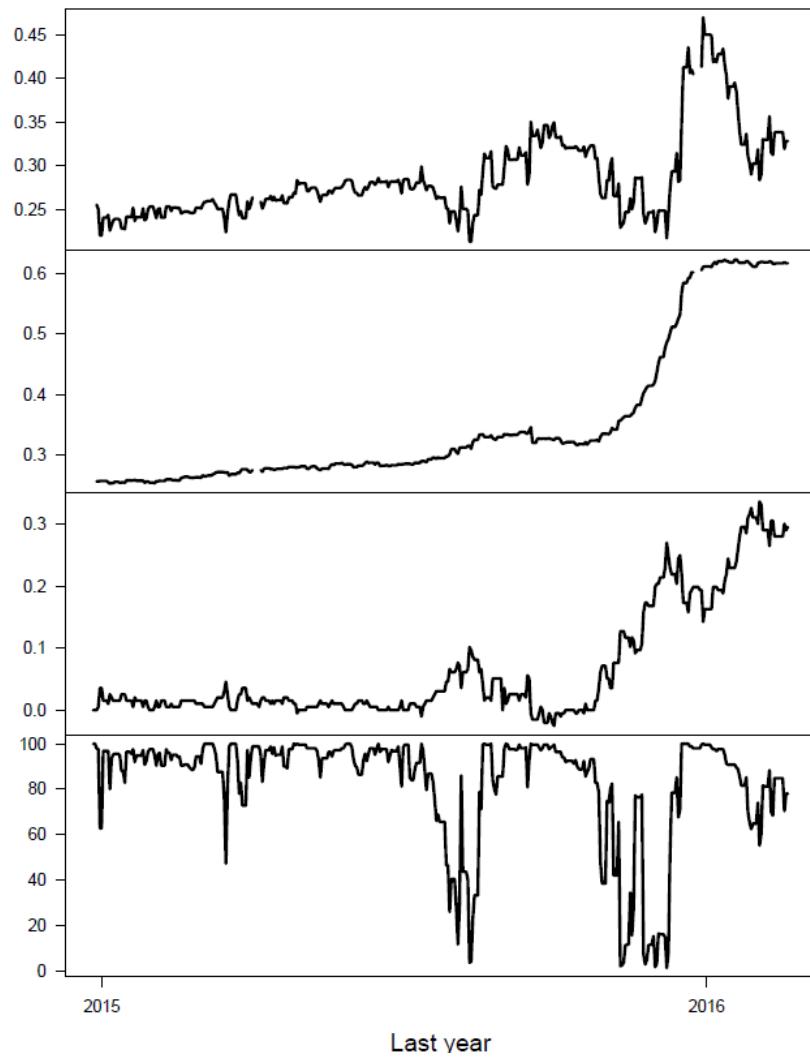
Figure 12: The CDS of global banks have all elevated to recent highs, although they have slightly dropped since last Friday after a rebound in banks. The plot on the right hand side highlights the movement of the time series on the left hand side, where red (blue) indicates that the level is higher (lower) from the median over the past year



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 13: With the rate hike announced in last December, both the 3M Libor and US 3M T-bills rates have increased. Nevertheless, the TED spread has dropped slightly from its recent peak in December, due to an increase in US T-bills. The plot on the right hand side highlights the movement of the time series on the left hand side, where red (blue) indicates that the level is higher (lower) from the median over the past year



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

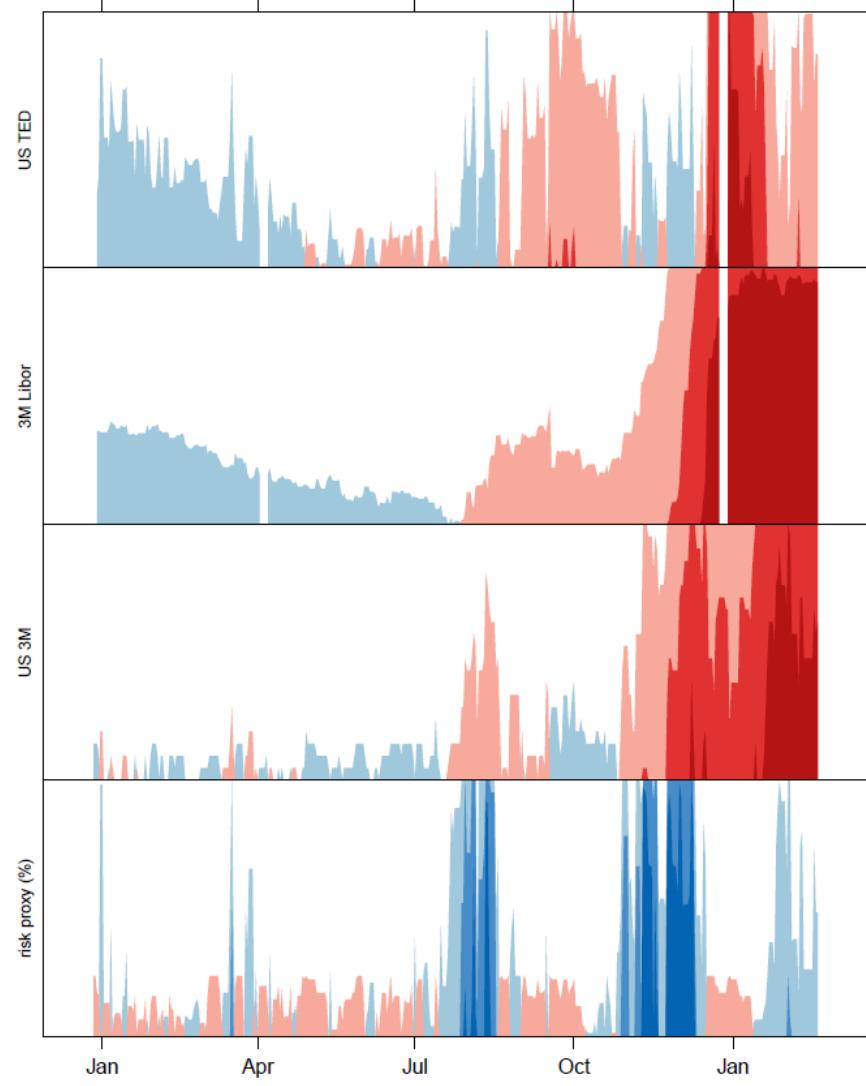
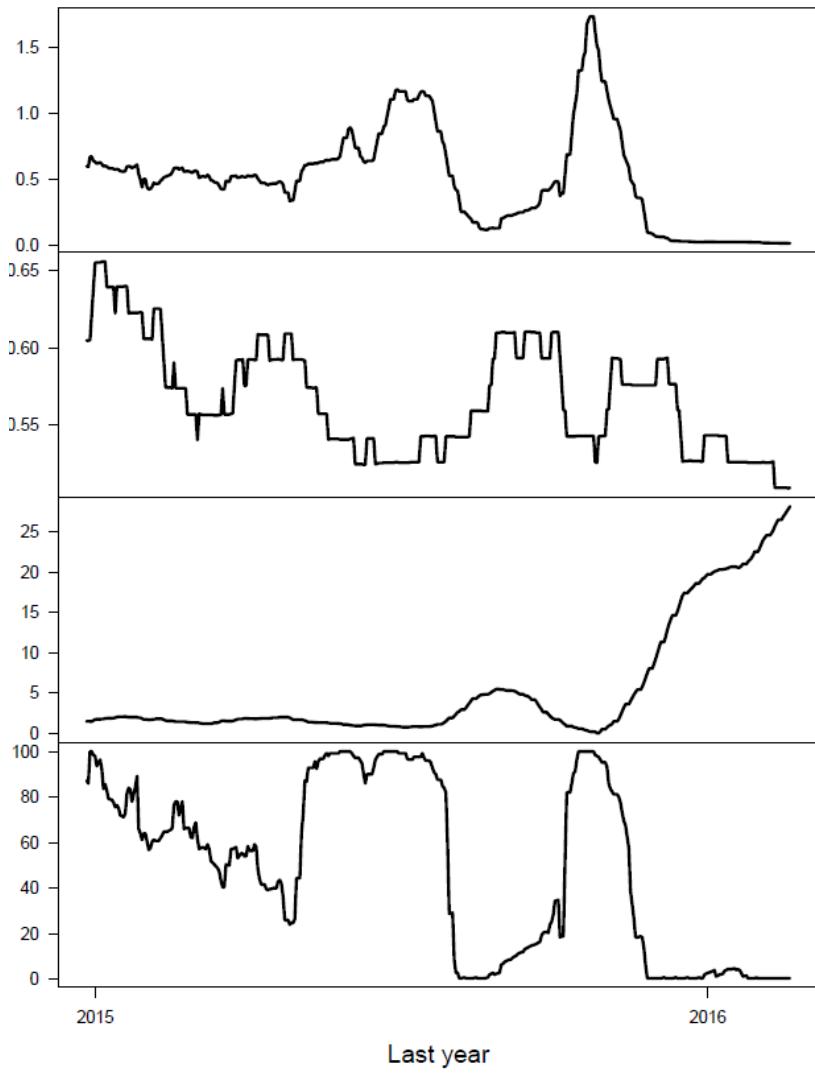


Figure 14: The bid-ask spread of US T-bills has remained tight, since it is scaled by the increasing mid price whilst the actual spread has not changed much. The plot on the right hand side highlights the movement of the time series on the left hand side, where red (blue) indicates that the level is higher (lower) from the median over the past year



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

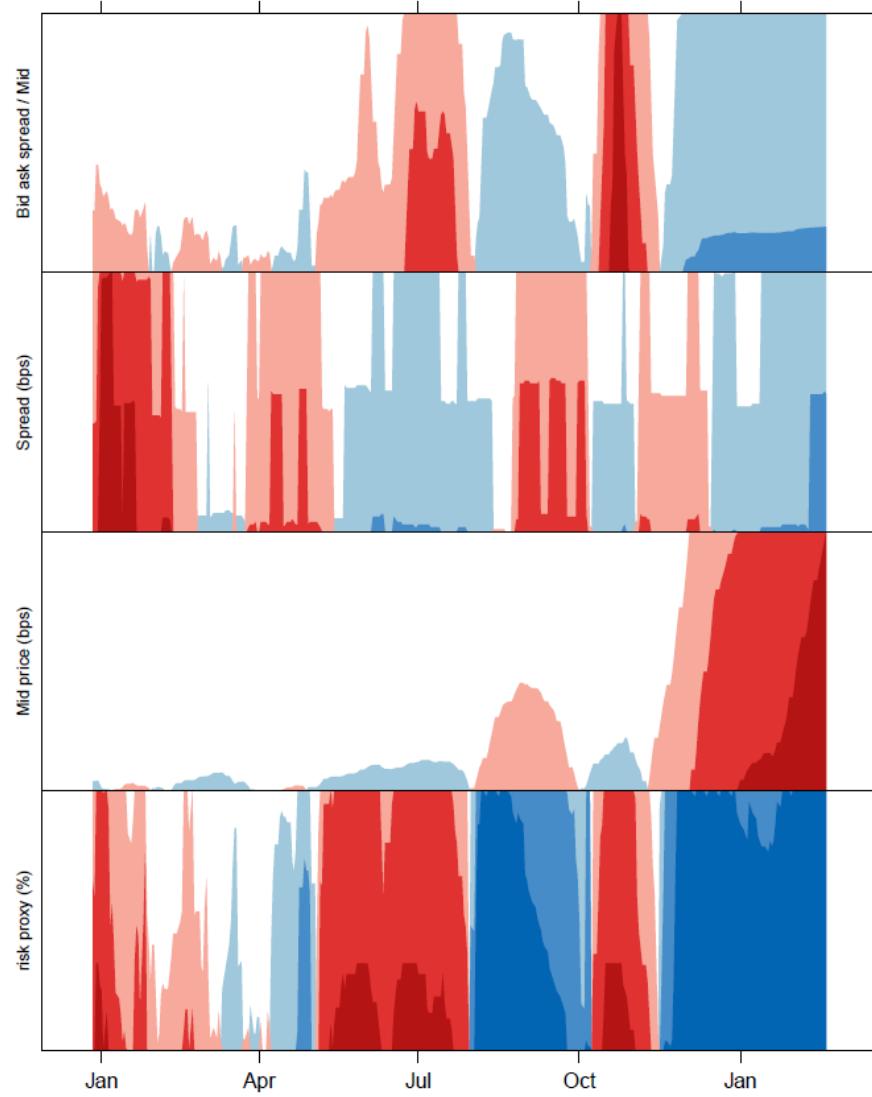
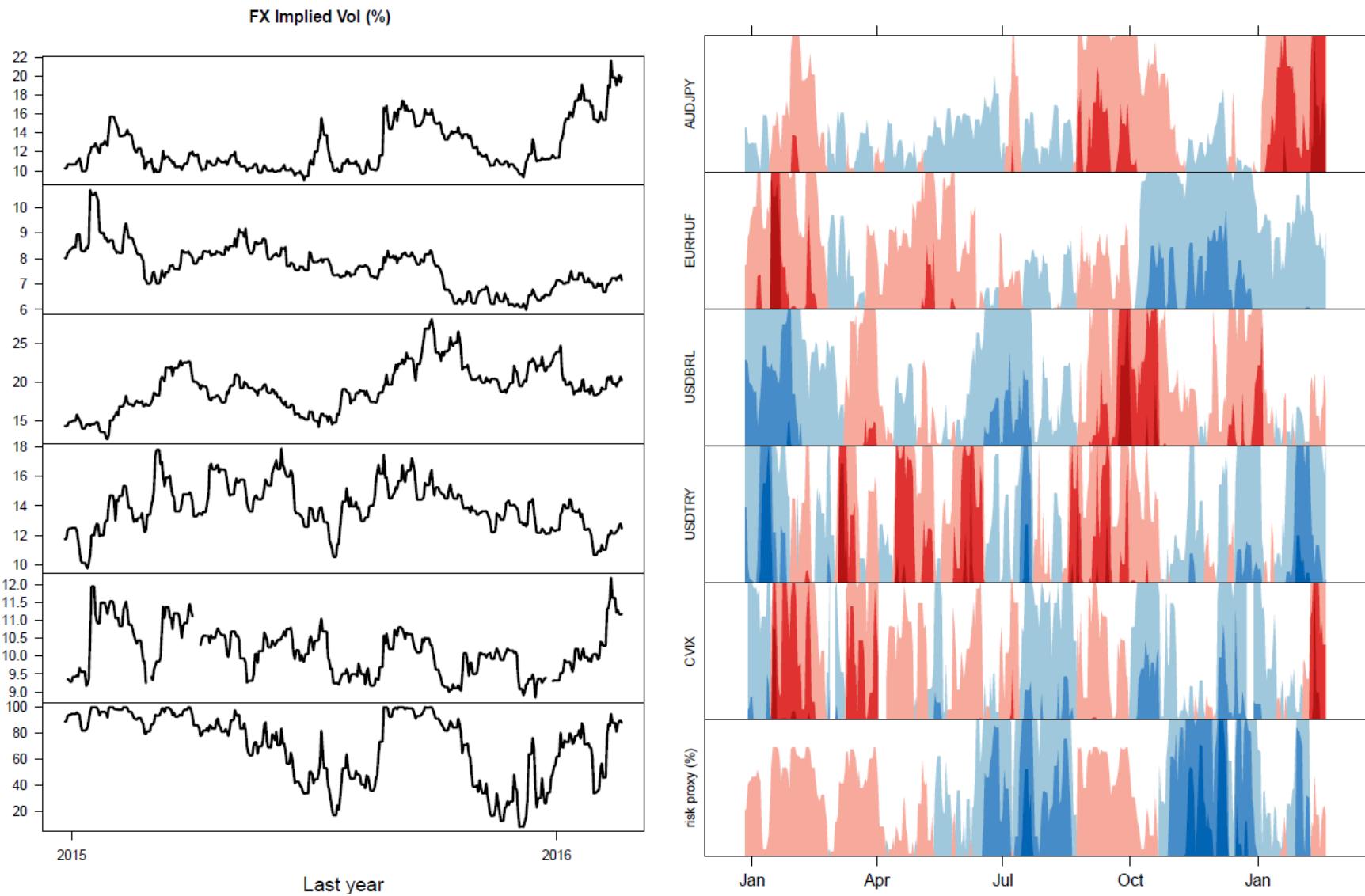


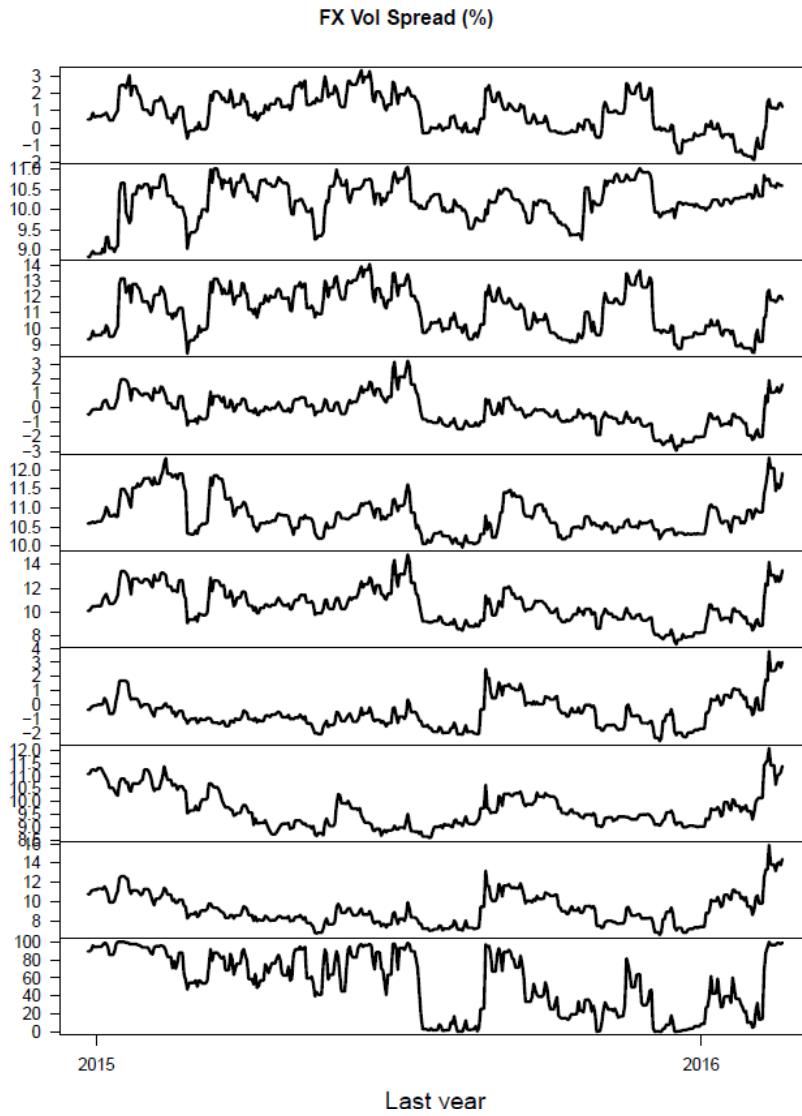
Figure 15: Implied volatility has recently spiked, with the CVIX over 11%. A major driver is the implied volatility of AUD/JPY, which has markedly increased from 10% in late November to over 18% recently. The plot on the right hand side highlights the movement of the time series on the left hand side, where red (blue) indicates that the level is higher (lower) from the median over the past year



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 16: Volatility spread (i.e. 1 month implied volatility over 1 year implied volatility) has moved to positive for all pairs: EUR/USD, EUR/JPY and USD/JPY, which is driven by the spike in the 1 month volatility during risk-off episodes. The plot on the right highlights the movement of the time series on the left, where red (blue) indicates that the level is higher (lower) from the median over the past year.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

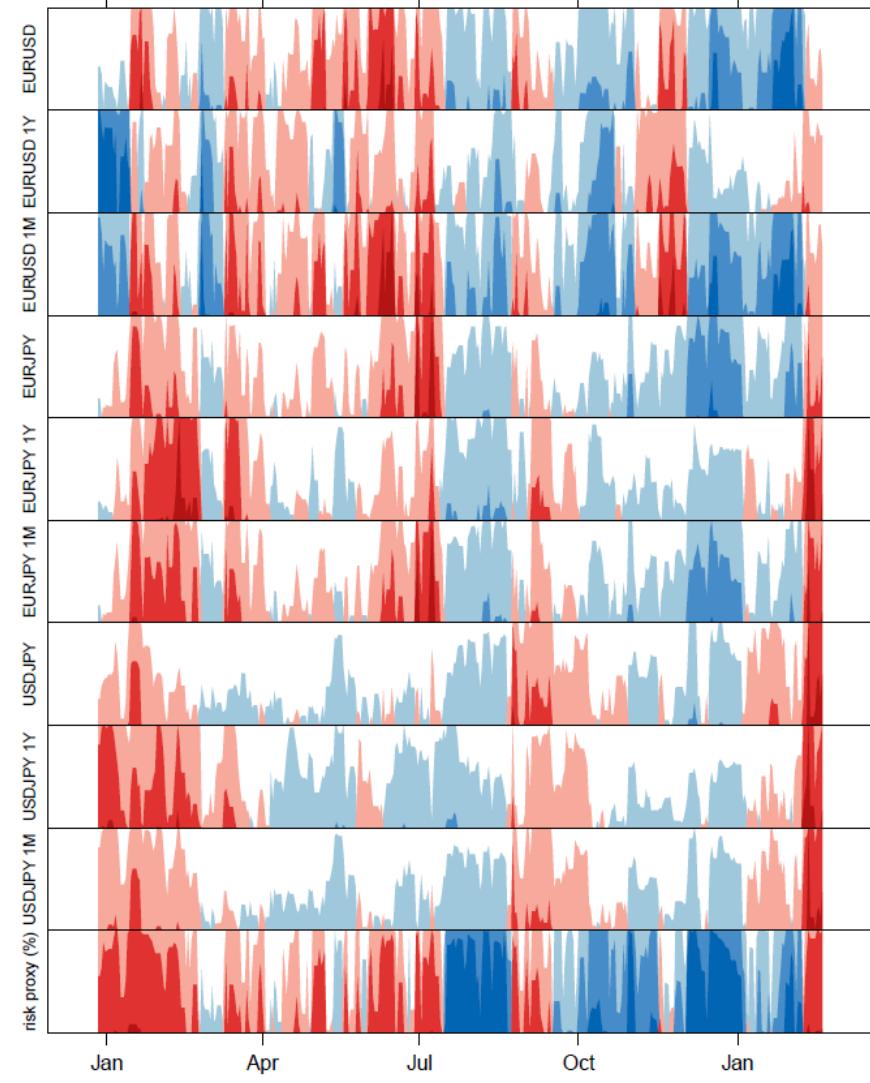
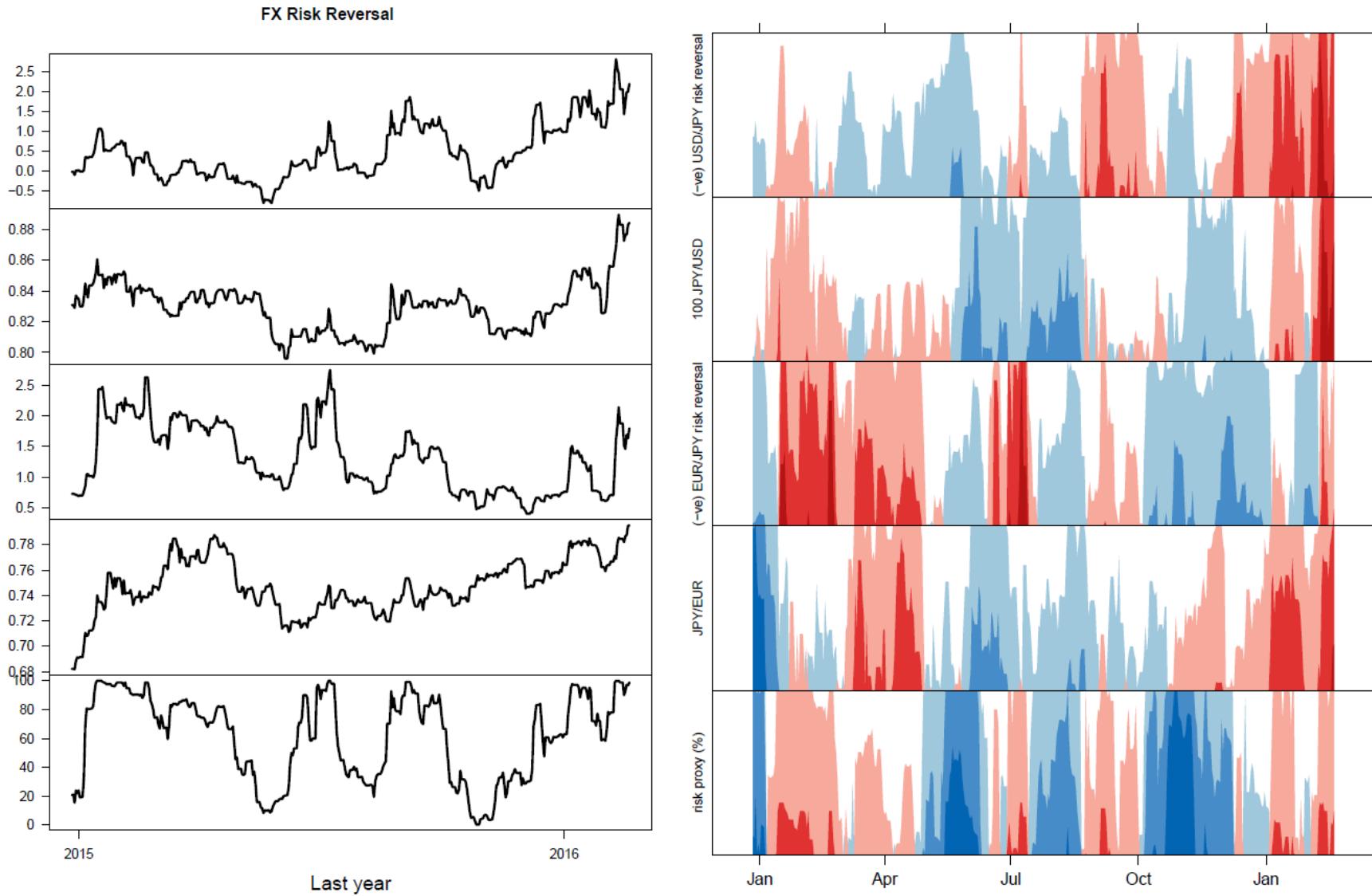


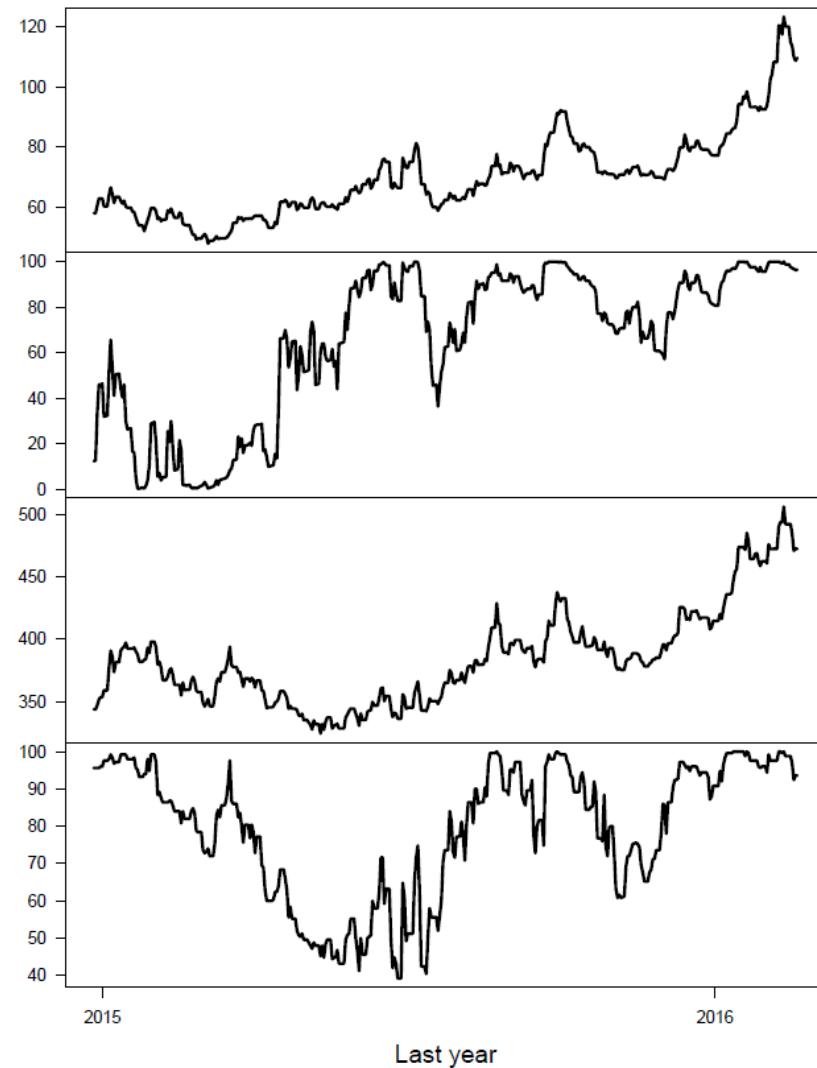
Figure 17: The Japanese Yen, being a safe haven currency, has appreciated significantly against the Dollar and the Euro. Risk reversals (i.e. the difference between implied volatility of put option over call option) in both USD/JPY and EUR/JPY indicate the preference for the Japanese Yen. The plot on the RHS highlight the movement of the time series on the left, where red (blue) indicates that the level is higher (lower) from the median over the past year.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 18: In the bond market, investable grade CDS tracked by Itraxx IG has surged to 120bps recently but dropped slightly last week. It stood below 60bps a year ago. Emerging market risk is also rising. The plot on the right highlights the movement of the time series on the left, where red (blue) indicates that the level is higher (lower) from the median over the past year.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

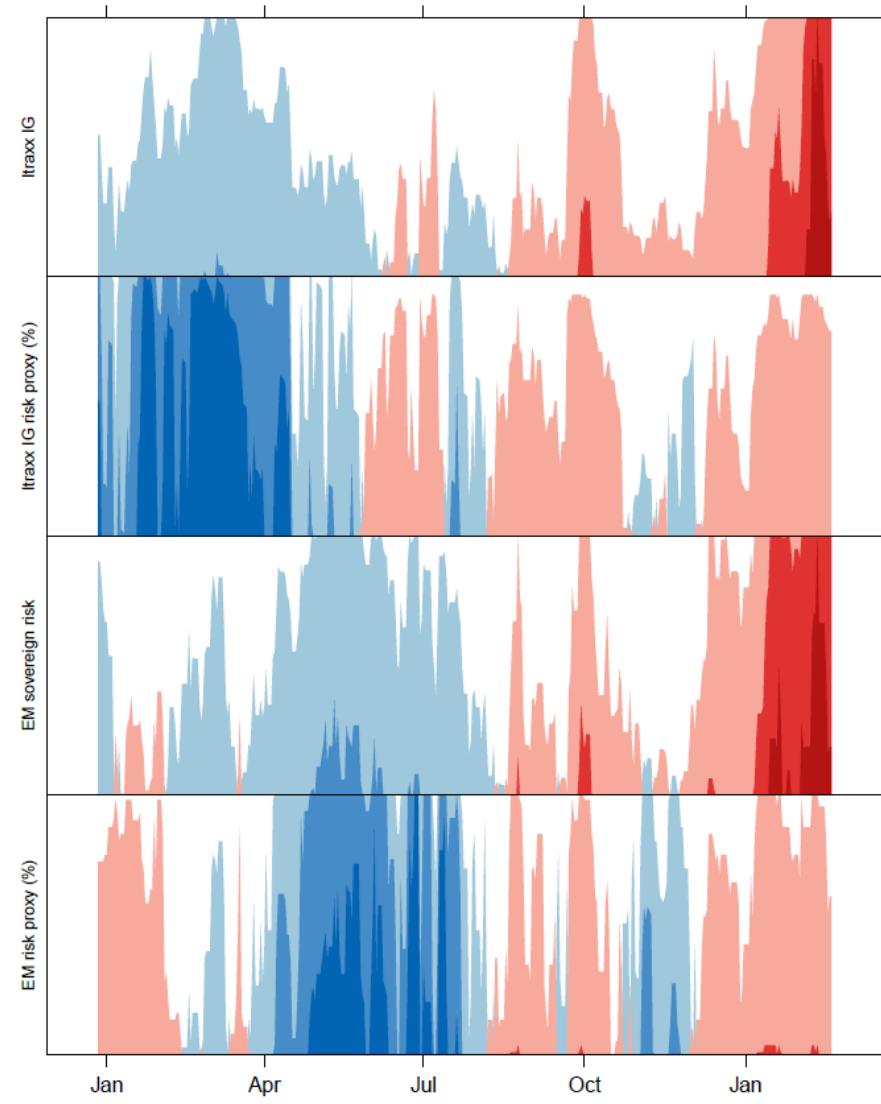
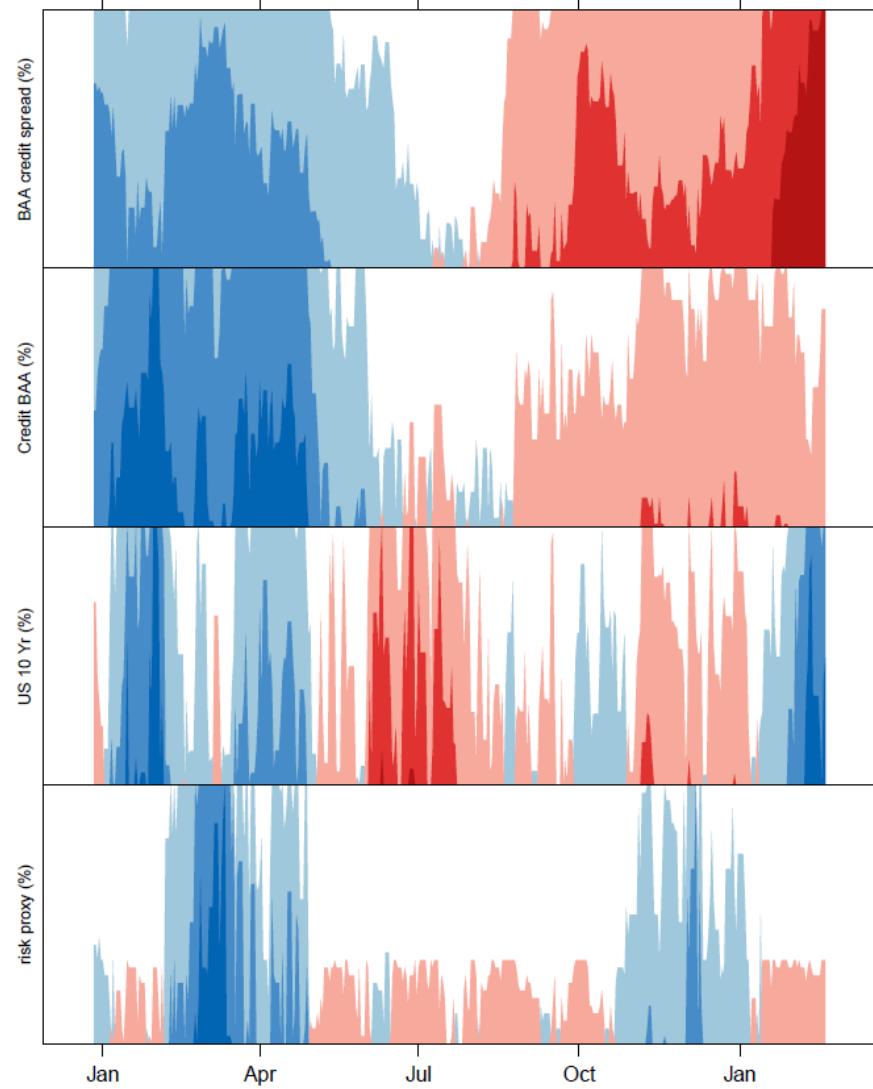
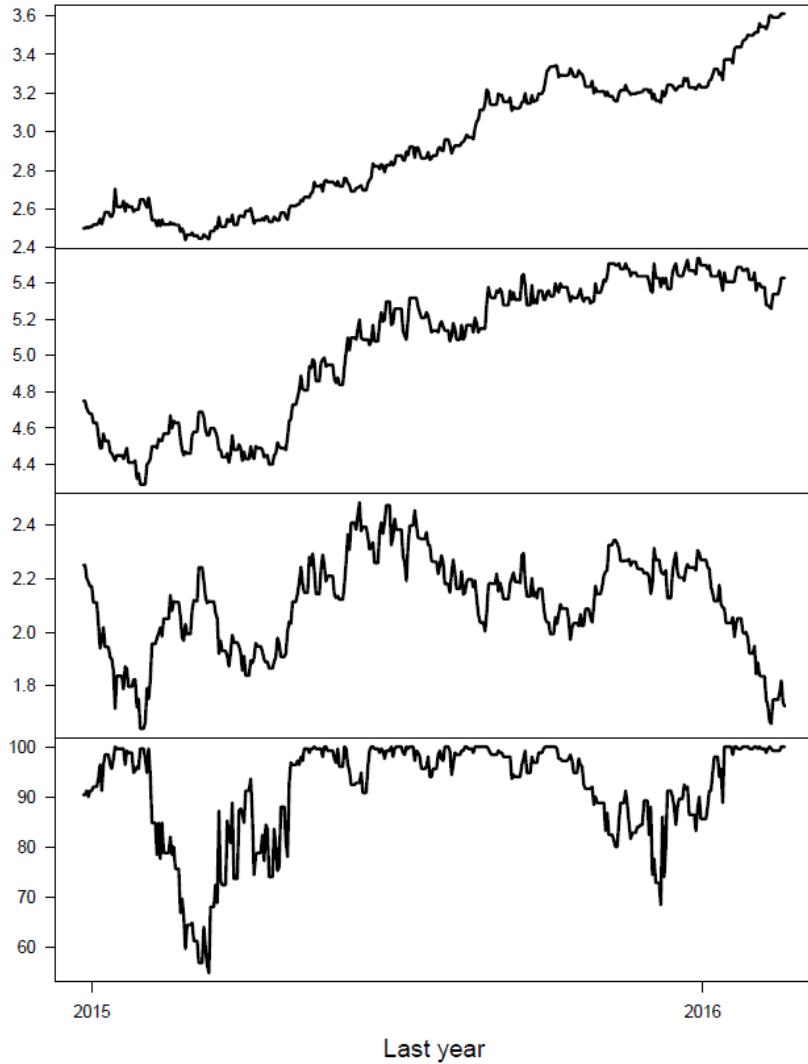


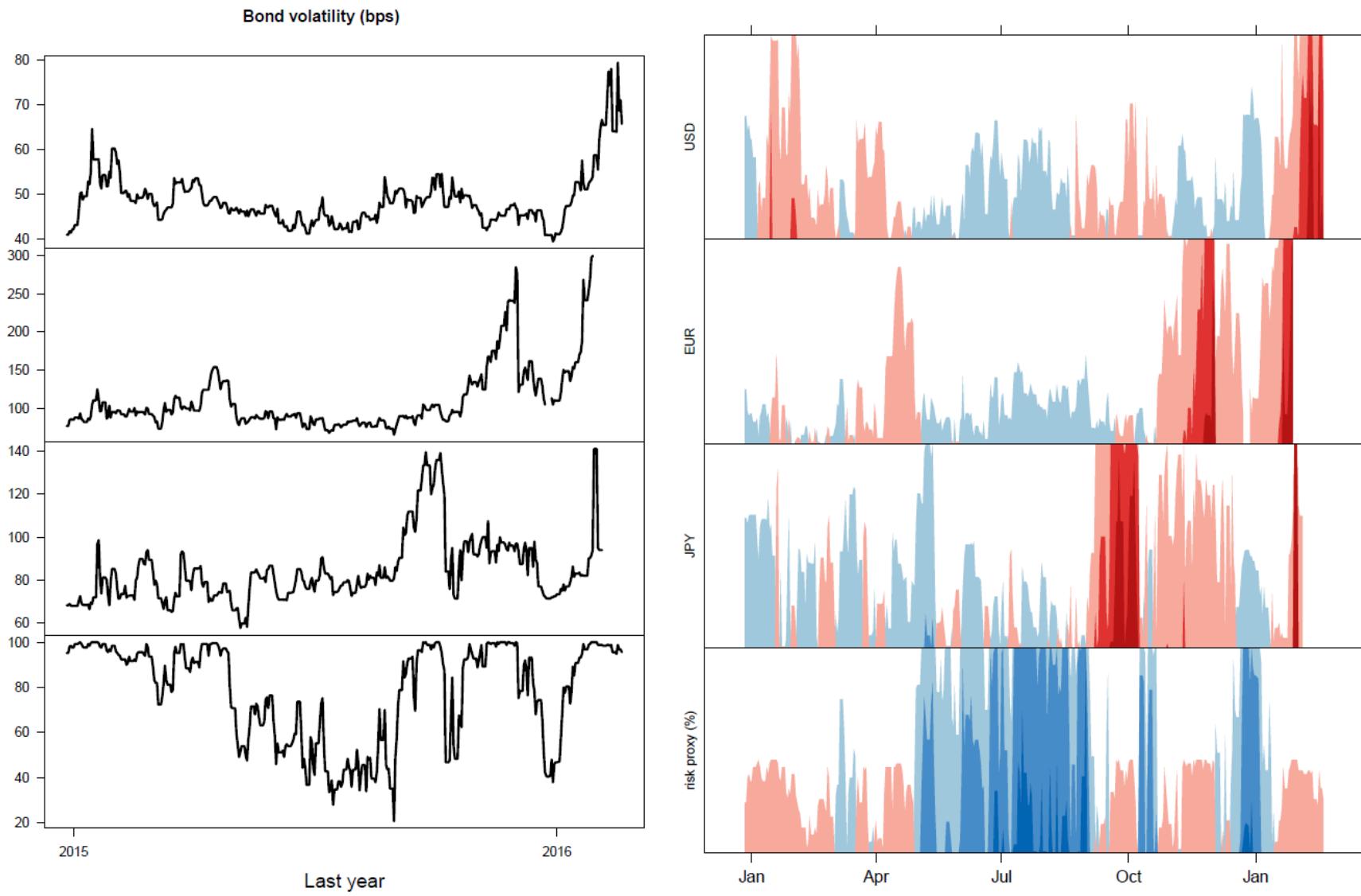
Figure 19: The US 10-year bond yield has decreased sharply to a 1-year low as investors flocked to safe haven assets. Whilst the yield of BAA bonds remains relatively stable, we observe a significant increase in the BAA credit spread. The plot on the right highlights the movement of the time series on the left, where red (blue) indicates that the level is higher (lower) from the median over the past year.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



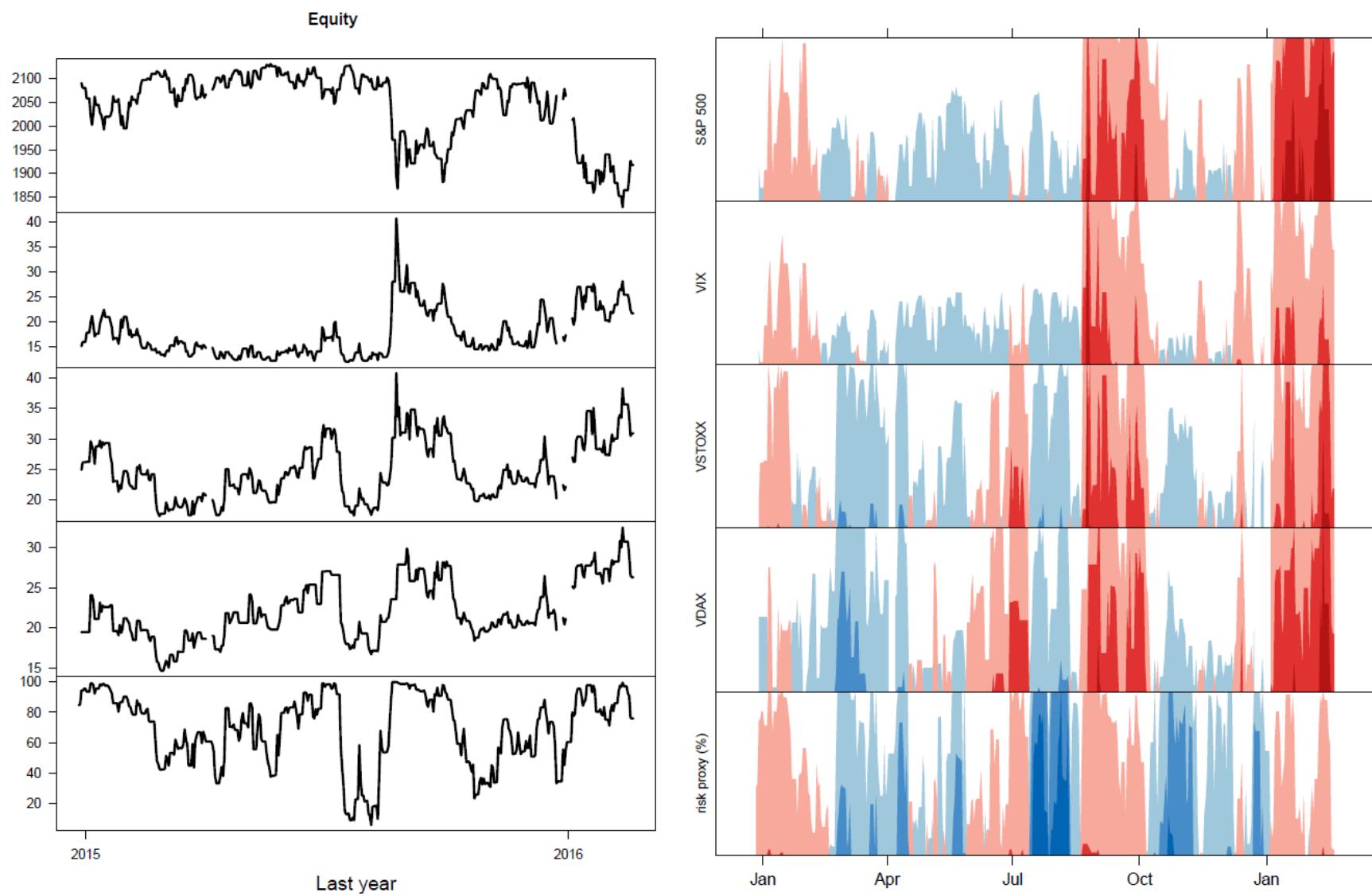
Figure 20: USD and EUR bond volatilities have increased sharply since the beginning of 2016. The plot on the right highlights the movement of the time series on the left, where red (blue) indicates that the level is higher (lower) from the median over the past year.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



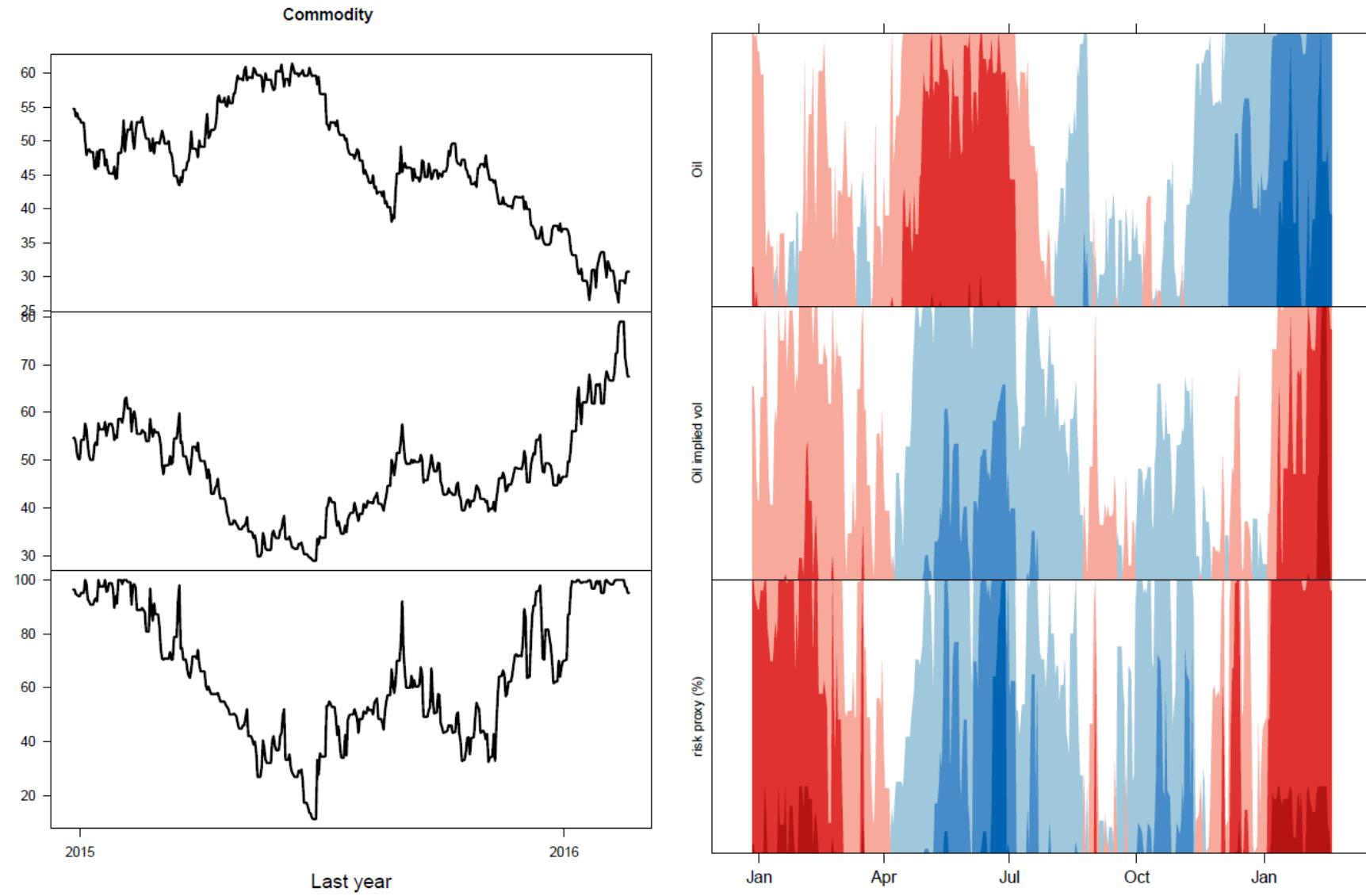
Figure 21: The U.S. market has been performing poorly recently, although it experienced a rebound last week. The fear indices VIX, VSTOXX and VDAX have all moved to recent highs, but dropped slightly amid the market rebound. The plot on the right highlights the movement of the time series on the left, where red (blue) indicates that the level is higher (lower) from the median over the past year.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 22: Oil price has been dropping steadily since October last year, and has recently been fluctuating around 30 U.S. dollars. Implied volatility has now escalated to about 70%. The plot on the right highlights the movement of the time series on the left, where red (blue) indicates that the level is higher (lower) from the median over the past year.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy





## Investor sentiment

Figure 23: 1) The overall sentiment in Asia Pacific remains bearish, mainly due to a significant drop in the market, a decrease in the proportion of overbought stocks, a decrease in both liquidity and variety, together with a significant outflow of foreign funds since June.

2) The sentiment on A-shares has deteriorated and is recently below historical average, mainly driven by a large decrease in the proportion of overbought stocks, lower variety and drying up of liquidity.

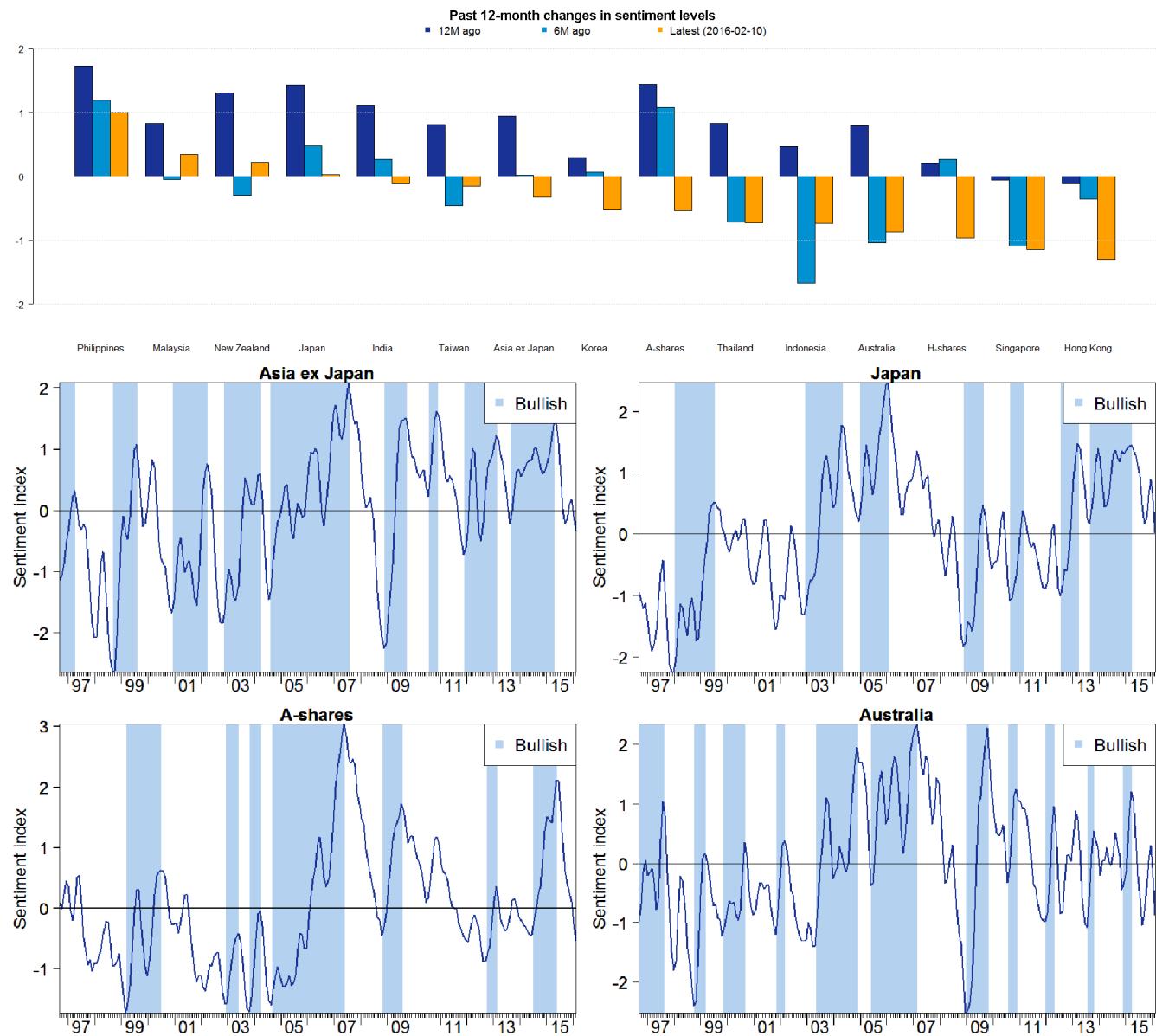


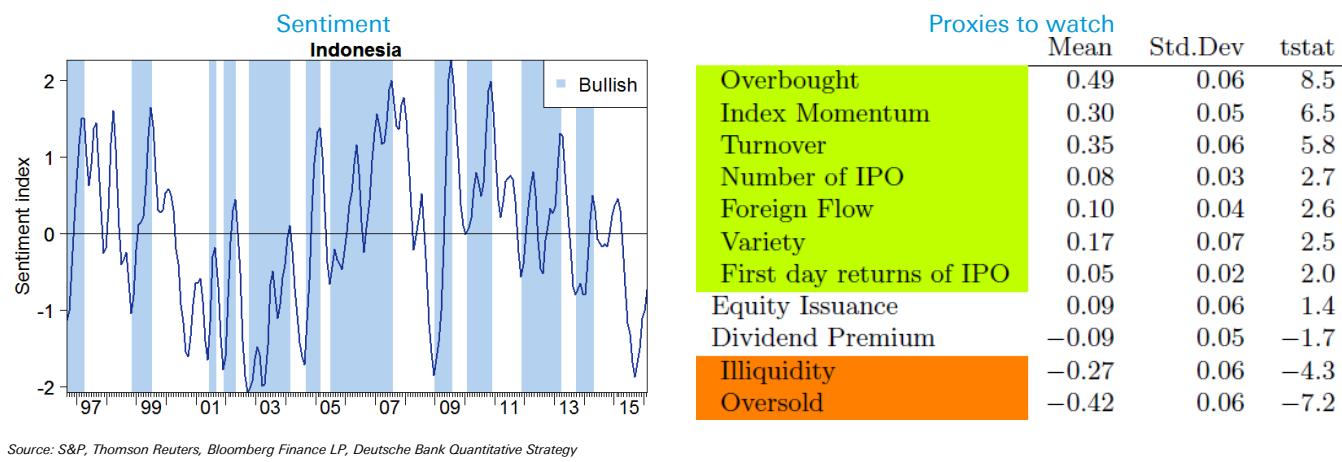


Figure 24: Drivers of Investor Sentiment in the China A market



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

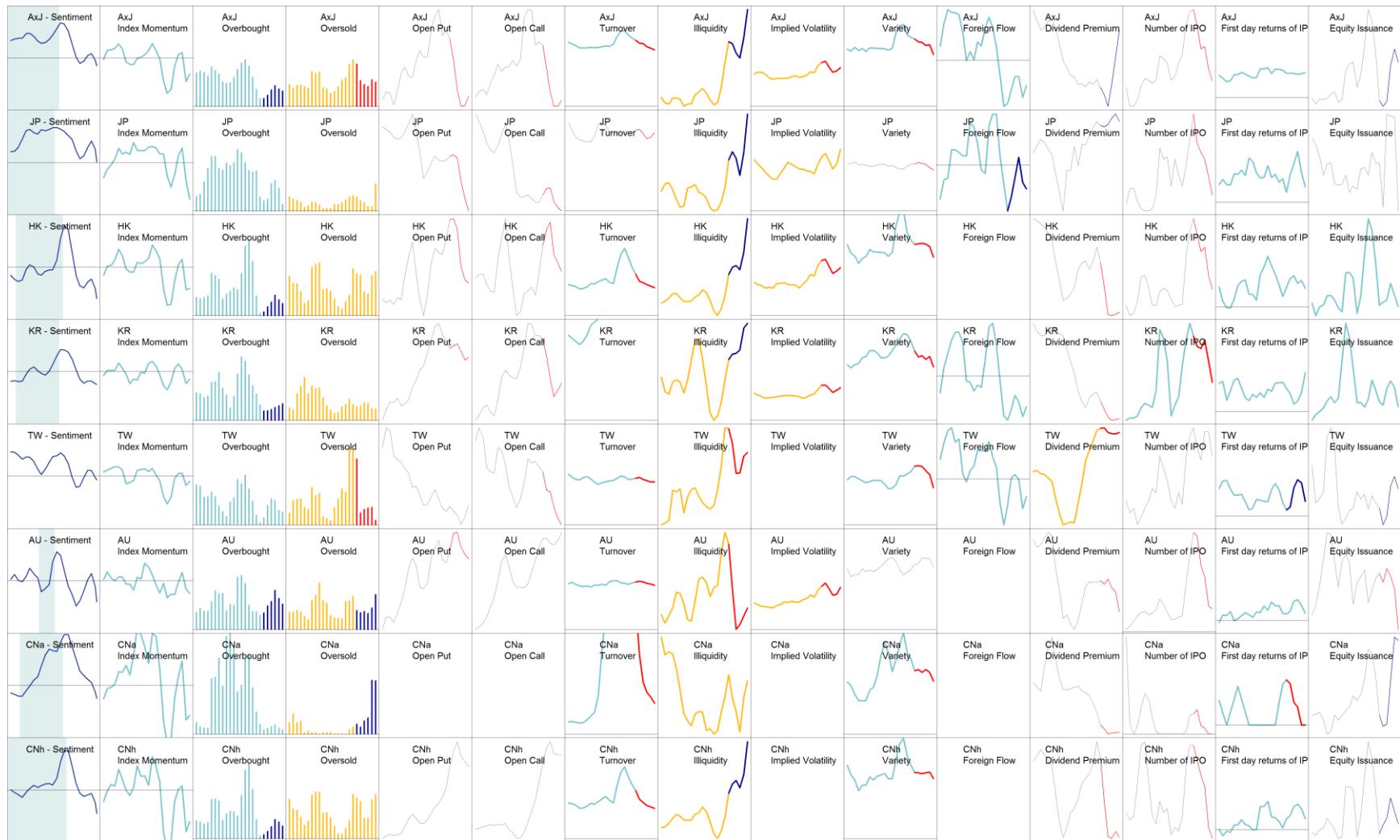
Figure 25: Drivers of Investor Sentiment in Indonesia



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

Figure 26: Sentiment and proxies over the past 2 years (1)

The overall sentiment in Asia Pacific remains bearish, mainly due to a significant drop in the market, a decrease in the proportion of overbought stocks, a decrease in both liquidity and variety, together with a significant outflow of foreign funds since June. (Key proxies are highlighted in sharper lines)

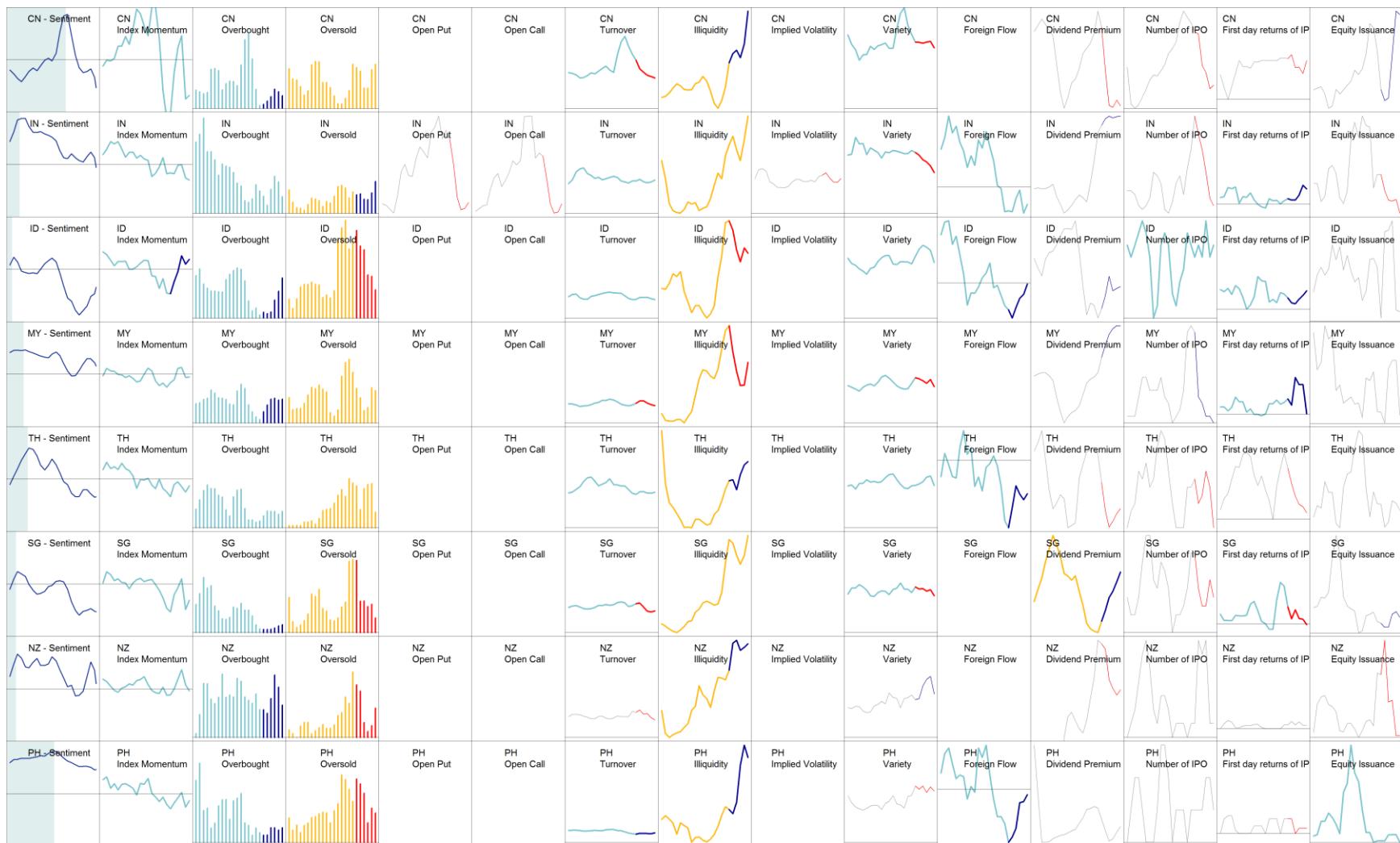


Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 27: Sentiment and proxies over the past 2 years (2)

Sentiment in India is dropping as driven by negative index momentum, an increasing proportion of stocks oversold, as well as a decrease in variety.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 28: Sentiment and proxies since 1996 (1)

Investor sentiment in Asia ex Japan can be monitored using index momentum, the proportion of stocks overbought/oversold, turnover, liquidity, implied volatility, variety, foreign investor flows and the first day returns of IPO

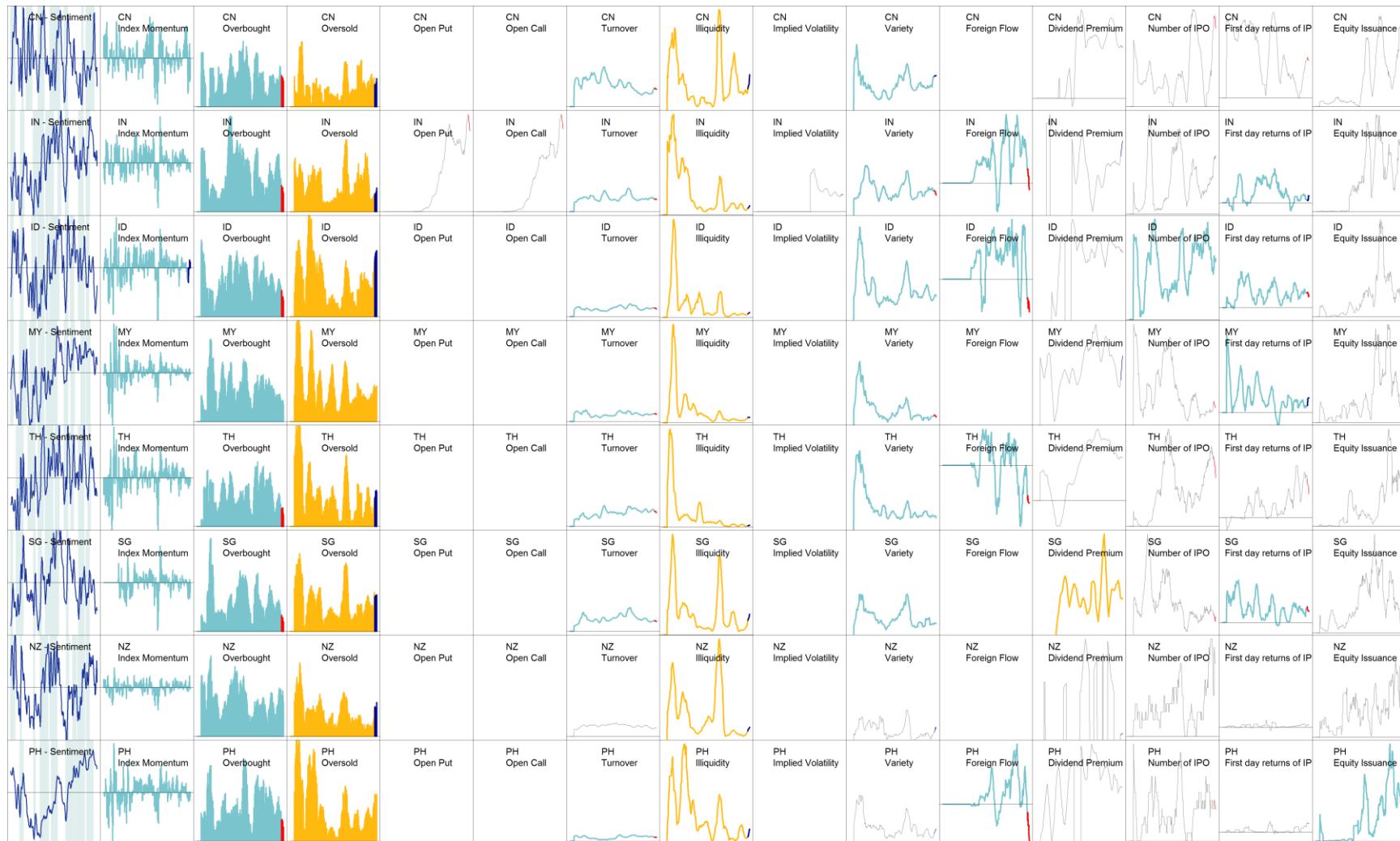


Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 29: Sentiment and proxies since 1996 (2)

In India we can monitor investor sentiment using index momentum, the proportion of stocks overbought/oversold, turnover, liquidity, variety, and the first day returns of IPOs.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



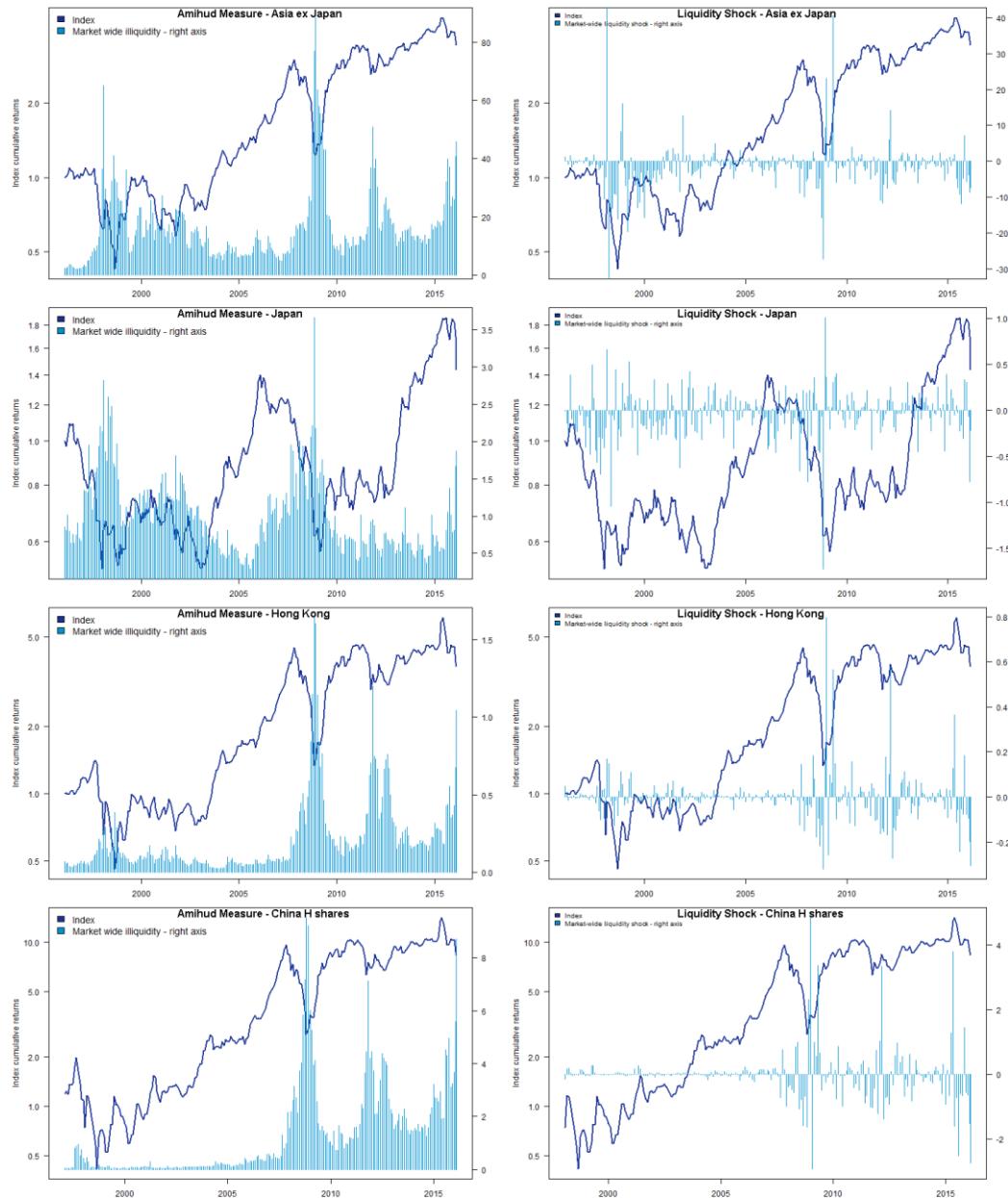


## Liquidity

We monitor liquidity using the Amihud measure (i.e. a price impact proxy), turnover, value traded; and liquidity risk using market wide illiquidity shocks<sup>5</sup>.

**Figure 30: Liquidity levels in Pan Asia (as of 2016-02-12)**

Liquidity has decreased in both Asia ex Japan and Japan, as seen from the increasing price impact over the past year. There have been positive spikes in the Amihud measure in the past few months amid the Global market sell-off. Most markets have recently experienced a series of negative liquidity shocks, i.e. an unexpected decrease in liquidity.

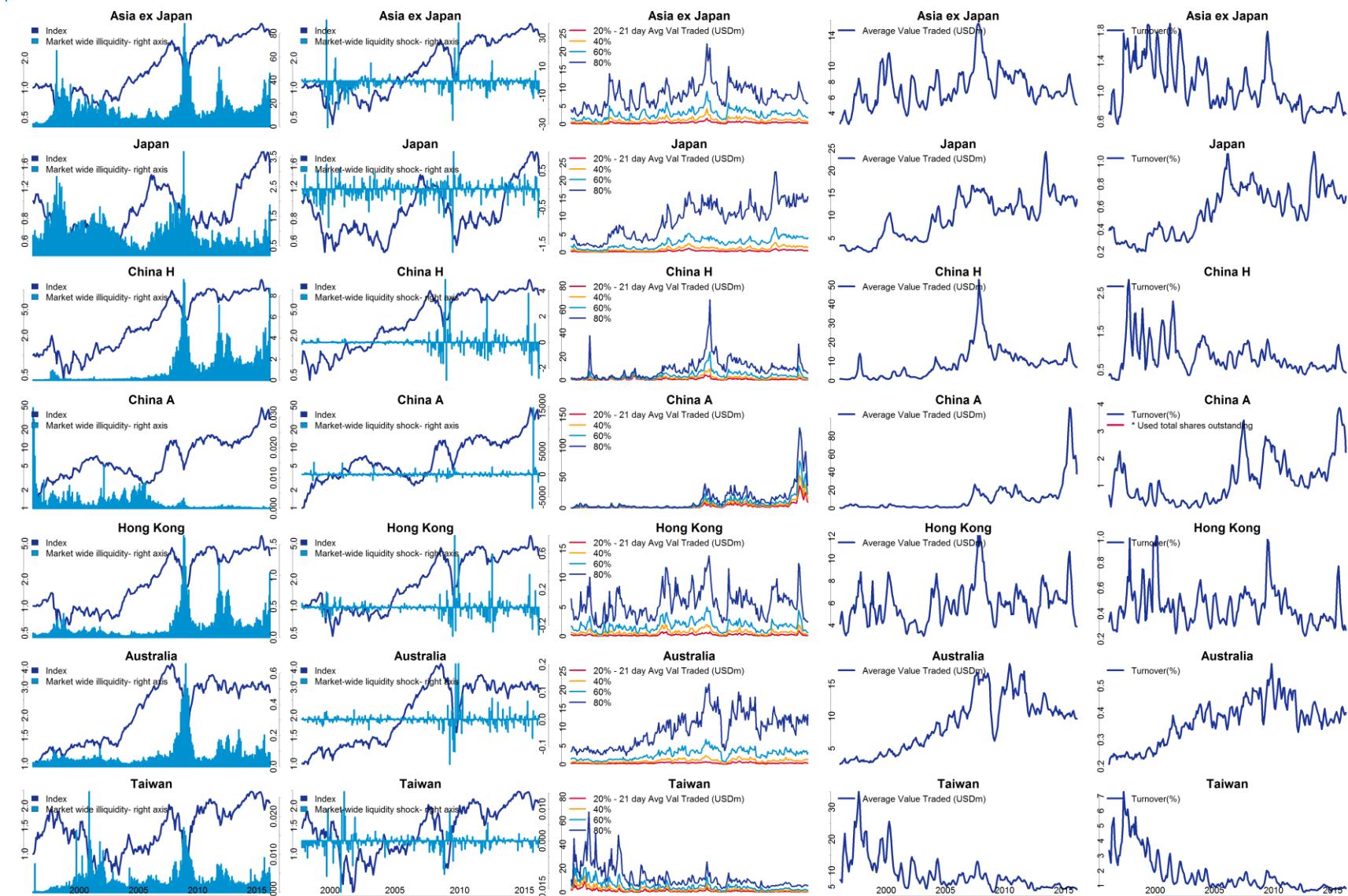


Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

<sup>5</sup>LeBinh et al, "Liquid Liquid", Deutsche Bank Quantitative Strategy, 05 June 2012

Figure 31: Liquidity and Liquidity Risk (1)

Overall value traded and turnover in Asia ex-Japan have decreased significantly. In particular, the Chinese markets (either Hong Kong, China A or China H) all experienced a remarkable dry up in liquidity.

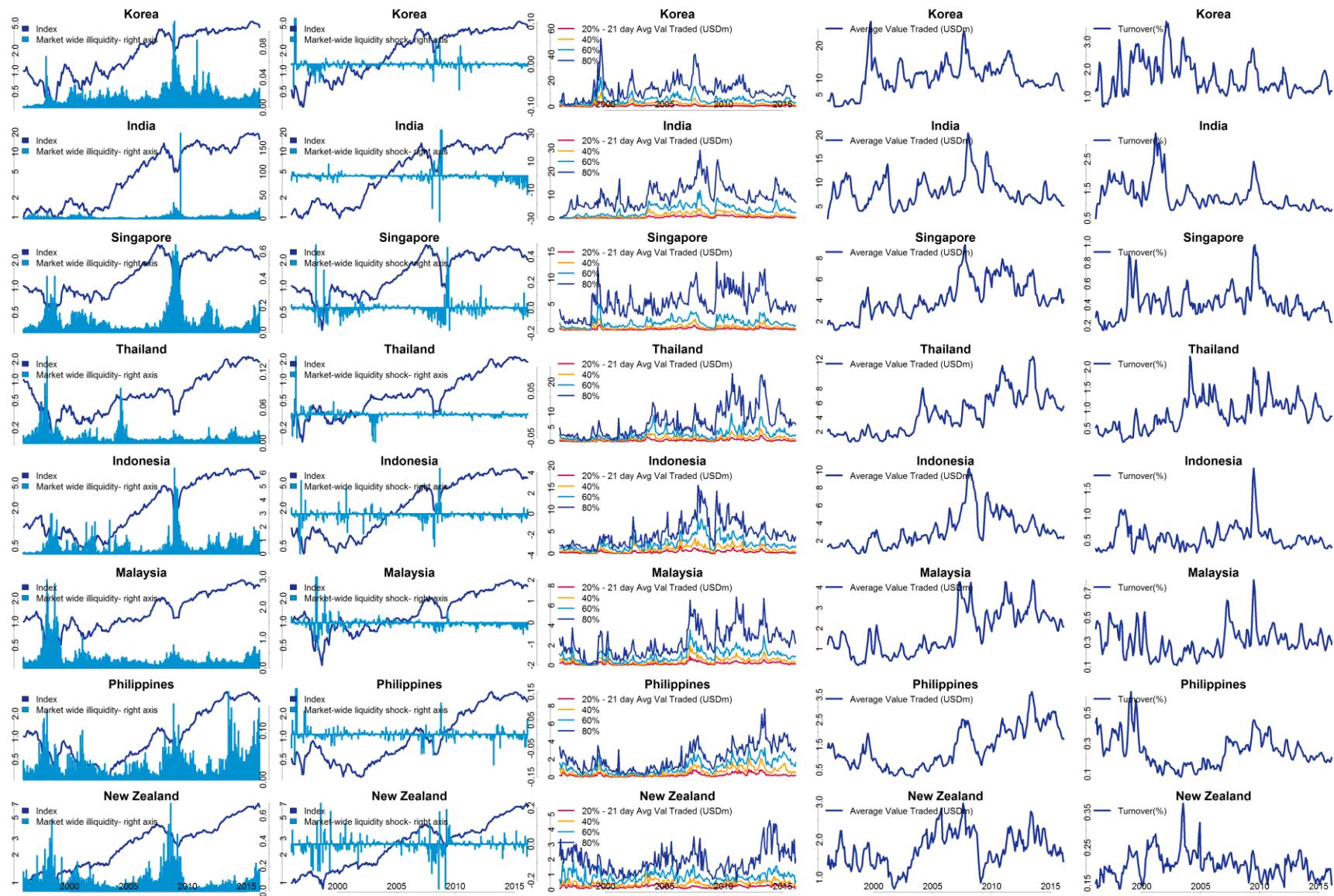


Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 32: Liquidity and Liquidity Risk (2)

Value traded and turnover have decreased across all markets in Asia ex Japan over the past year



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



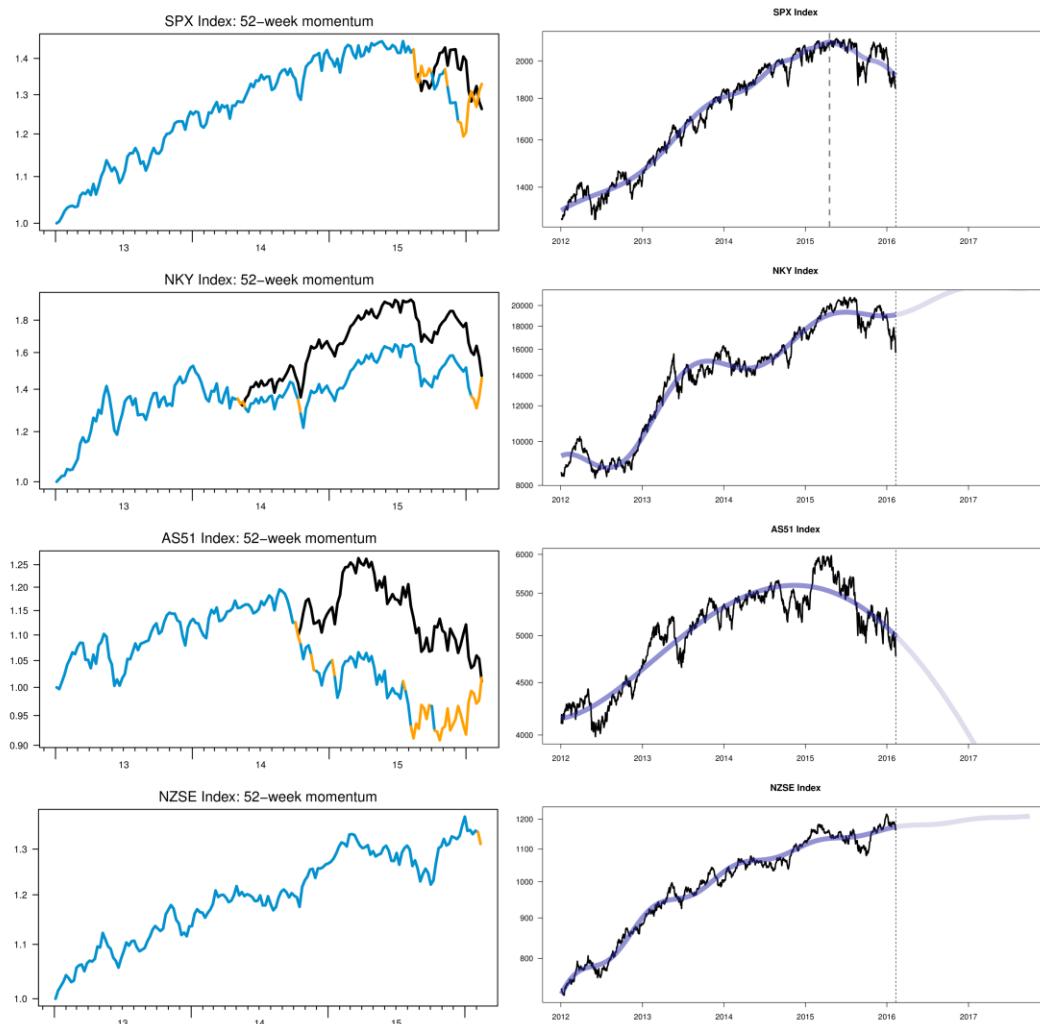


## Trends or Bubbles?

In our report on trends and momentum signals<sup>6</sup>, we have looked into various definitions of trends for indices and find that they could be good timing signals to ride assets. On the other hand, are the trends going to last, or do we see a possibility of experiencing a change in regime in the coming future? Our "Bubble" model (please see the Appendix) may assist us. However, both the trend signals and the "Bubble" model rely only on price-based measures. To obtain a more balanced – and possibly more informed – view, one can refer to the recommendations of our Composite Country Rotation Model.

**Figure 33: 1) US (SPX): There may have been a recent regime change. 2) Japan (NKY), New Zealand (NZSE): The market may stagnate or grow, but slowly.**

The asset trajectory is in black, the colored line corresponds to the wealth of a strategy going long (blue) or short (orange) the asset based on past momentum..

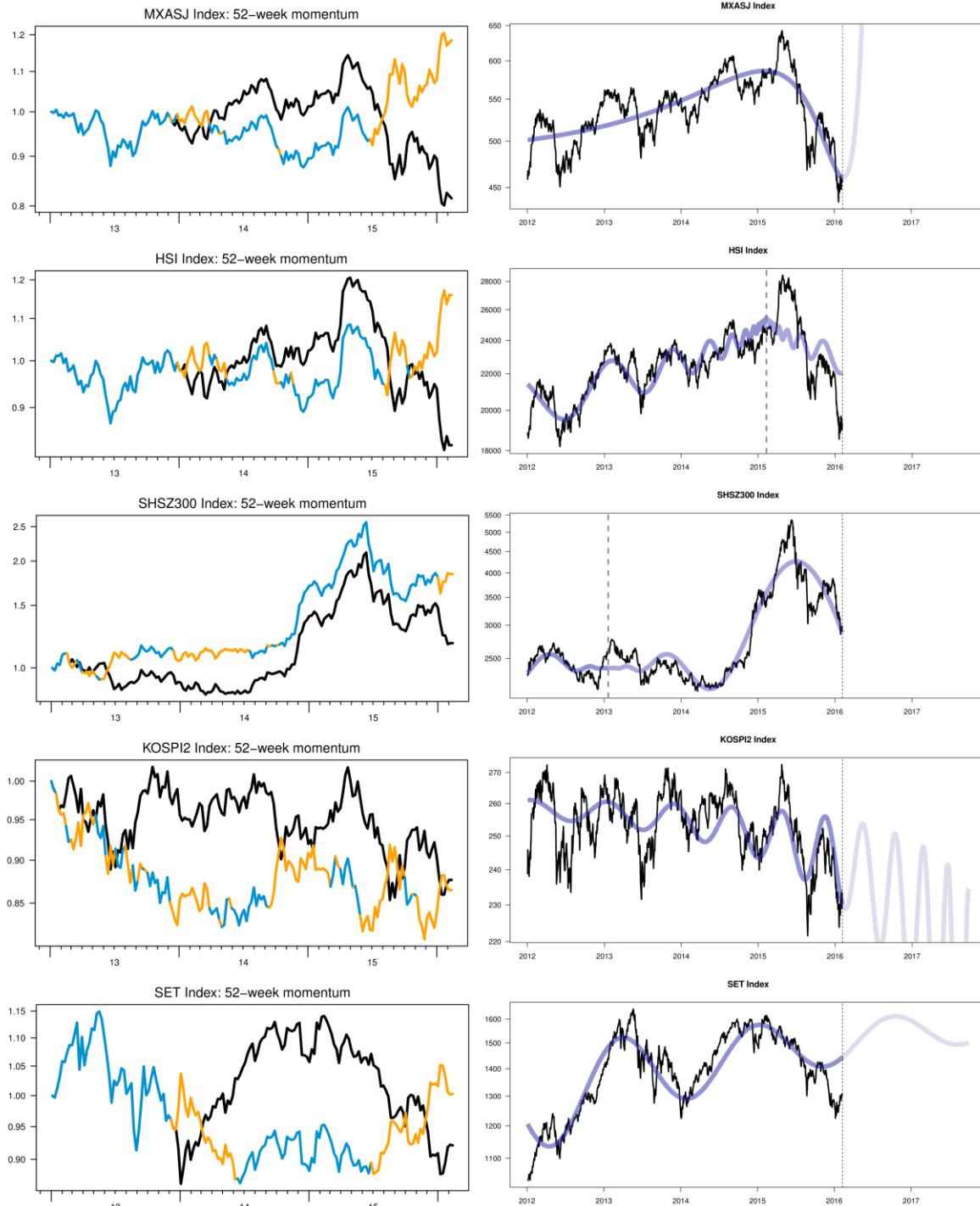


Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

<sup>6</sup> LeBinh et al, "A First Momentum Playbook", Deutsche Bank Quantitative Strategy, 22 September 2014



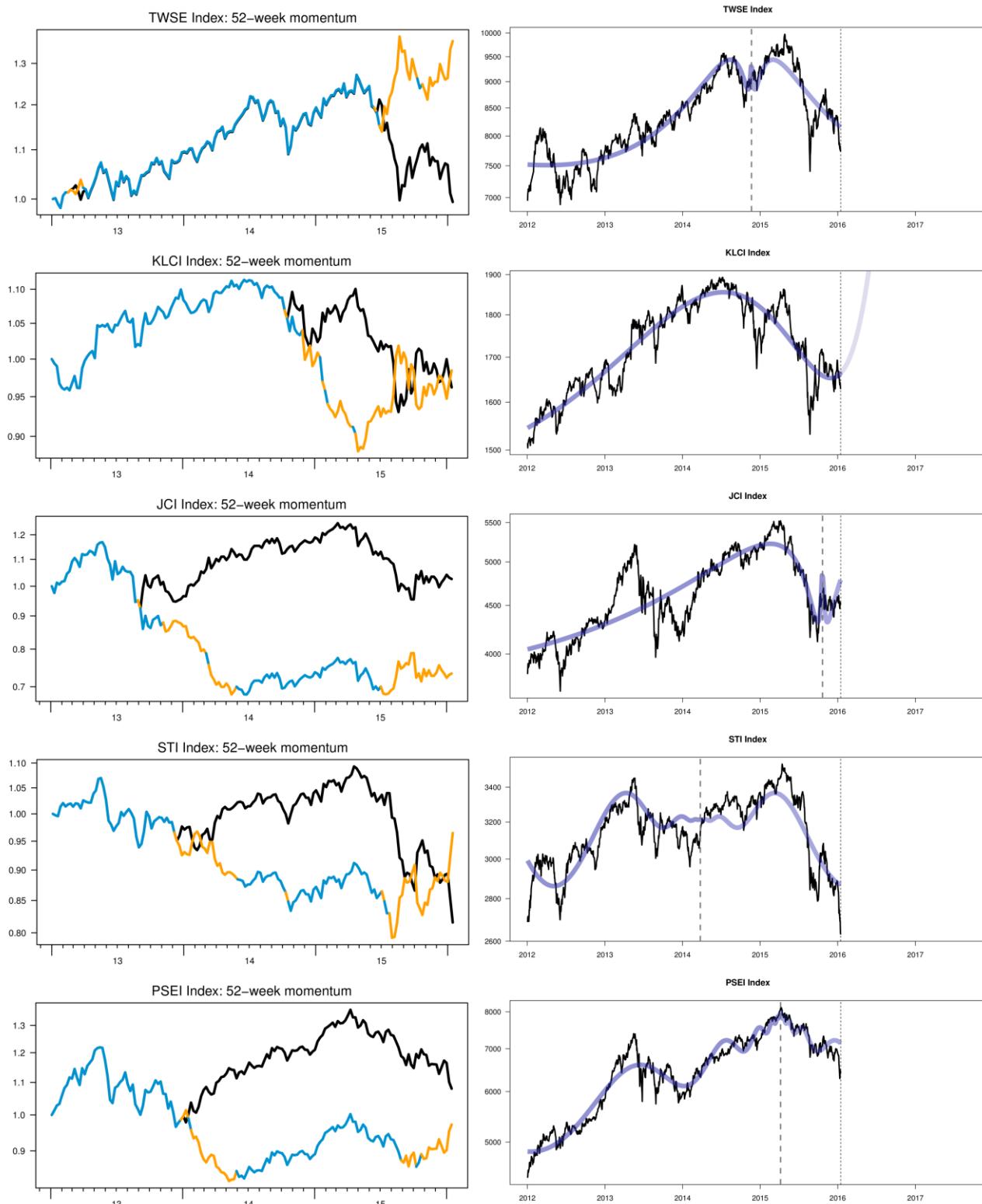
**Figure 34: 1) Korea (KOSPI2): The oscillations continue, with a more pronounced downward trend. 2) Thailand (SET): The oscillations may continue. The asset trajectory is in black, the colored line corresponds to the wealth of a strategy going long (blue) or short (orange) the asset based on past momentum..**



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



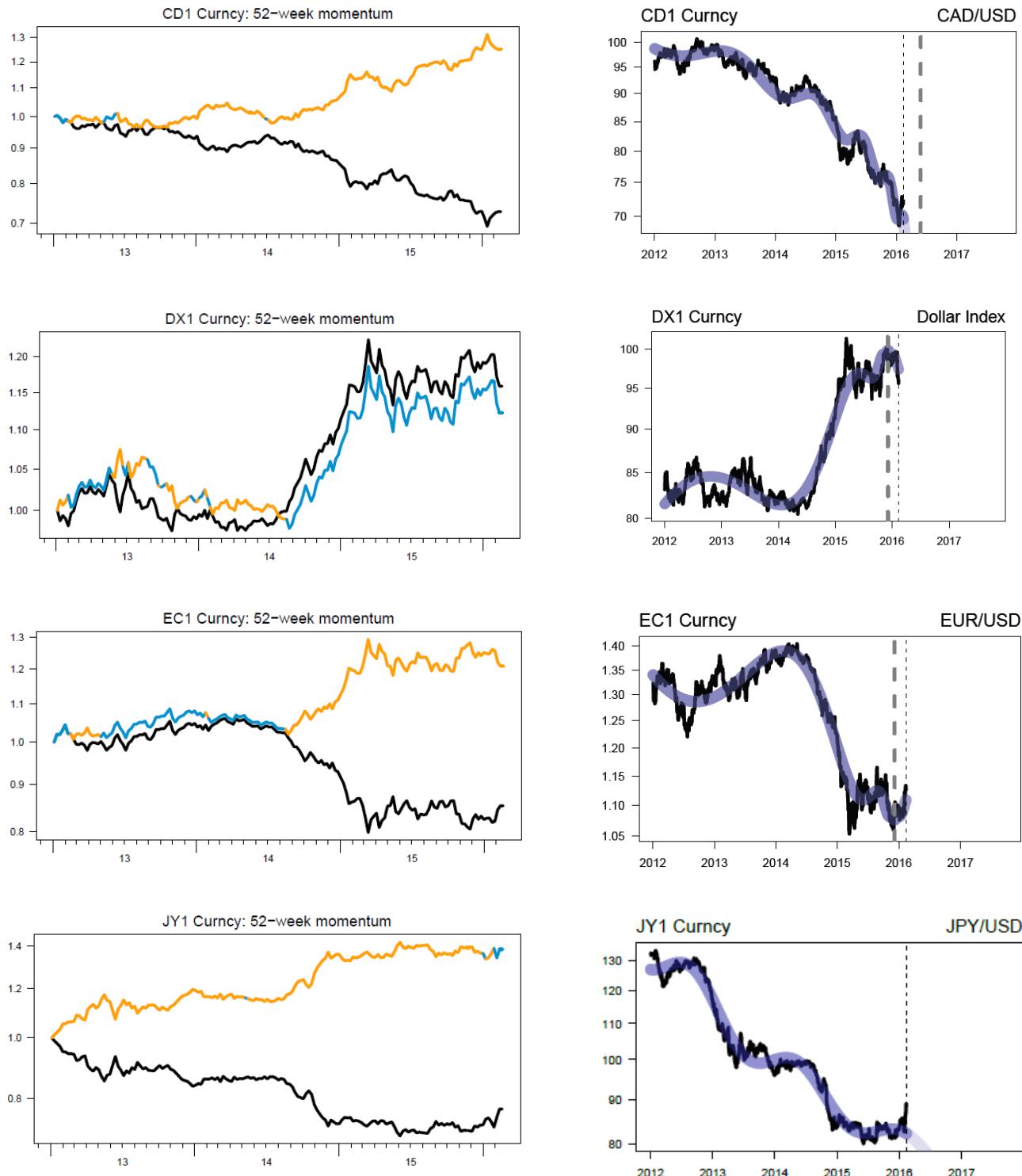
Figure 35: 1) Taiwan (TWSE), Indonesia (JCI) and Philippines (PSEI): There may have been a recent regime change.  
2) Malaysia (KLCI): The market may rebound. 3) Singapore (STI): The model does not fit the data.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



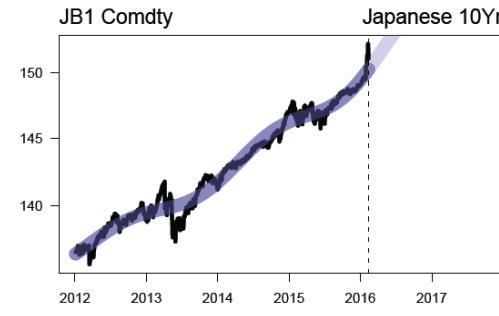
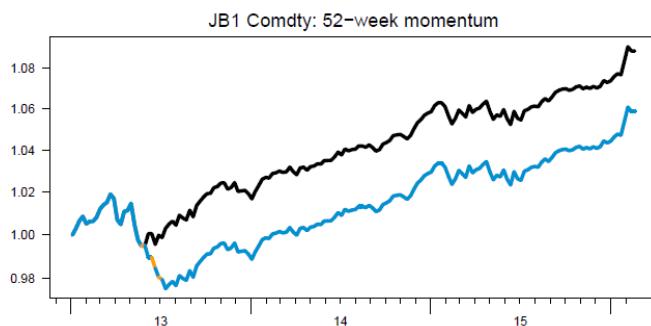
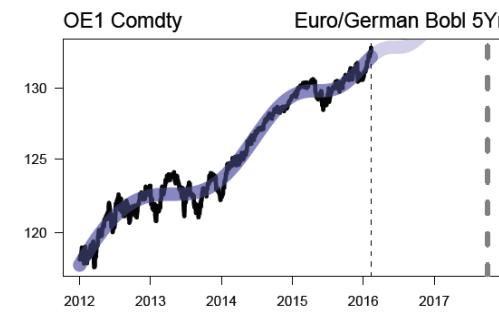
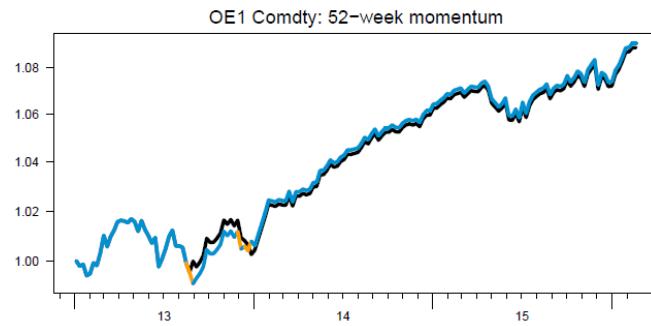
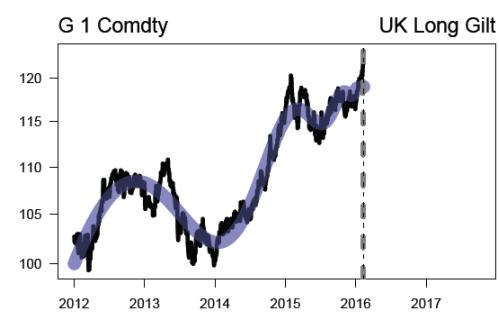
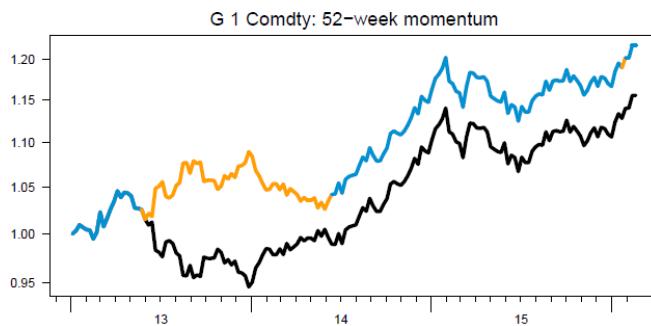
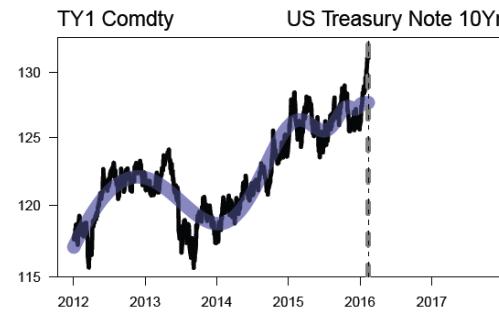
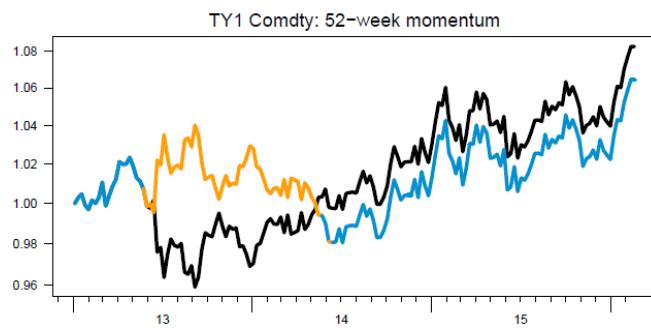
Figure 36: The CAD, the Euro and the Dollar have either experienced or are about to experience a regime change. However, the model does not forecast any halt in the downward trend for the Japanese Yen.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



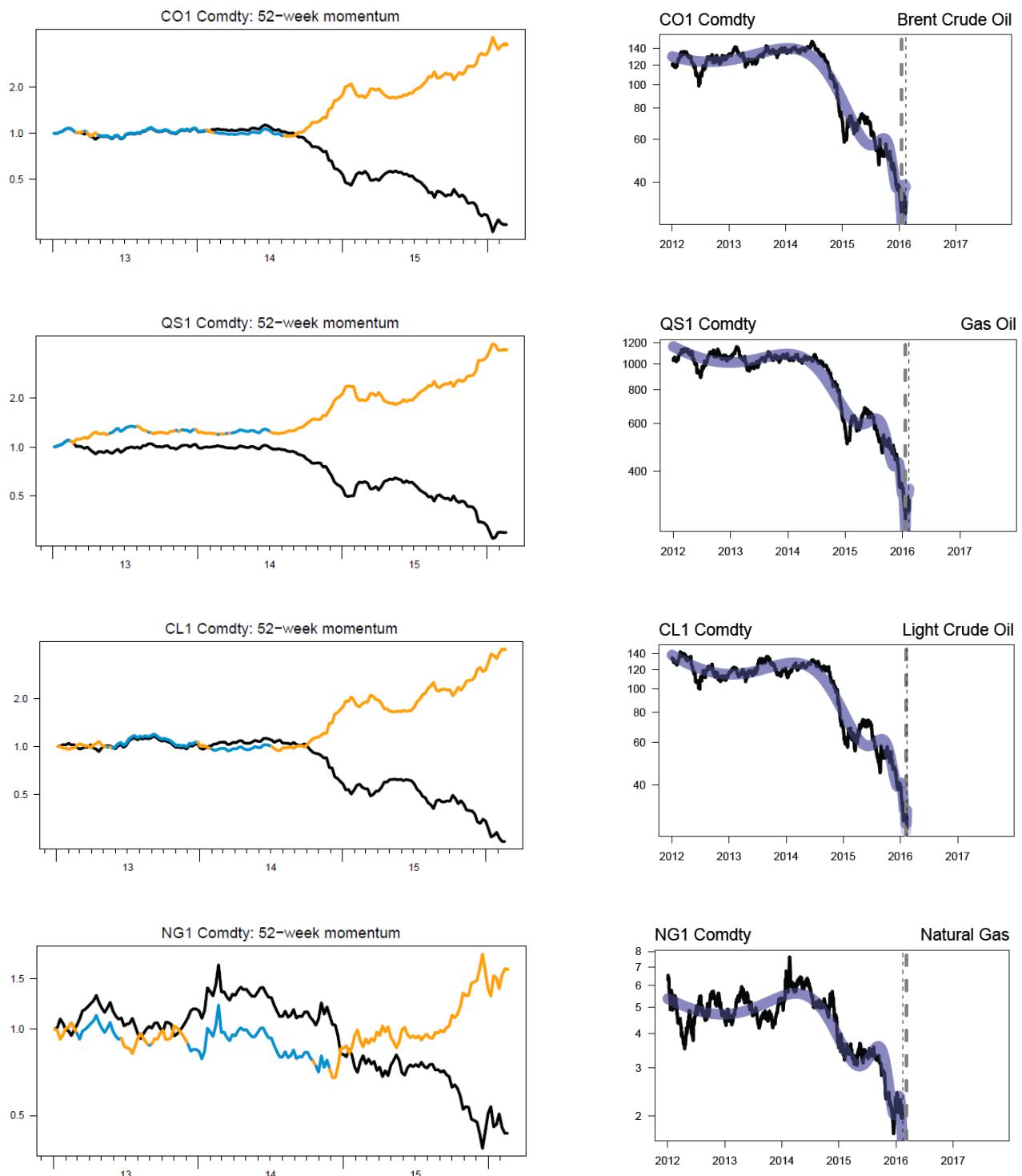
Figure 37: The US 10-year government bonds and the UK Gilt may have already moved to a new regime. German bonds may continue to rise for one or two years before the next regime change. This upward trend is also visible in the Japanese 10-year government bonds.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



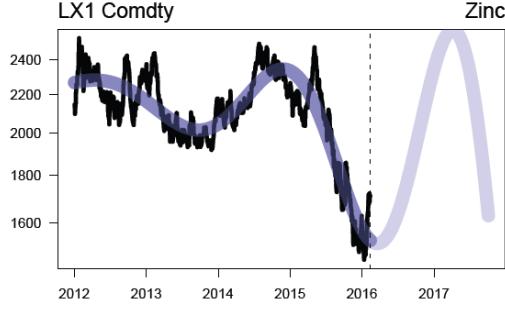
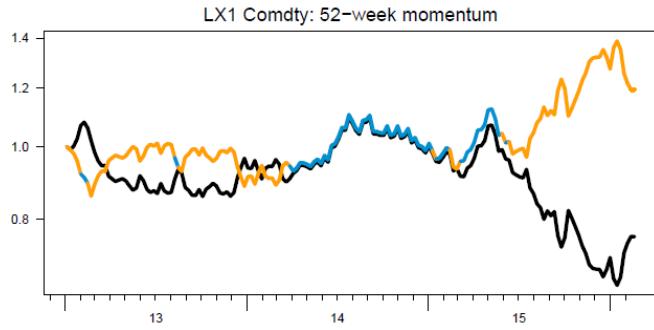
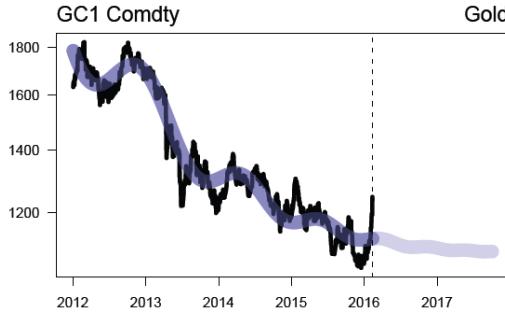
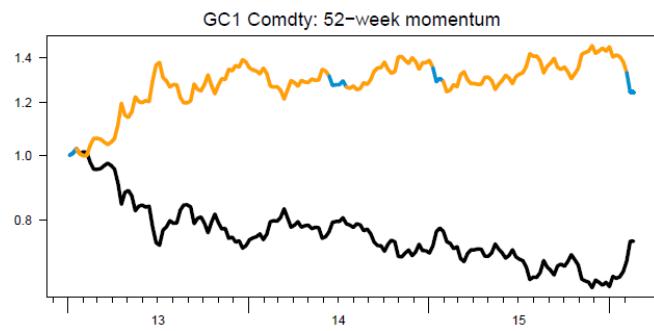
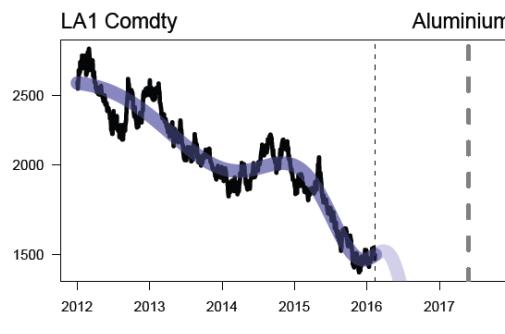
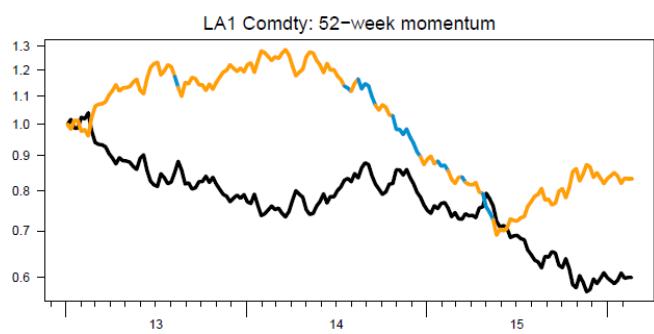
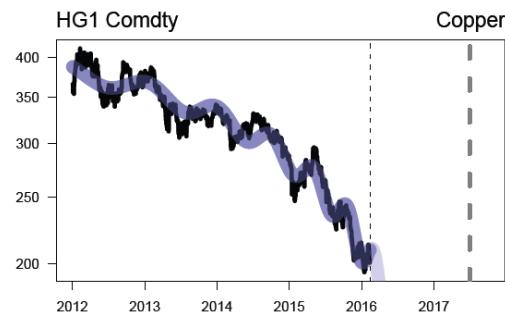
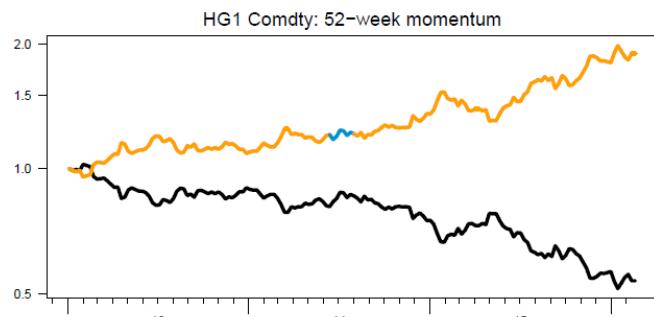
Figure 38: Oil and gas seem to have reached the end of their current regime.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



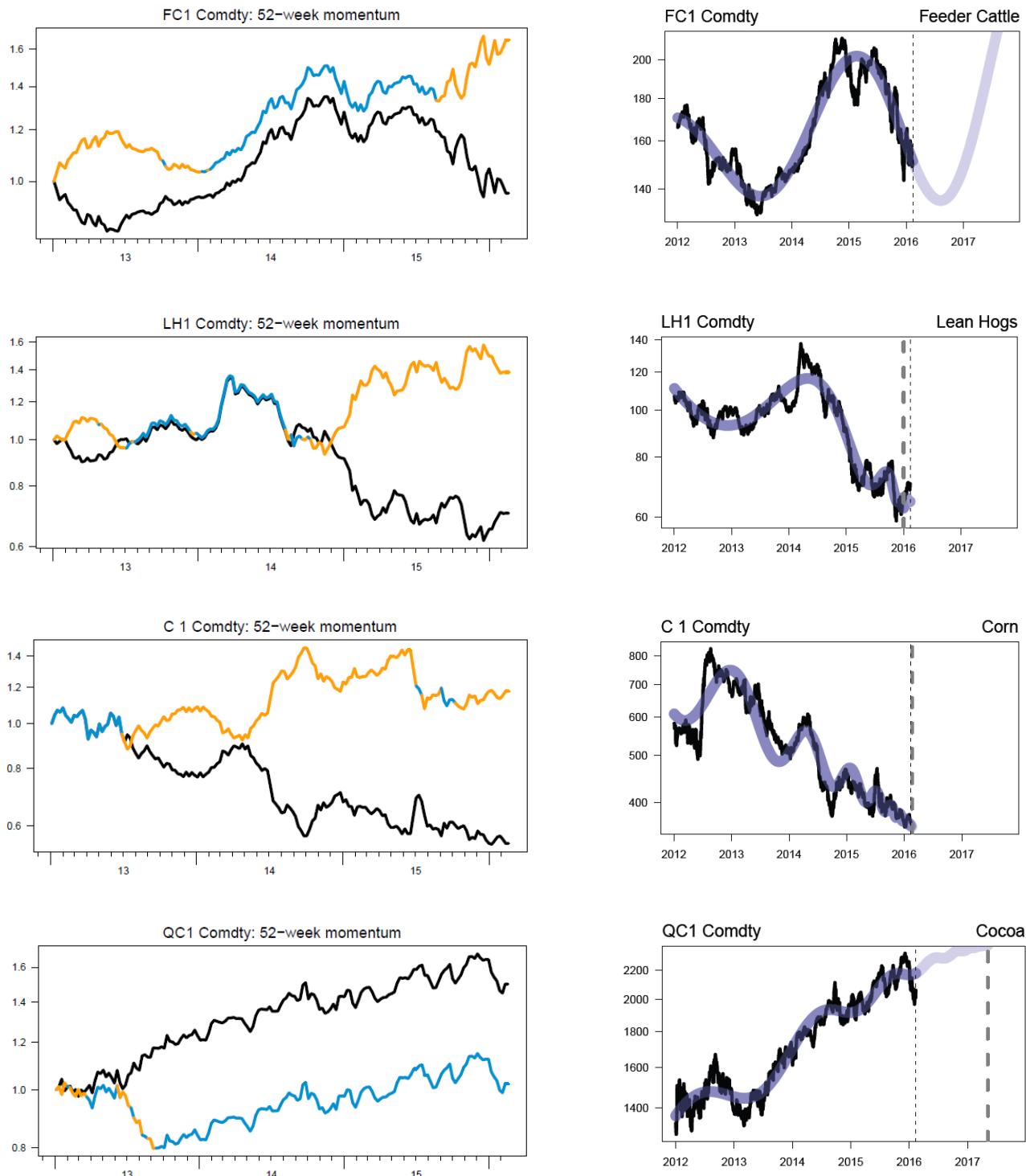
Figure 39: Most commodities are on a downward trend, with a possible regime change within the next two years for Copper and Aluminium. Gold may stagnate, and Zinc may rebound.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 40: Cattle may rebound, and lean hog may have switched to a different regime. Corn may have reached the end of its current regime. Cocoa may continue to rise.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

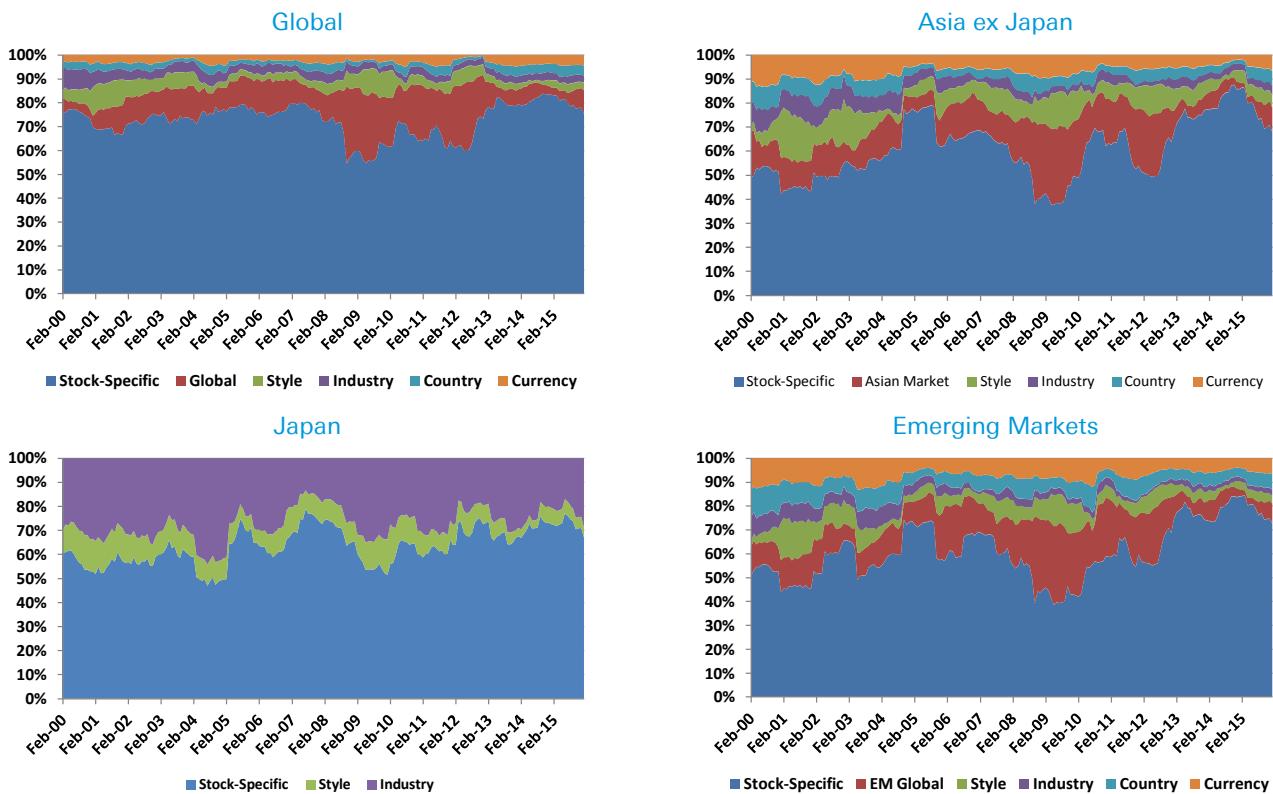


# Disentangling Markets

## Opportunity set

Investors can view the “opportunity set” as the total alpha on the table<sup>7</sup>. Our main interest is to understand what is driving that opportunity, so that we can position our strategies accordingly.

Figure 41: Opportunity sets for different investment universes (as of 2016-01-29)



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

In the charts, the blue portion shows the opportunity explained by stock selection, whereas the other colors represent the opportunity from top-down calls like picking the right countries, industries, and styles. As the Global Financial Crisis unfolded, we moved into a much more macro-dominated world. The portion of overall opportunity that could be explained by individual company characteristics shrank sharply; no one cared if a stock looked good on fundamentals if it was exposed to Europe for instance. We are currently facing a similar situation: the opportunity set for stock pickers has decreased in the recent sell-off.

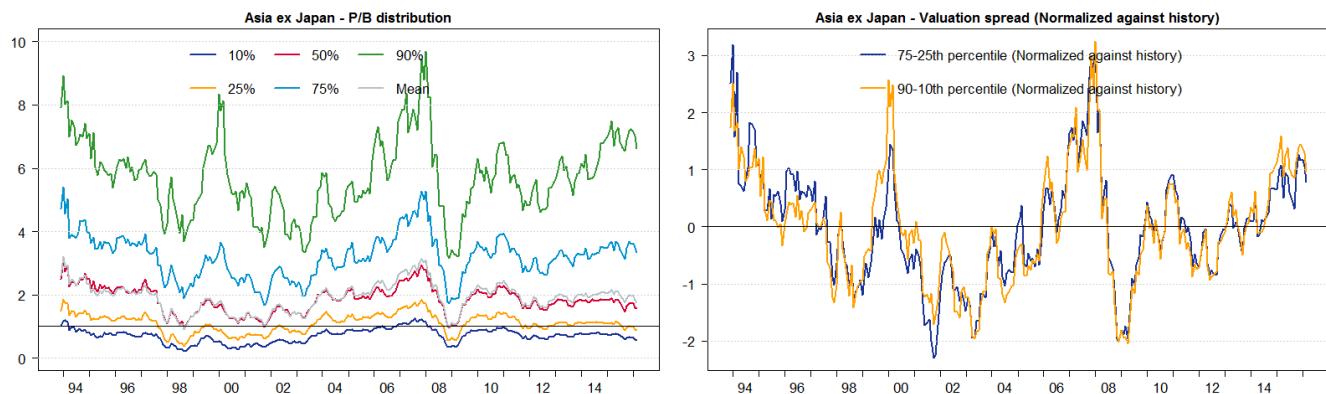
<sup>7</sup> For technical details on our definition of the opportunity set, see: Alvarez et al., 2012, “Portfolios Under Construction: Correlation and Opportunity”, Deutsche Bank Quantitative Strategy, 24 January 2012.



## Valuation dispersion in Asia ex Japan

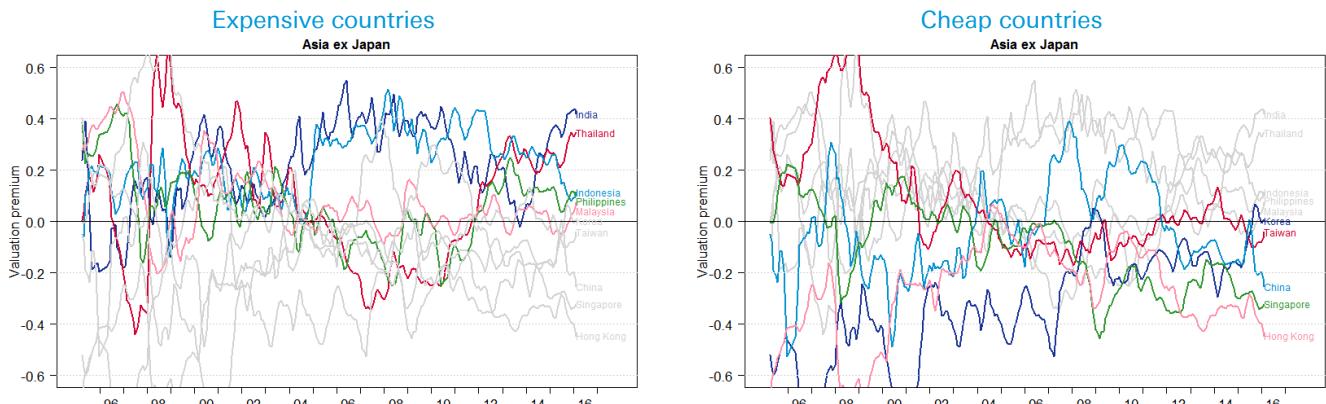
Another way to assess the stock selection opportunity in equity markets is to look at the distribution of valuation metrics: the “wider” a distribution, the more differentiation among stocks. Although “healthily” high relative to history, the valuation spread in Asia ex Japan has decreased in the current sell-off.

Figure 42: Historical P/B distribution and Normalized valuation dispersion in Asia ex Japan



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

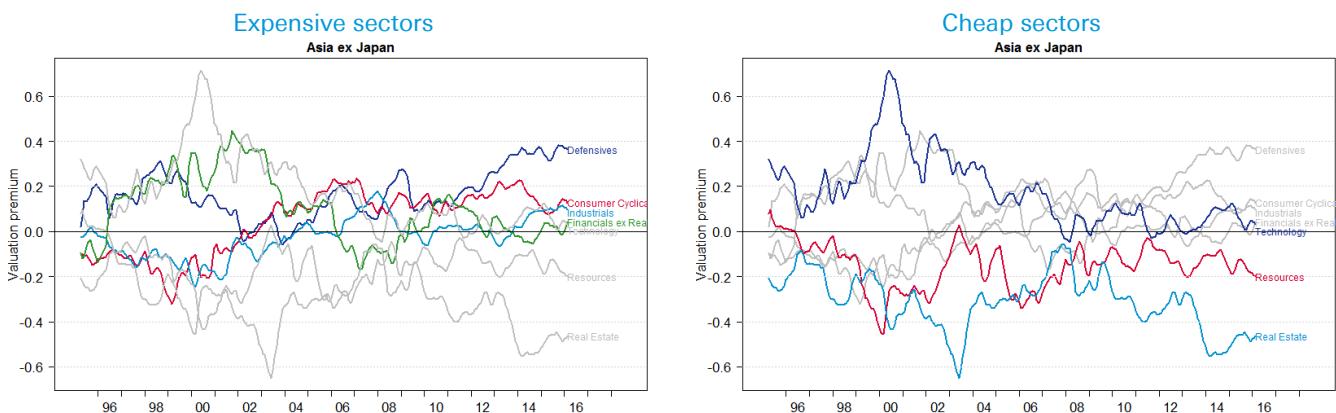
Figure 43: Asia ex Japan Country Premia: Indian stocks are still the most expensive followed closely by stocks from Thailand. Stocks from Hong Kong, Singapore and China are discounted.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

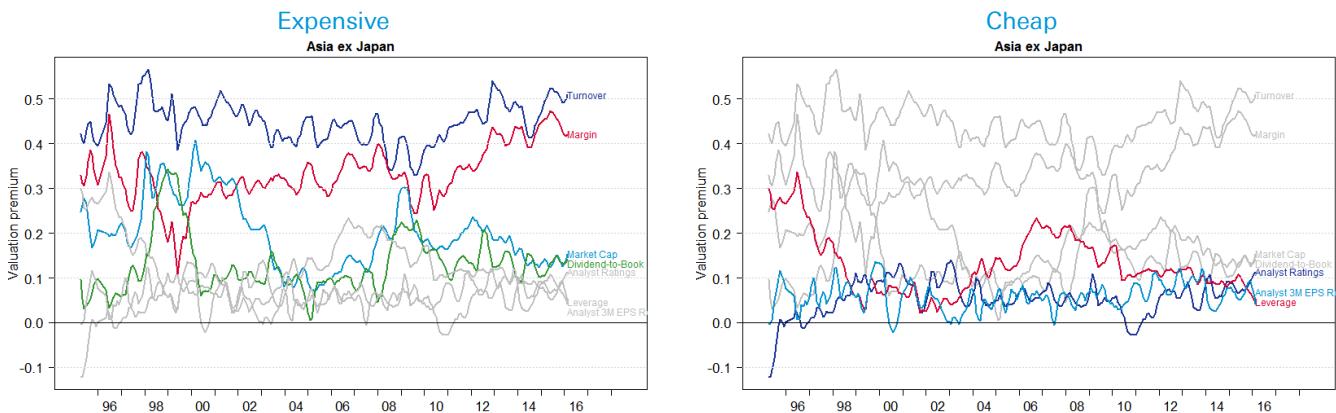


Figure 44: Asia ex Japan Sector Premia: Investors have continued to pay a premium for Defensive stocks whilst shying away from Real Estate stocks.



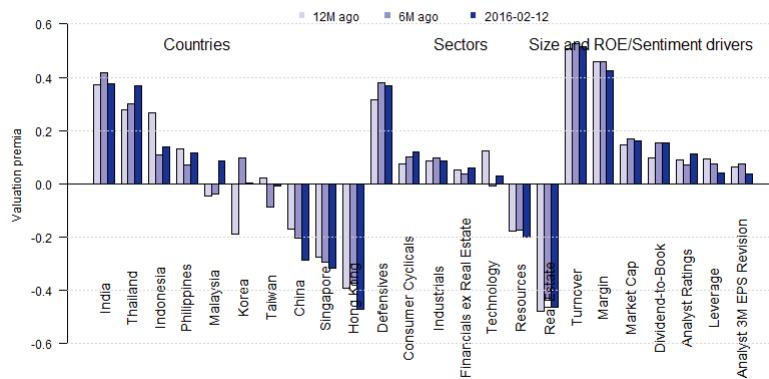
Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

Figure 45: Turnover and Margin are still the most important fundamental drivers in Asia ex Japan.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

Figure 46: Asia ex Japan Valuation premia changes : The premium for leverage has decreased over the past year.



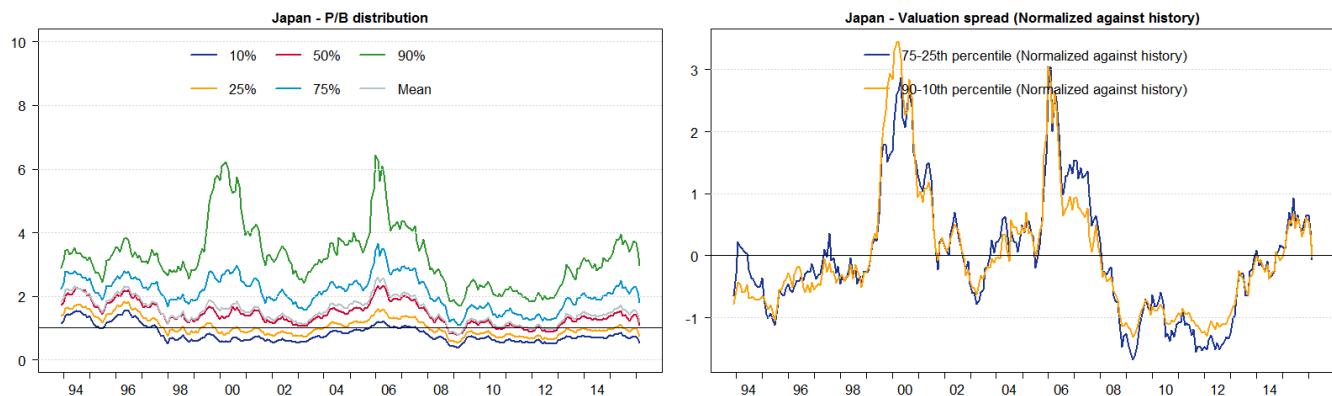
Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



## Valuation dispersion in Japan

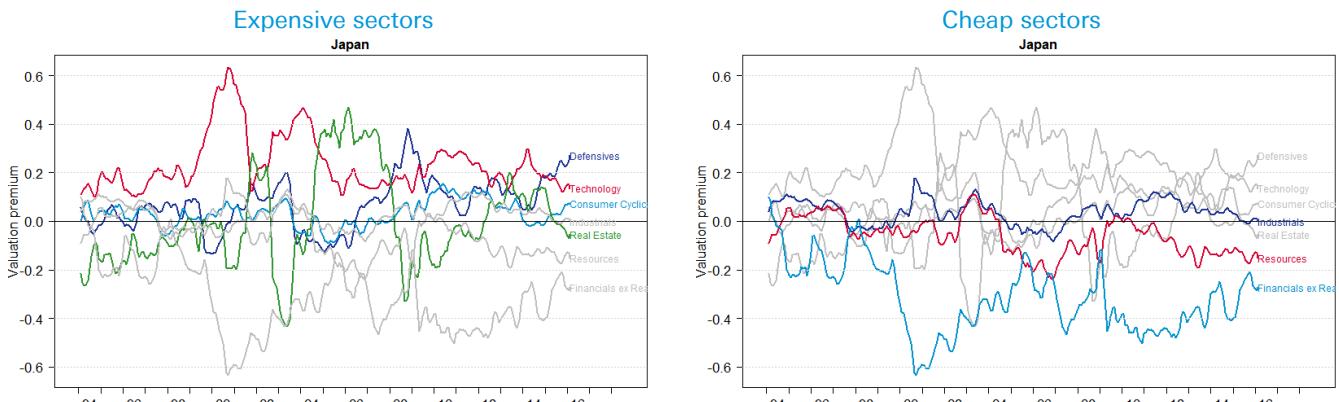
In Japan the valuation dispersion was low before “Abenomics” and is now close to the past 20-year average. As in Asia, the valuation dispersion has decreased recently in the current sell-off.

Figure 47: Historical P/B distribution and Normalized valuation dispersion in Japan



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

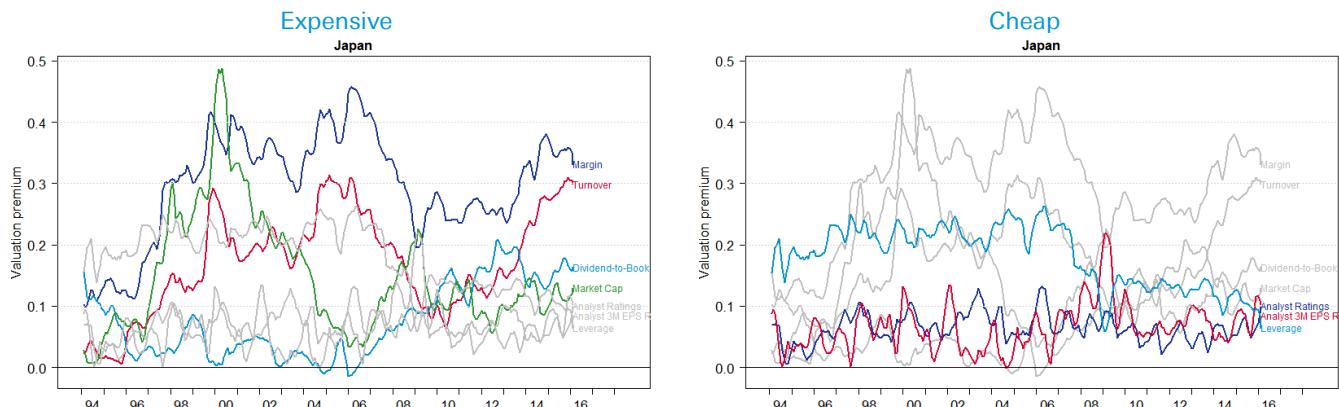
Figure 48: Japan Sector Premia: Defensives and Technology are the most expensive sectors. Financials ex Real Estate is the cheapest sector.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

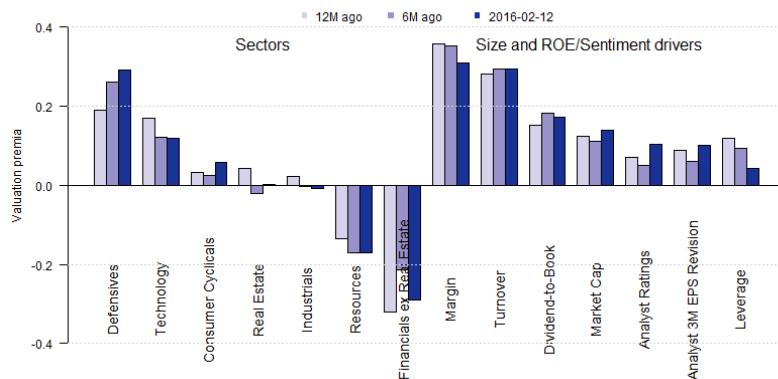


Figure 49: Japan Fundamental value drivers': Margin remains the most important driver, followed by Turnover.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

Figure 50: Japan Valuation premia changes :



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

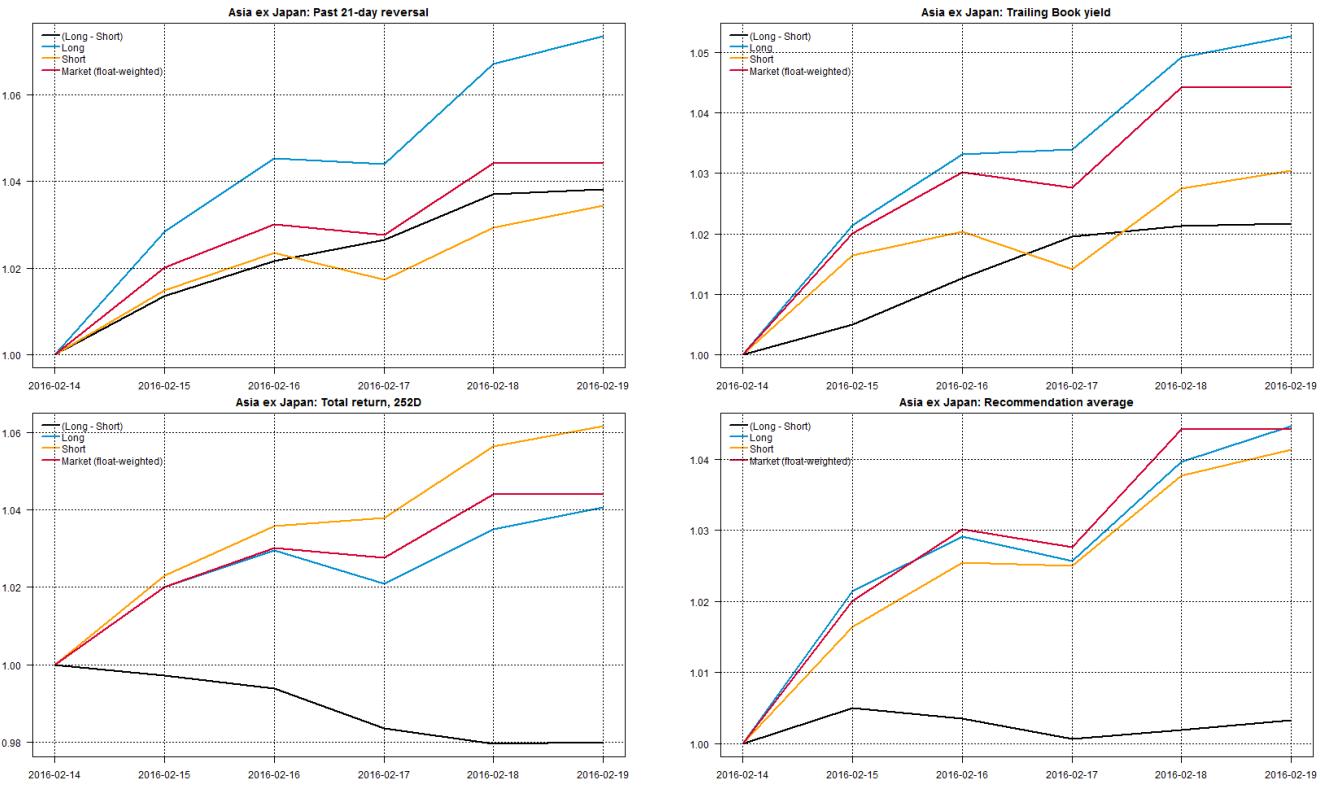


## Factor Performance in Asia ex Japan

Reversal kicked in last week (the week of February 15) in Asia ex Japan with past 1 month underperformers outperforming the universe and past outperformers underperforming. Momentum factors reverted with past 1 year winners sharply underperforming the universe. It might be too early to confirm whether some investors have started to buy shares trading at a discount (low price-to-book stocks have started to outperform) but expensive stocks have markedly underperformed the region.

Key themes over the past month in Asia ex Japan

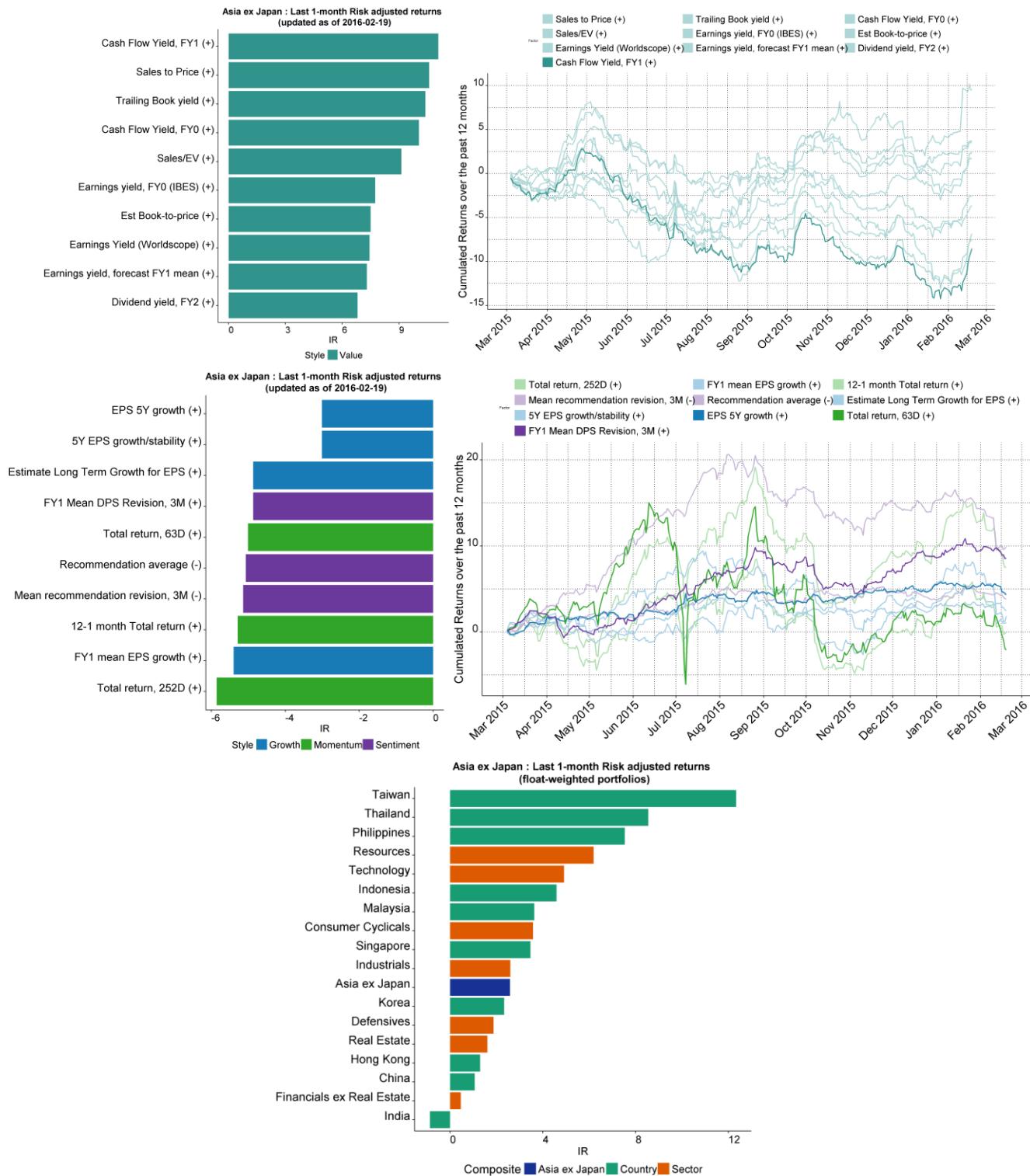
Figure 51: Week of February 15: Investors looked for reversal opportunities (long short term underperformers, short past 1 year outperformers), might have started to buy cheap stocks but have mostly avoided expensive ones.



Source: Deutsche Bank



**Figure 52: Past 1-month:** Investors have focused on **Value** factors (e.g. Cash Flow Yield, Sales-to-Price, etc) but have shied away from **Momentum** factors, **Growth** factors and **Sentiment** factors. : Taiwan and Indonesia have been the top countries on a risk-adjusted basis. Resources and Technology have rebounded and Defensives have taken a step back

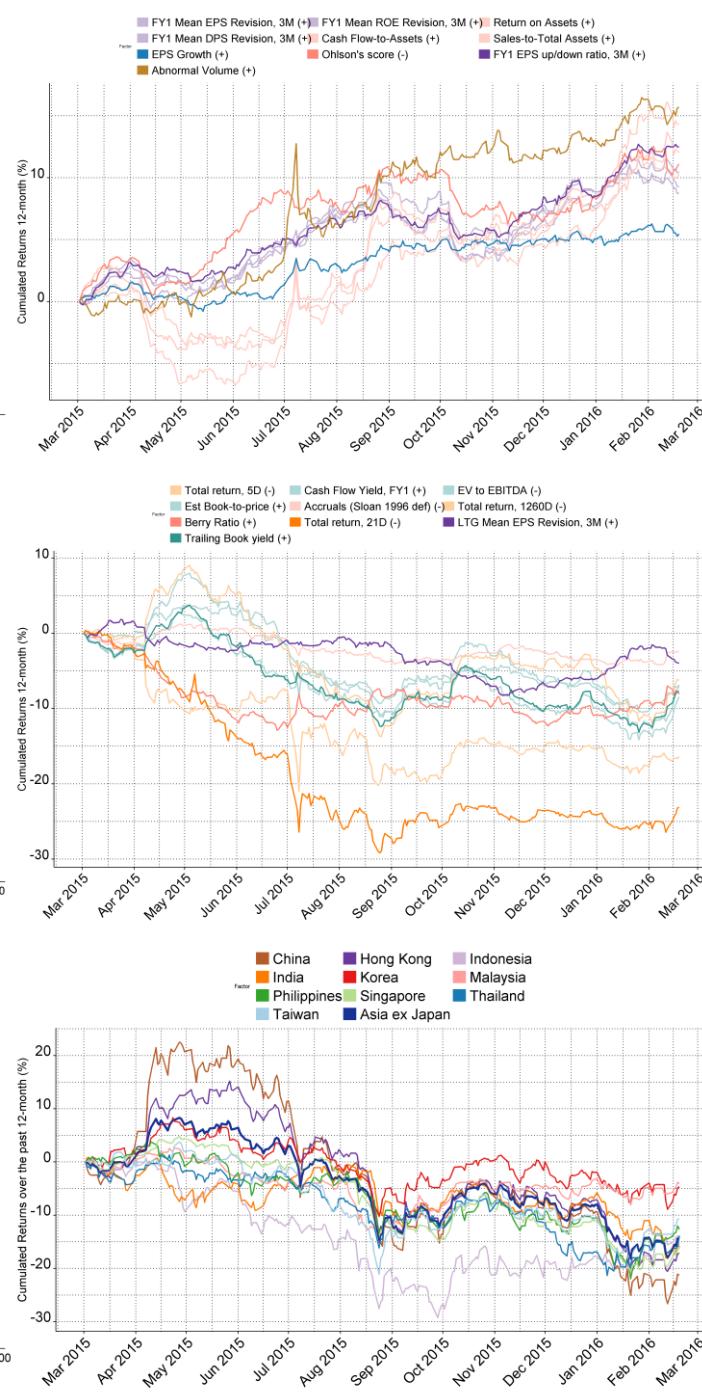
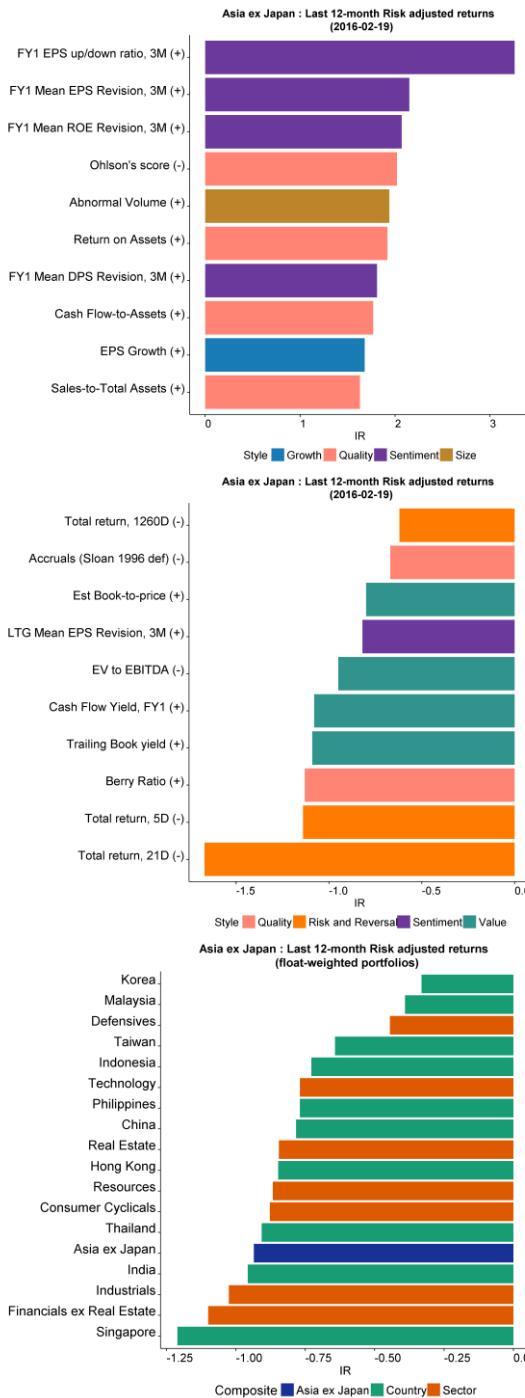


Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



## Key themes over the past 12 months in Asia ex Japan

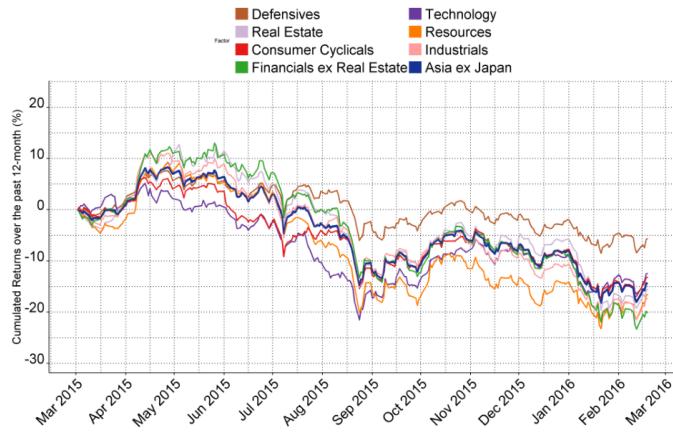
**Figure 53: Past 12 months:** Investors have focused on **Sentiment** factors (e.g. 3-month FY1 EPS Diffusion, 3-month FY1 EPS Revision, 3-month FY1 DPS Revision and 3-month FY1 ROE Revision) and **Quality** factors (e.g., ROA, Ohlson's score, Cash Flow to Assets and Sales-to-Total Assets).



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

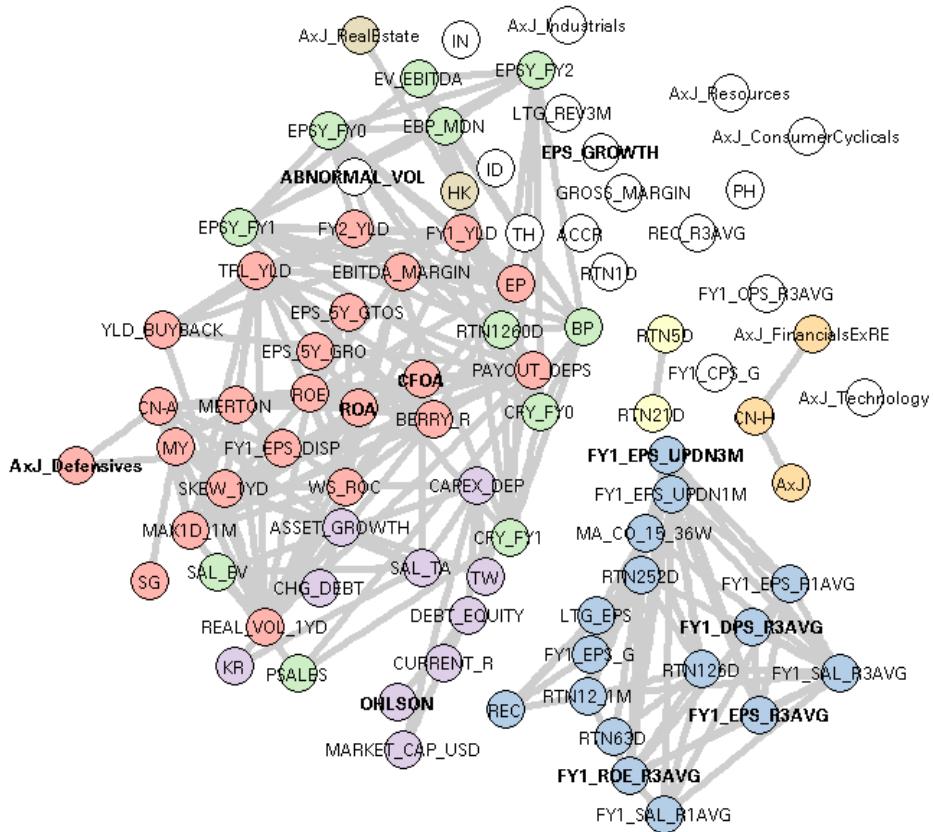


Figure 54: Past 12 months: Defensives have performed well relative to other sectors.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

Figure 55: Asia ex Japan: Key themes over the past 12 months

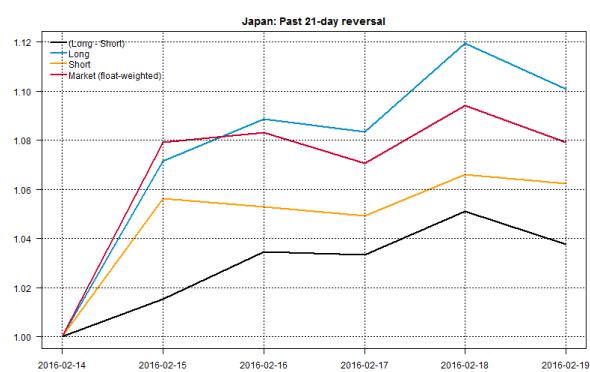
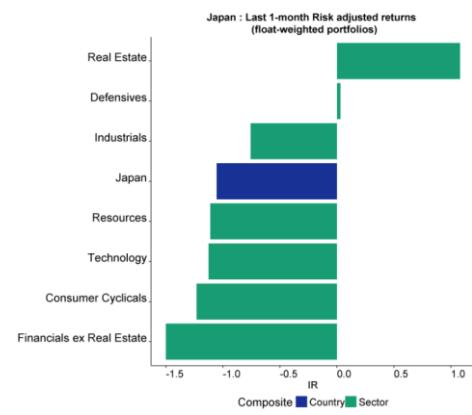
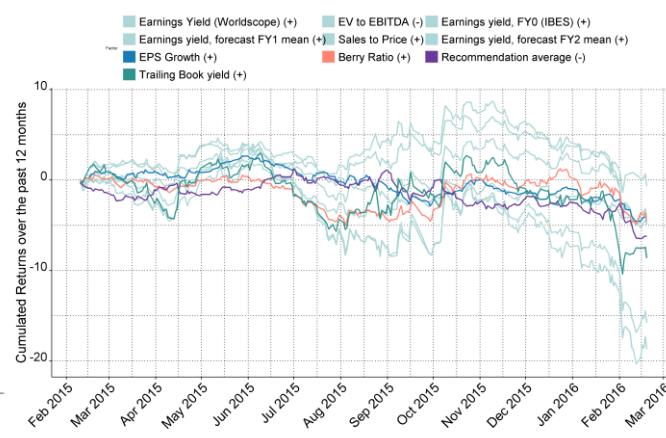
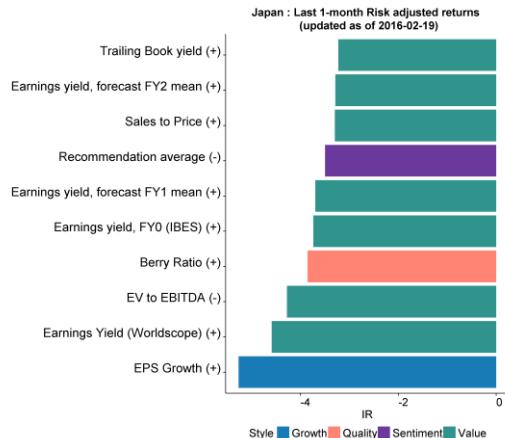
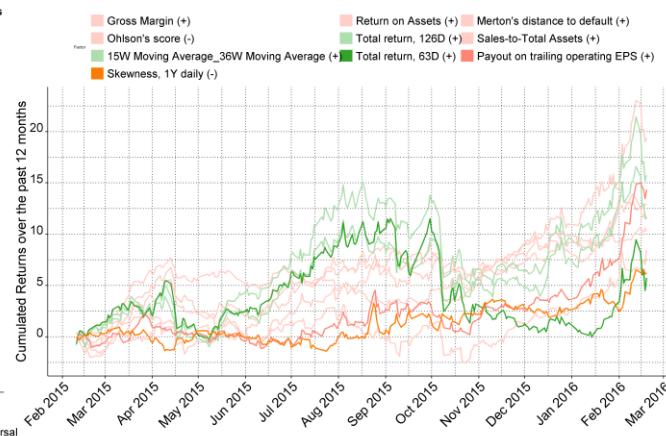
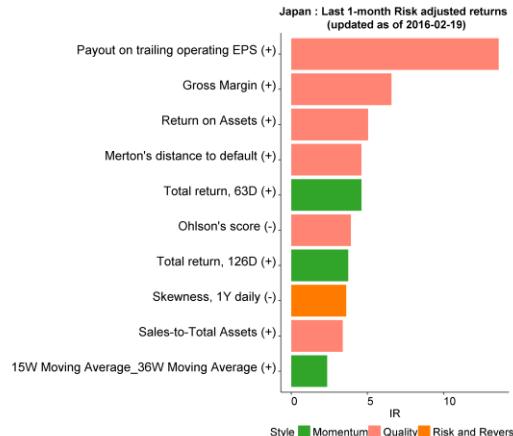


Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



## Factor Performance in Japan

Figure 56: In Japan, the focus has been on Quality but there has been a recent correction except for the Payout ratio. Investors have shied away from Value factors. Real Estate is performing particularly well relative to Banks (with the introduction of negative rates).

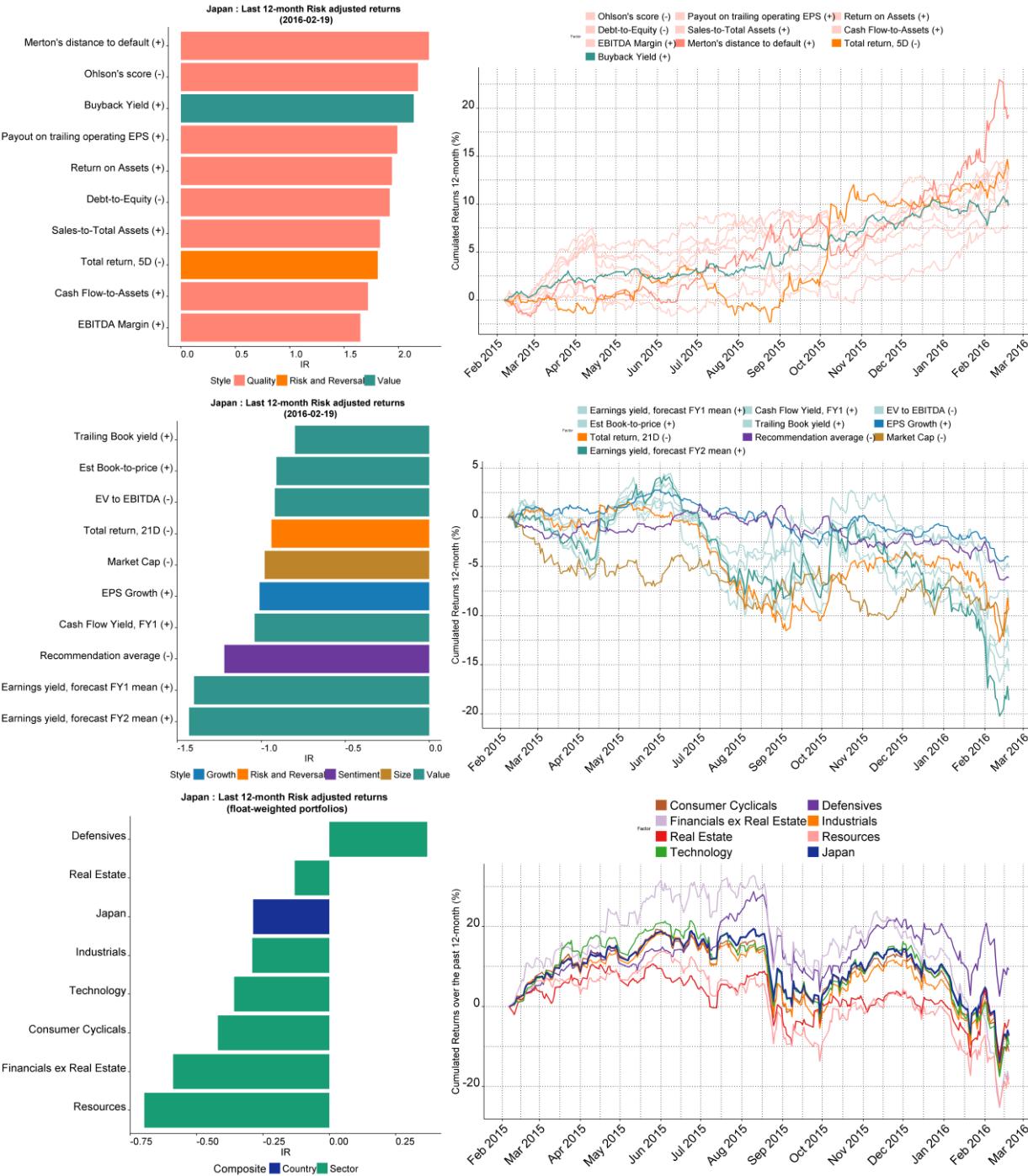


Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



## Key themes over the past 12 months in Japan

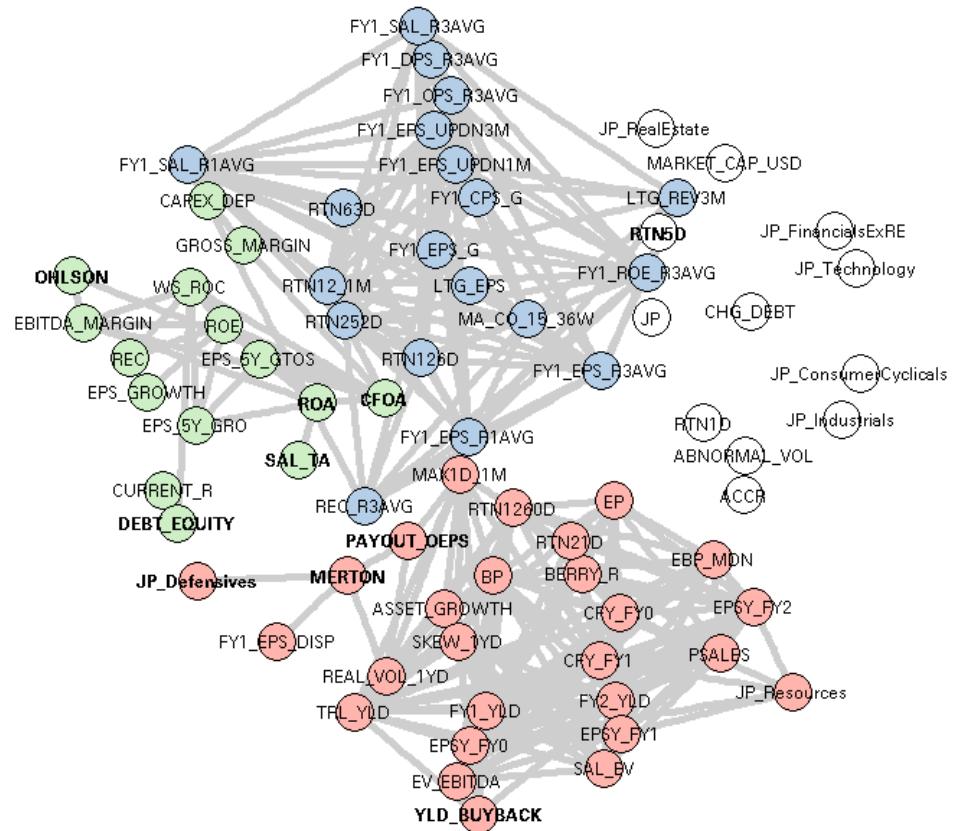
**Figure 57: Past 12 months: Investors have focused on Buyback Yield and Quality factors (e.g., Merton's Distance to Default, Payout ratio, Ohlson's score, Payout ratio, ROA, Debt-to-Equity, and Sales-to-Total Assets etc).**



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 58: Japan: Key themes over the past 12 months

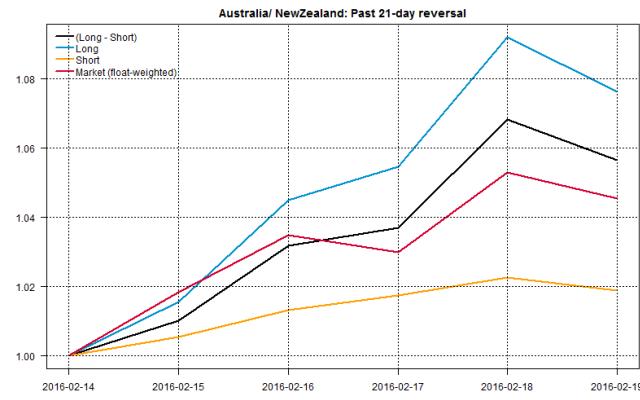
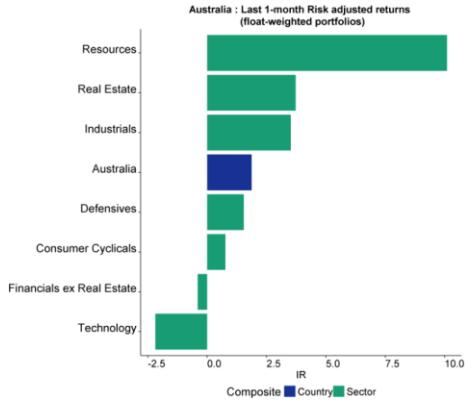
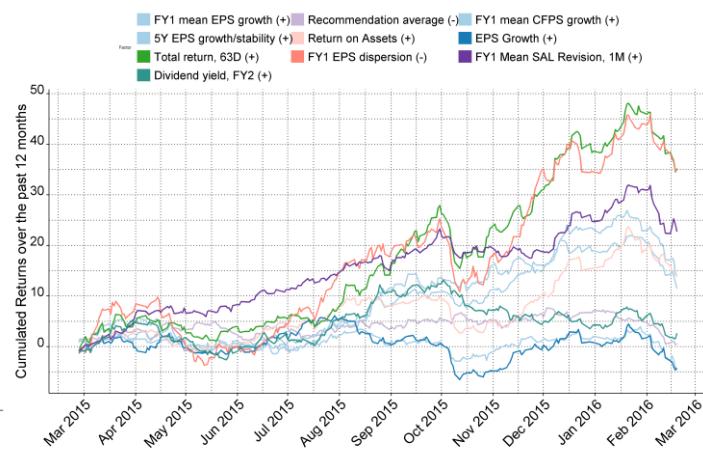
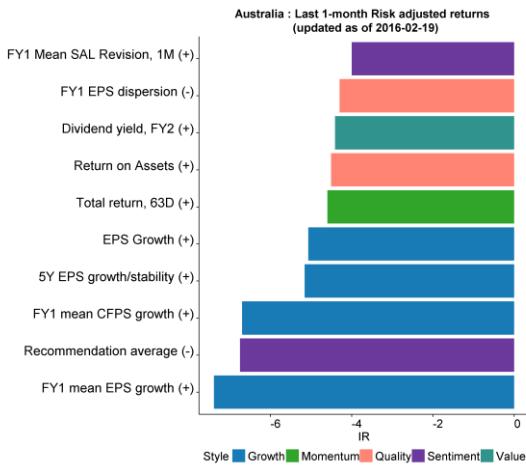
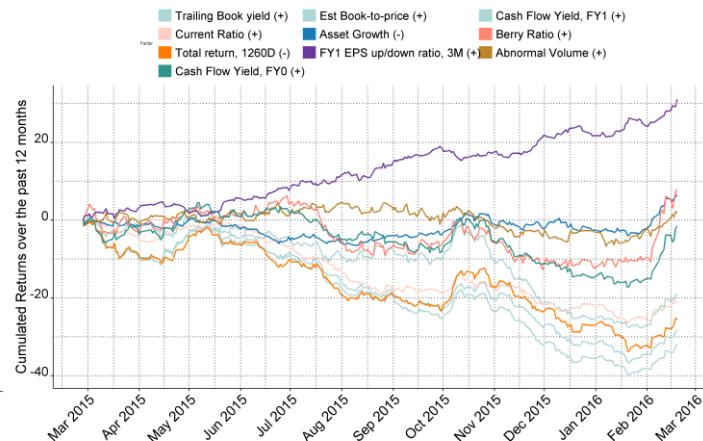
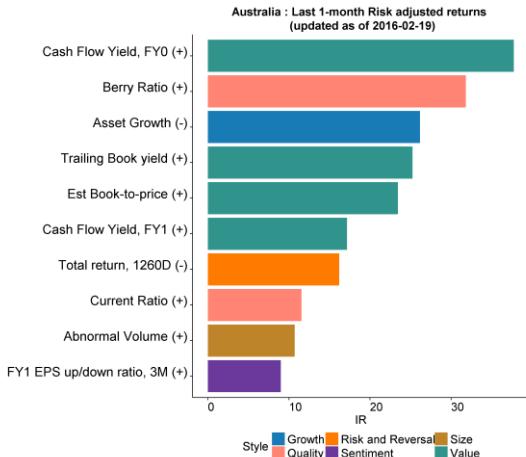


Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



## Factor Performance in Australia/New Zealand

Figure 59: Reversal kicked in last week. Short term outperformers, past 1 year underperformers have outperformed the universe. Value stocks have started to be picked but not clearly at the expense of stocks trading at higher multiples. The 3-month Earnings Diffusion indicator is still performing steadily. Resources have rebounded in the last month.

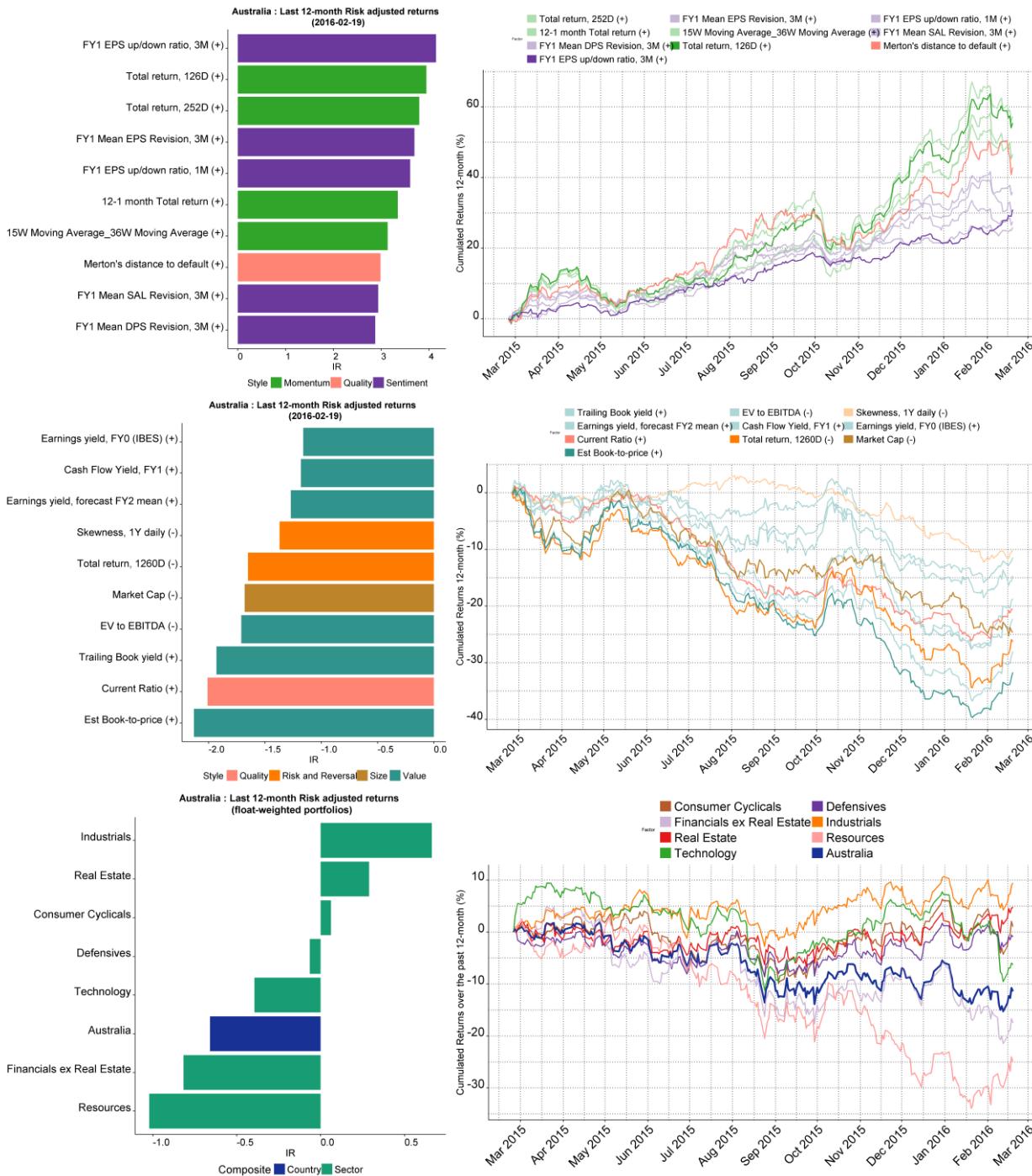


Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



## Key themes over the past 12 months in Australia and New Zealand

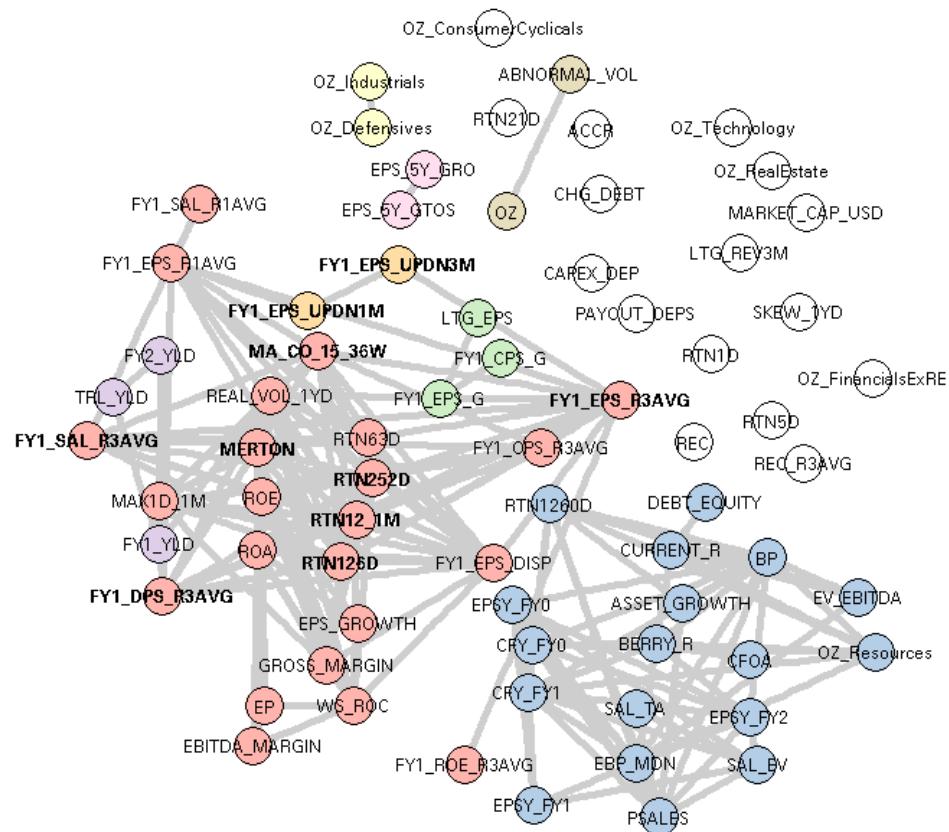
**Figure 60: Past 12 months:** Investors have focused on **Momentum factors** (126-day total return, 252-day total return, 15-36 week moving average crossover, 12-1 month total return). **Sentiment factors** (e.g. 1-month/3-month FY1 EPS Diffusion, 3-month FY1 mean EPS Revision, 3-month FY1 Sales Revision, 3-month FY1 mean DPS Revision)



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 61: Australia: Key themes over the past 12 months



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



# Screens

## Bottom-Up stock selection

Combining “old” and “new” ideas in Asia

We have combined in a generic fashion the following signals:

- Valuation factors, including the valuation signal derived from our valuation decomposition, dividend yield and cash flow yield;
- Sentiment factors (recommendation and recommendation changes, earnings/sales diffusion and revision);
- Quality factors such as ROE, asset growth in Asia ex Japan;
- Technical components (our technical composite, our liquidity shock factor, the lottery factor).

Our take on technical indicators remains one of the favorite topics of discussion with our (fast-paced) readers.

- Our composite technical indicator as well as its components have continued to perform well through the risk-on risk-off period.
- Even though not everyone can deal with the high turnover of such strategies, taking into account our transformed technical indicators could prove useful to time entry and exit points.

Please refer to the following publications for further details:

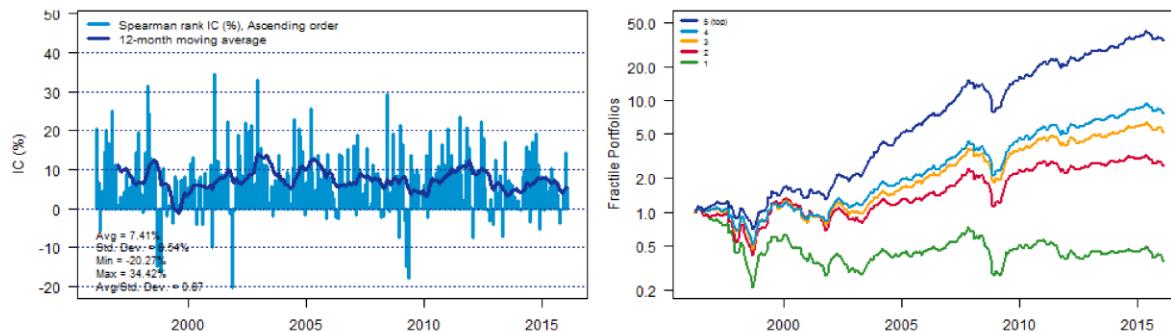
- Le Binh et al. (2011), “Unearthing Asia”
- Le Binh et al. (2011), “Technicalities in Asia”

We show in the following pages for each model applied to Asia ex-Japan and Japan:

- the information coefficient and the quintile portfolios performance time-series charts, which highlight that focusing on a diversified set of equity characteristics, some traditional, some less traveled, would have helped investors in Asia discriminate stocks fairly consistently.
- the top and bottom 20 stocks in the large and mid cap section of the S&P BMI universe. Bespoke screens for pre-specified universes are available upon request. Please contact [DBEQS.Asia@db.com](mailto:DBEQS.Asia@db.com)



Figure 62: Asia ex Japan Composite Model (As of 2016-02-12)



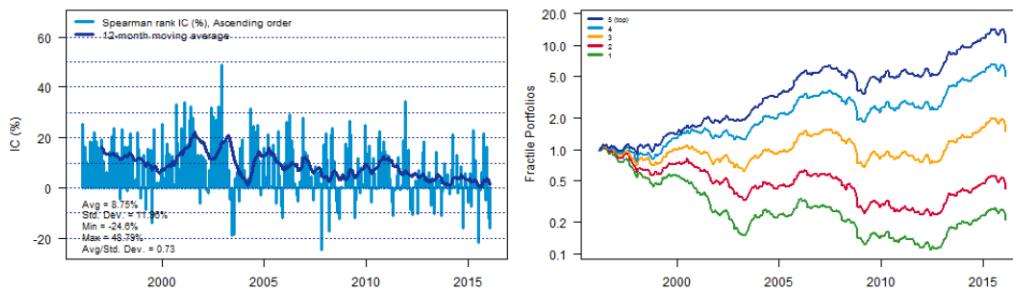
Ticker	Name	Country	Sector	Marketcap (USDm)	Composite Score
UPL MK	United Plantations BHD	MY	Consumer Staples	1,247	100
2356 TT	Inventec Corp	TW	Information Technology	2,547	100
2377 TT	Micro Star Intl Co	TW	Information Technology	1,040	100
NHPC IB	NHPC Ltd	IN	Utilities	3,225	100
028670 KS	Pan Ocean Co Ltd	KR	Industrials	1,255	100
2727 HK	Shanghai Electric Group Co Ltd H Shares	CN	Industrials	1,156	100
TOP TB	Thai Oil PCL	TH	Energy	3,321	100
PLNG IB	Petronet LNG Ltd	IN	Energy	2,650	100
NLC IB	Neyveli Lignite Corp Ltd	IN	Utilities	1,609	99
008560 KS	Meritz Securities	KR	Financials	1,359	99
2408 TT	Nanya Technology Corp	TW	Information Technology	3,144	99
IOCL IB	Indian Oil Corp Ltd	IN	Energy	12,960	99
4938 TT	Pegatron Corporation	TW	Information Technology	5,964	99
BPCL IB	Bharat Petroleum Corp Ltd	IN	Energy	8,182	99
RPWR IB	Reliance Power Ltd	IN	Utilities	1,758	99
127 HK	Chinese Estates Holdings Ltd.	HK	Financials	4,158	99
TASCO TB	Tipco Asphalt PCL	TH	Materials	1,191	98
363 HK	Shanghai Industrial Holdings Ltd.	CN	Industrials	2,107	98
000070 KS	Samyang Holding Corp	KR	Consumer Staples	1,044	98
2207 TT	Hotai Motor Co Ltd	TW	Consumer Discretionary	5,379	98

Ticker	Name	Country	Sector	Marketcap (USDm)	Composite Score
TBIG IJ	Tower Bersama Infrastructure Tbk PT	ID	Telecommunication Services	2,168	3
696 HK	TravelSky Technology Ltd. - H Shares	CN	Information Technology	1,316	3
388 HK	Hong Kong Exchanges and Clearing Ltd.	HK	Financials	25,289	3
GE SP	Great Eastern Holdings	SG	Financials	6,638	3
NOL SP	Neptune Orient Lines Ltd	SG	Industrials	2,319	2
2883 HK	China Oilfield Services Ltd H Shares	CN	Energy	1,188	2
009540 KS	Hyundai Heavy Industries Co	KR	Industrials	5,952	2
MAHB MK	Malaysia Airports Holdings Bhd	MY	Industrials	2,399	2
2066 HK	Shengjing Bank Ltd-H share	CN	Financials	1,958	2
2186 HK	Luye Pharma Group Ltd	CN	Health Care	2,515	2
6863 HK	China Huishan Dairy Holdings Company Ltd	CN	Consumer Staples	5,120	2
1031 HK	Kingston Financial Froup Ltd	HK	Financials	3,810	2
168 HK	Tsingtao Brewery Co Ltd H Shares	CN	Consumer Staples	2,346	1
1060 HK	Alibaba Pictures Group Ltd	CN	Consumer Discretionary	4,956	1
ITD TB	Italian-Thai Development PCL	TH	Industrials	1,015	1
MRT SP	SMRT Corp Ltd	SG	Industrials	1,766	1
241 HK	Alibaba Health Information Technology Ltd	HK	Telecommunication Services	3,672	1
522 HK	ASM Pacific Technology Ltd.	HK	Information Technology	3,193	1
IDFCBK IB	IDFC Bank Ltd	IN	Financials	2,503	1
2039 HK	China International Marine Containers (Group) Co Ltd	CN	Industrials	2,432	1

Source: S&amp;P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 63: Japan Composite Model (As of 2016-02-12)



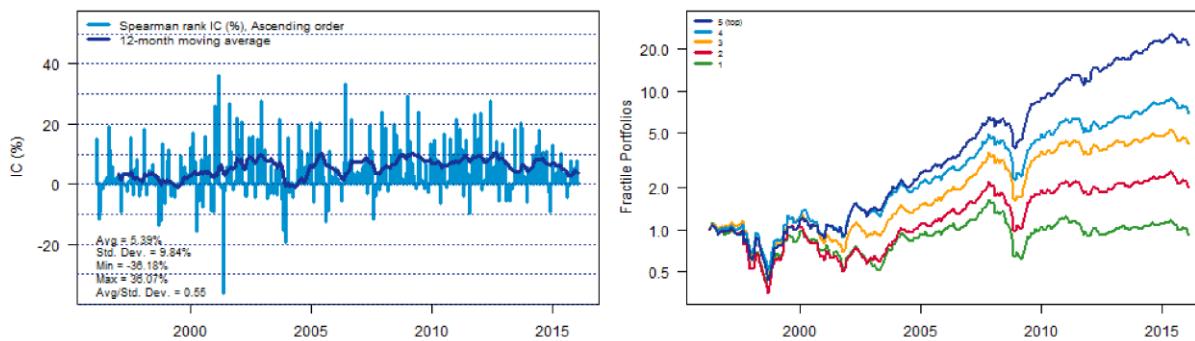
TOP RANKED STOCKS (as of 2016-02-12)				
Ticker	Name	Sector	Marketcap (USDm)	Composite Score
4042 JT	Tosoh Corp	Materials	2,306	100
8591 JT	Orix Corp	Financials	14,828	100
7201 JT	Nissan Motor Co	Consumer Discretionary	37,214	100
6724 JT	Seiko Epson Corp	Information Technology	5,466	100
7203 JT	Toyota Motor Corp	Consumer Discretionary	169,076	99
7240 JT	NOK Corp	Consumer Discretionary	2,521	99
6503 JT	Mitsubishi Electric Corp	Industrials	18,066	99
8354 JT	Fukuoka Financial Group	Financials	2,661	99
6201 JT	Toyota Industries Corp	Consumer Discretionary	12,949	98
8804 JT	Tokyo Tatemono Co	Financials	1,999	98
8341 JT	77 Bank Ltd	Financials	1,278	98
8601 JT	Daiwa Securities Group Inc	Financials	9,172	98
8316 JT	Sumitomo Mitsui Financial Group	Financials	35,868	97
8586 JT	Hitachi Capital Corp	Financials	2,479	97
6448 JT	Brother Industries	Information Technology	2,582	97
8379 JT	Hiroshima Bank	Financials	2,257	97
7211 JT	Mitsubishi Motors Corp	Consumer Discretionary	6,762	96
8333 JT	Joyo Bank	Financials	2,508	96
8001 JT	Itochu Corp	Industrials	17,310	96
3291 JT	Iida Group Holdings Co Ltd	Consumer Discretionary	4,743	96

BOTTOM RANKED STOCKS (as of 2016-02-12)				
Ticker	Name	Sector	Marketcap (USDm)	Composite Score
8113 JT	Uni Charm Corp	Consumer Staples	11,289	5
5901 JT	Toyo Seikan Group Holdings Ltd	Materials	3,672	5
4704 JT	Trend Micro Inc	Information Technology	4,878	5
3462 JT	Nomura Real Estate Master Fund Inc	Financials	4,731	5
2229 JT	Calbee Inc	Consumer Staples	5,177	4
6753 JT	Sharp Corp	Consumer Discretionary	2,097	4
2670 JT	ABC-Mart Inc	Consumer Discretionary	4,558	4
9024 JT	Seibu holding Inc	Industrials	6,637	4
9766 JT	Konami Holdings Cor	Information Technology	3,260	3
6861 JT	Keyence Corp	Information Technology	27,809	3
9045 JT	Keihan Electric Railway Co	Industrials	3,559	3
8572 JT	Acom Co	Financials	6,088	3
9983 JT	Fast Retailing Co	Consumer Discretionary	30,477	2
3197 JT	Skylark Co Ltd	Consumer Discretionary	2,506	2
3064 JT	Monotaro Co Ltd	Industrials	2,389	2
2413 JT	M3 Inc	Health Care	6,867	2
9706 JT	Japan Airport Terminal Co	Industrials	2,637	1
2702 JT	McDonald's Hldgs Co Japan	Consumer Discretionary	2,923	1
7182 JT	Japan Post Bank co	Financials	46,824	1
7181 JT	Japan Post Insurance co	Financials	11,991	1

Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 64: Asia ex Japan Technical Model (As of 2016-02-12)



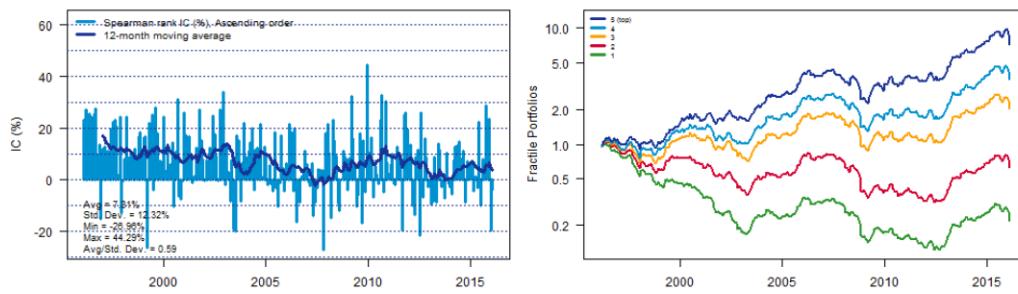
TOP RANKED STOCKS (as of 2016-02-12)					
Ticker	Name	Country	Sector	Marketcap (USDm)	Composite Score
371 HK	Beijing Enterprises Water Group Ltd.	CN	Utilities	3,966	100
257 HK	China Everbright International Ltd.	CN	Industrials	4,109	100
2454 TT	Mediatek Inc	TW	Information Technology	9,438	100
1288 HK	Agricultural Bank of China Ltd H Shares	CN	Financials	9,865	100
2823 TT	China Life Insurance	TW	Financials	2,291	100
CMS MK	Cahya Mata Sarawak Bhd	MY	Industrials	1,296	100
HART MK	Hartalega Holdings Bhd	MY	Health Care	1,936	100
1177 HK	Sino Biopharmaceutical Ltd.	CN	Health Care	5,233	100
669 HK	Techtronic Industries Co. Ltd.	HK	Consumer Discretionary	6,603	99
12 HK	Henderson Land Development Co. Ltd.	HK	Financials	16,492	99
2308 TT	Delta Electronic Ind	TW	Information Technology	10,335	99
BAF IB	Bajaj Finance Ltd	IN	Financials	4,709	99
BHEL IB	Bharat Heavy Electricals Ltd	IN	Industrials	3,743	99
MAXIS MK	Maxis Bhd	MY	Telecommunication Services	10,914	99
204320 KS	Mando Corp	KR	Consumer Discretionary	1,110	99
084990 KS	ViroMed Co. Ltd.	KR	Health Care	1,726	99
BIGC TB	Big C Supercenter PCL	TH	Consumer Staples	5,696	98
1216 TT	Uni-President Enterprises	TW	Consumer Staples	9,350	98
004370 KS	Nong Shim Co	KR	Consumer Staples	2,107	98
PNBN IJ	Bank Pan Indonesia Tbk PT	ID	Financials	1,113	98

BOTTOM RANKED STOCKS (as of 2016-02-12)					
Ticker	Name	Country	Sector	Marketcap (USDm)	Composite Score
2412 TT	Chunghwa Telecom Co Ltd	TW	Telecommunication Services	23,994	3
917 HK	New World China Land Ltd.	HK	Financials	8,377	3
161390 KS	Hankook Tire Co Ltd/New	KR	Consumer Discretionary	5,097	3
PTTGC TB	PTT Global Chemical PCL	TH	Materials	6,517	3
2325 TT	Siliconware Precision Industries Co	TW	Information Technology	4,857	2
000270 KS	Kia Motors Corp	KR	Consumer Discretionary	15,539	2
005380 KS	Hyundai Motor Co	KR	Consumer Discretionary	24,959	2
2884 TT	E Sun Financial Hldgs Co Ltd	TW	Financials	3,951	2
GENS SP	Genting Singapore Plc	SG	Consumer Discretionary	5,839	2
017670 KS	SK Telecom Co Ltd	KR	Telecommunication Services	14,091	2
CIMB MK	CIMB Group Holdings Bhd	MY	Financials	8,589	2
WSKT IJ	PT Waskita Karya (Persero)	ID	Industrials	1,931	2
000670 KS	Young Poong Corp	KR	Materials	1,521	1
303 HK	VTech Holdings Ltd.	HK	Information Technology	2,729	1
2330 TT	Taiwan Semiconductor Manufacturing Co Ltd	TW	Information Technology	113,689	1
9945 TT	Ruentex Development Co Ltd	TW	Financials	1,778	1
MRT SP	SMRT Corp Ltd	SG	Industrials	1,766	1
5347 TT	Vanguard International Semiconductor Co	TW	Information Technology	2,448	1
1929 HK	Chow Tai Fook Jewellery Group Ltd	HK	Consumer Discretionary	6,547	1
3702 TT	WPG Holdings	TW	Information Technology	1,610	1

Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 65: Japan Technical Model (As of 2016-02-12)



TOP RANKED STOCKS (as of 2016-02-12)				
Ticker	Name	Sector	Marketcap (USDm)	Composite Score
8591 JT	Orix Corp	Financials	14,828	100
6503 JT	Mitsubishi Electric Corp	Industrials	18,066	100
4118 JT	Kaneka Corp	Materials	2,517	100
4307 JT	Nomura Research Institute Ltd	Information Technology	7,805	100
9021 JT	West Japan Railway	Industrials	10,844	99
7282 JT	Toyoda Gosei Co	Consumer Discretionary	2,365	99
1928 JT	Sekisui House	Consumer Discretionary	10,145	99
6592 JT	Mabuchi Motor Co	Industrials	2,960	99
5233 JT	Taiheiyo Cement Corp	Materials	2,415	98
6501 JT	Hitachi	Information Technology	18,479	98
9020 JT	East Japan Railway Co	Industrials	32,039	98
5020 JT	JX Holdings Inc	Energy	9,390	98
9005 JT	Tokyu Corp	Industrials	9,201	97
9404 JT	Nippon Television Holdings Inc	Consumer Discretionary	4,266	97
4183 JT	Mitsui Chemicals Inc	Materials	3,263	97
8601 JT	Daiwa Securities Group Inc	Financials	9,172	97
9041 JT	Kinki Nippon Railway Co (Kintetsu)	Industrials	7,610	96
4901 JT	Fujifilm Holdings Corp	Information Technology	17,845	96
5201 JT	Asahi Glass Co	Industrials	5,526	96
4681 JT	Resorttrust	Consumer Discretionary	2,310	96

BOTTOM RANKED STOCKS (as of 2016-02-12)				
Ticker	Name	Sector	Marketcap (USDm)	Composite Score
9503 JT	Kansai Electric Power Co Inc	Utilities	10,217	5
1963 JT	JGC Corp	Industrials	3,679	5
9435 JT	Hikari Tsushin Inc	Consumer Discretionary	2,969	5
4581 JT	Taisho Pharmaceutical Holdings Co Ltd	Health Care	6,340	5
5101 JT	Yokohama Rubber Co	Consumer Discretionary	2,364	4
4543 JT	Terumo Corp	Health Care	12,447	4
7731 JT	Nikon Corp	Consumer Discretionary	5,796	4
3765 JT	GungHo Online Entertainment	Information Technology	2,364	4
8035 JT	Tokyo Electron	Information Technology	8,991	3
6857 JT	Advantest Corp	Information Technology	1,726	3
4021 JT	Nissan Chemical Industries	Materials	3,498	3
4578 JT	Otsuka Holdings Co Ltd	Health Care	18,675	3
2282 JT	Nippon Meat Packers Inc	Consumer Staples	4,473	2
9983 JT	Fast Retailing Co	Consumer Discretionary	30,477	2
9783 JT	Benesse Holdings Inc	Consumer Discretionary	3,035	2
7181 JT	Japan Post Insurance co	Financials	11,991	2
6971 JT	Kyocera Corp	Information Technology	15,710	1
3863 JT	Nippon Paper Industries Co Ltd	Materials	1,934	1
2670 JT	ABC-Mart Inc	Consumer Discretionary	4,558	1
3197 JT	Skylark Co Ltd	Consumer Discretionary	2,506	1

Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



### “Fundamental” vs. Technical models: recent performance

In Asia ex-Japan, our bottom-up multi-factor model has performed well since the beginning of 2016. In Japan, the technical composite has performed better than the multi-factor composite, but it has also been affected by the Japanese market correction.

Figure 66: Model Performance over the last month and last 12 months.



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



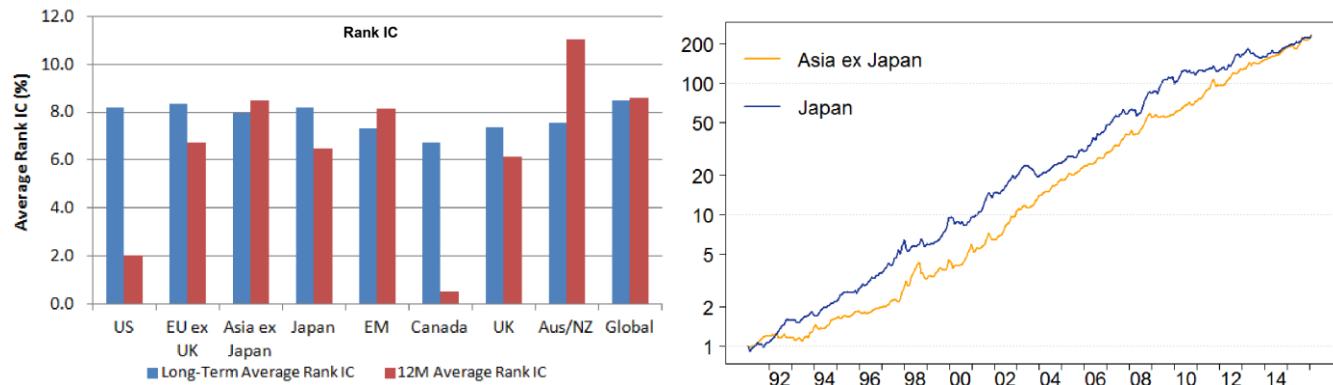
## N-LASR global stock selection model

- The N-LASR model is our flagship stock selection model for global equities.
- The model is based on a machine learning algorithm called AdaBoost, and is designed to adaptively learn which factors to use, often in a non-linear way.
- For complete details on the model, please see Wang et al., "Signal Processing: The Rise of the Machines", 5 June 2012.
- For a complete ranking for of our different universes, please contact [DBEOS.Americas@db.com](mailto:DBEOS.Americas@db.com).

### Model performance

The N-LASR model has performed well since inception. The charts below show the average pure signal performance, measured as a monthly rank information coefficient (IC), in different regions. On the right hand side, it shows the wealth curve of the portfolio going long the top decile and short the bottom decile of stocks ranked by N-LASR in both Japan and Asia ex Japan.

|Figure 67: N-LASR model performances (As of 2016-01-29)



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 68: N-LASR model screens for Asia ex Japan (as of 2016-01-29)

TOP RANKED STOCKS (as of 2016-01-29)					
Ticker	Name	Country	Sector	Marketcap (USDm)	Composite Score
3088 TT	Axiomtek Co Ltd	Taiwan	Information Technology	110	2.01
RHT SP	Religare Health Trust	Singapore	Health Care	379	1.86
FIRT SP	First REIT	Singapore	Financials	444	1.83
KLCCSS MK	KLCC Property Holdings Bhd	Malaysia	Financials	548	1.81
2377 TT	Micro Star Intl Co	Taiwan	Information Technology	861	1.81
SCC PM	Semirara Mining and Power Corp	Philippines	Energy	825	1.79
3023 TT	Sinbon Electronics Co Ltd	Taiwan	Information Technology	333	1.77
1093 HK	CSPC Pharmaceutical Group Ltd.	China	Health Care	2,037	1.74
PHRM MK	Pharmaniaga Berhard	Malaysia	Health Care	119	1.67
019680 KS	Daekyo	Korea	Consumer Discretionary	277	1.66
5388 TT	SerComm Corp	Taiwan	Information Technology	550	1.65
BCP TB	Bangchak Petroleum PCL	Thailand	Energy	282	1.65
UMSH SP	UMS Holdings Ltd	Singapore	Information Technology	113	1.65
ART SP	Ascott Residence Trust	Singapore	Financials	663	1.64
108790 KS	Interpark Corp	Korea	Consumer Discretionary	167	1.63
074600 KS	Wonik Qnc Corp	Korea	Information Technology	107	1.61
UOAD MK	UOA Development BHD	Malaysia	Financials	240	1.6
8114 TT	Posiflex Technologies Inc	Taiwan	Information Technology	217	1.55
VMS SP	Venture Corp Ltd	Singapore	Information Technology	1,409	1.53
1338 TT	Hiroca Holdings Ltd.	Taiwan	Consumer Discretionary	228	1.48

BOTTOM RANKED STOCKS (as of 2016-01-29)					
Ticker	Name	Country	Sector	Marketcap (USDm)	Composite Score
RWM PM	Travellers International Hotel Group; Inc.	Philippines	Consumer Discretionary	178	-1.72
2448 TT	Epistar Corp	Taiwan	Information Technology	923	-1.76
2103 TT	TSRC Corp	Taiwan	Materials	459	-1.78
323 HK	Maanshan Iron and Steel Co Ltd H Shares	China	Materials	316	-1.78
BUMI IJ	Bumi Resources Tbk PT	Indonesia	Energy	80	-1.78
6136 HK	Kangda International Environmental Company Ltd	China	Utilities	180	-1.8
RHBC MK	RHB Capital Bhd	Malaysia	Financials	1,100	-1.81
2603 TT	Evergreen Marine Corp	Taiwan	Industrials	580	-1.82
BEST IJ	Bekasi Fajar Industrial Estate Tbk PT	Indonesia	Financials	71	-1.85
1251 HK	SPT Energy Group Inc.	China	Energy	70	-1.9
SMM SP	Sembcorp Marine Ltd	Singapore	Industrials	890	-1.94
NOL SP	Neptune Orient Lines Ltd	Singapore	Industrials	767	-1.95
1365 HK	China Greenland Rundong Auto Group Ltd	China	Consumer Discretionary	77	-1.95
011160 KS	Doosan Engineering & Construct	Korea	Industrials	91	-1.95
2002 TT	China Steel Corp	Taiwan	Materials	6,618	-2.04
8267 HK	Linekong Interactive Group Co Ltd	China	Information Technology	130	-2.04
336 HK	Huabao International Holdings Ltd.	China	Materials	733	-2.08
COS SP	Cosco Corp (Singapore) Ltd	Singapore	Industrials	246	-2.52
028050 KS	Samsung Engineering Co Ltd	Korea	Industrials	1,634	-2.55
011200 KS	Hyundai Merchant Marine	Korea	Industrials	298	-2.69

Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



Figure 69: N-LASR model screens for Japan (as of 2016-01-29)

TOP RANKED STOCKS (as of 2016-01-29)				
Ticker	Name	Sector	Marketcap (USDm)	Composite Score
9945 JT	Plenus Co	Consumer Discretionary	360	1.99
4502 JT	Takeda Pharmaceutical Co Ltd	Health Care	35,420	1.9
7762 JT	Citizen Holdings Co Ltd	Information Technology	1,984	1.89
8016 JT	Onward Holdings Co Ltd	Consumer Discretionary	921	1.82
9437 JT	NTT DOCOMO	Telecommunication Services	28,996	1.8
9936 JT	Ohsho Food Service Corp	Consumer Discretionary	481	1.76
2503 JT	Kirin Holdings Co Ltd	Consumer Staples	12,153	1.65
4680 JT	Round One Corp	Consumer Discretionary	310	1.64
7752 JT	Ricoh Co	Information Technology	7,101	1.64
7282 JT	Toyoda Gosei Co	Consumer Discretionary	1,577	1.62
3405 JT	Kuraray Co	Materials	4,221	1.6
6960 JT	Fukuda Denshi Co	Health Care	553	1.6
8270 JT	UNY Group Holdings Co Ltd	Consumer Staples	1,481	1.57
2651 JT	Lawson Inc	Consumer Staples	5,318	1.56
4665 JT	Duskin Co Ltd	Industrials	1,041	1.55
6809 JT	Toa Corp (Hyogo)	Consumer Discretionary	295	1.51
4508 JT	Mitsubishi Tanabe Pharma Corp	Health Care	3,999	1.49
2433 JT	Hakuhodo DY Holdings	Consumer Discretionary	3,057	1.44
4298 JT	Proto Corp	Consumer Discretionary	151	1.44
2220 JT	Kameda Seika Co	Consumer Staples	689	1.43

BOTTOM RANKED STOCKS (as of 2016-01-29)				
Ticker	Name	Sector	Marketcap (USDm)	Composite Score
1720 JT	Tokyu Construction Co	Industrials	609	-1.54
4577 JT	Daito Pharmaceutical Co Ltd	Health Care	299	-1.54
9369 JT	K.R.S. Corp	Industrials	135	-1.56
4576 JT	D.Western Therapeutics Institute Inc	Health Care	59	-1.56
5408 JT	Nakayama Steel Works	Materials	158	-1.56
2160 JT	GNI Group Ltd	Health Care	131	-1.57
5981 JT	Tokyo Rope Mfg Co	Materials	190	-1.59
3653 JT	Morpho Inc.	Information Technology	187	-1.6
4564 JT	Oncotherapy Science	Health Care	276	-1.61
4406 JT	New Japan Chemical Co Ltd	Materials	47	-1.61
8897 JT	Takara Leben Co Ltd	Financials	433	-1.62
1811 JT	The Zenitaka Corp.	Industrials	173	-1.64
6317 JT	Kitagawa Iron Works Co	Industrials	168	-1.64
7868 JT	Kosaido Printing Co Ltd	Industrials	66	-1.73
6077 JT	N Field Co Ltd	Health Care	88	-1.76
6516 JT	Sanyo Denki Co	Industrials	272	-1.81
3692 JT	FFRI Inc.	Information Technology	187	-1.84
8925 JT	Ardepro Co Ltd	Financials	139	-1.9
4572 JT	Carna Biosciences Inc.	Health Care	128	-2
3252 JN	Nippon Commercial Development Co Ltd	Financials	90	-2.33

Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



# Appendix

## Quantifying Markets

### Risk aversion

#### Motivation

- How can we monitor risk in financial markets? What proxies should we pay attention to?
- Is there a way to aggregate all the information into a single risk indicator?
- Can investors better allocate their assets based on current risk regimes?

Figure 70: Comparing our risk proxies with other studies

	Cleveland Financial Stress Index (CFSI)	Canadian Financial Stress Index (FSI)	Composite Indicator of Systemic Stress (CISS)	Global Quantile Risk Indicator (GQRI)	Sentiment Indicator (SI)	Risk Aversion (RA)	Our Risk Aversion Indicator
No. of components	11	9	15	6	16	Over 60	15
Money markets	US TED spread Interbank cost of borrowing Realized vol of LIBOR MFI recourse to the marginal facility Swap spread Bid-ask spread	✓ ✓ ✓ ✓ ✓ ✓				✓	✓
Financial sector	MSCI Financials Index / MSCI World Index CMAX of Financial sector Idiosyncratic volatility of bank equity returns Bank bond spread 30Y / 2Y Asset swap spread Financial beta CDS			✓ ✓	✓		✓
Foreign Exchange markets	Weighted dollar crashes Implied Volatility Realized Volatility of currency pairs IM / IY volatility spread Risk reversal	✓ ✓ ✓ ✓ ✓		✓ ✓	✓ ✓	✓ ✓	✓ ✓
Credit markets	Covered interest spread Corporate bond spread Commercial paper over Treasury bill spread Treasury yield curve spread Itraxx IG Bond volatility Non-financial CDS spread	✓ ✓ ✓ ✓ ✓ ✓ ✓		✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓
Equity markets	CMAX of stock market index VIX Realized Volatility of non-financial returns 4-year / 4-week stock-bond correlations differences	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓
Commodity markets	Oil implied volatility					✓	✓
Reference	Oet et al (2011)	Ilking and Liu (2006)	Hollo et al (2012)	Luo et al (2009)	Chen and Natividade (2012)	Guilleminot et al (2014)	

Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



### Constructing a risk aversion indicator

- To compare across different risk proxies and over time, we normalize the proxies using a rolling 250-day Quantile score.
- We first construct sector risk aversion indicators by equal weighting all proxies within the same sector.
- Then, we apply non-negative matrix factorization to obtain the dynamic weights assigned to each risk aversion sector. We look for positive matrices  $F$  (columns of factors) and  $W$  (factor weights) to decompose our risk aversion sectors  $X$ , which are assumed to be positive:

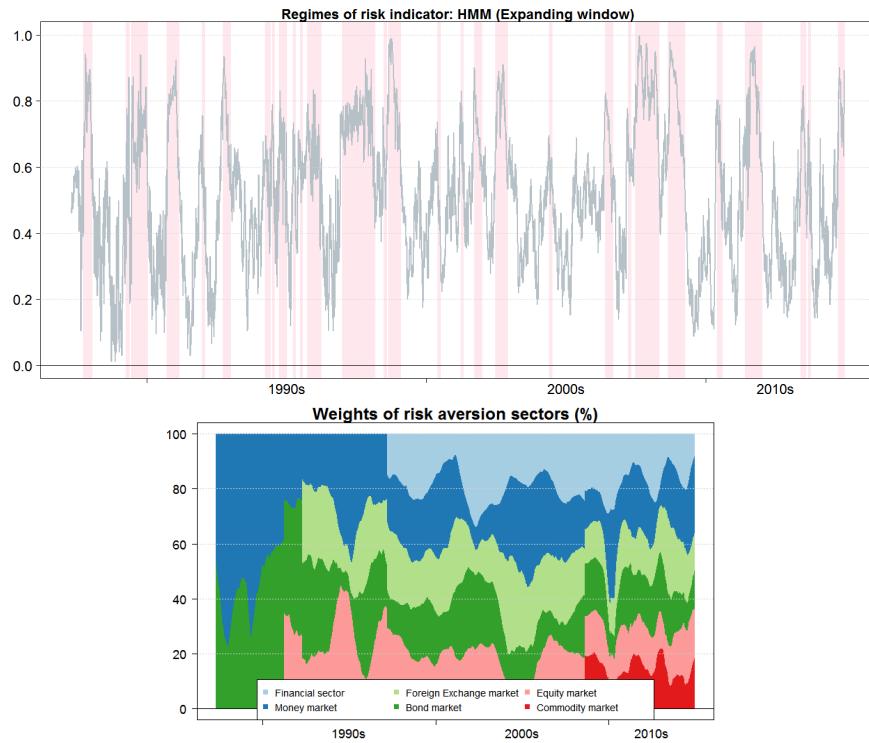
$$X \approx F \times W$$

- The Global risk aversion indicator is a weighted average of all risk aversion sectors.

### Identifying risk regimes based on the Hidden Markov Model

- In a hidden Markov model, the system (e.g., the economy) can be in different states (e.g., "volatile" and "calm").
- The evolution of the states is described by a Markov chain, i.e., the probability of being in a given state at time  $(t+1)$  depends on the state at time  $t$ , but not on previous states.
- The state is latent: what we observe is a draw from a distribution associated with the current state.
- For instance, the return distribution for the "volatile" state could have a negative mean and high variance, while the distribution for the "calm" state could have a positive mean and a smaller variance.

Figure 71: Risk aversion indicator and sector weights over whole history



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



## Investor Sentiment

### Motivation

- Companies which decide to raise capital through an IPO show an optimistic view to the market, while negative momentum in the major stock index shows a pessimistic view.
- We quantify all the information reflecting the views of investors and build a market-wide sentiment index which tracks the collective view.

### State space model

- We model the sentiment index via a dynamic linear model, casted in state space form
- The unobservable sentiment index is viewed as a common driver (i.e. the state variable) for various sentiment measures
- Sentiment proxy:  $y_{i,t}$  changes in sentiment index:  $\theta_t$

$$y_{i,t} = \gamma_i \theta_t + v_{i,t}$$

- Dynamics for state variable and error process:

$$\theta_t = \phi_1 \theta_{t-1} + \varepsilon_t, \quad \varepsilon_t \sim N(0,1)$$

$$v_{i,t} = \psi_{i1} v_{i,t-1} + \eta_{i,t}, \quad \eta_{i,t} \sim N(0, \sigma_i^2)$$

- Observation equation:  
$$y_{i,t} - \psi_{i1} y_{i,t-1} = \gamma_i \cdot (\theta_t - \psi_{i1} \theta_{t-1}) + \eta_{i,t}, \quad \eta_{i,t} \sim N(0, \sigma_i^2)$$
- We estimate the parameters and the state using a Gibbs sampler with MCMC
- We standardize the sentiment index with respect to the history starting from August 1996

For further details, please see Le Binh et al., "Quantiles: Harnessing Investor Sentiment", 4 February 2013 on our Global Quantitative Strategy website at <https://eqindex.db.com/gqs/>



Figure 72: What sentiment proxies for Asia?

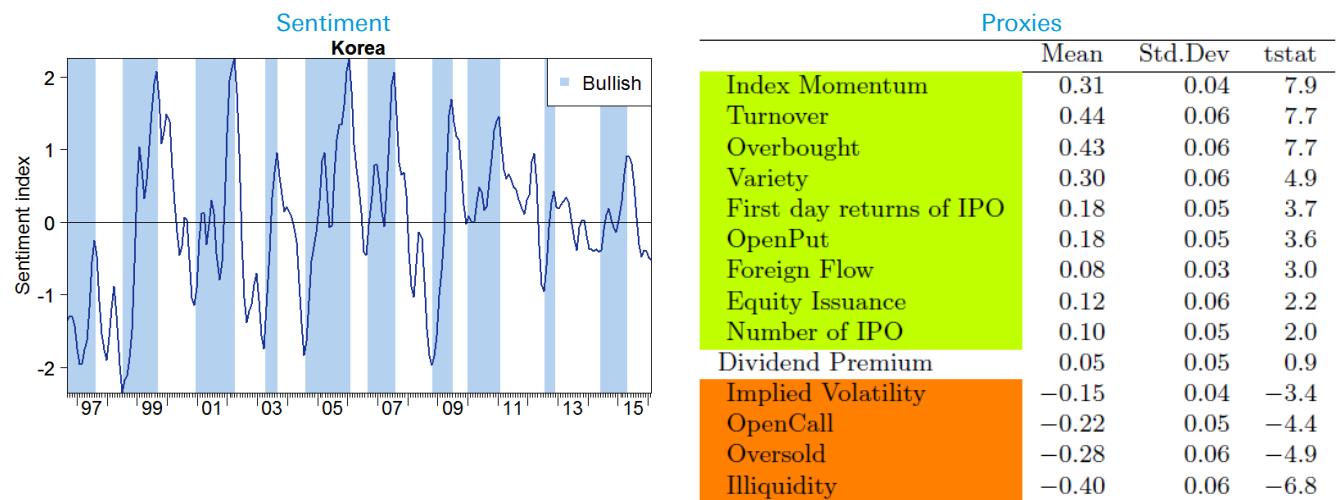
Proxy	Description	First difference	Expected sign	Reason	AU	HK	JP	KR	TW
Mom	3 month momentum in major Index		+	Positive momentum is good for sentiment	✓	✓	✓	✓	✓
Overbought	% of stocks with RSI > 70	✓	+	A large proportion of overbought stocks could be a possible indication of exuberance	✓	✓	✓	✓	✓
Oversold	% of stocks with RSI < 30	✓	-	A large proportion of oversold stocks could be a possible indication of stress	✓	✓	✓	✓	✓
OpenPut	Open interest in put options	✓	+	Could act as a contrarian indicator	✓	✓	✓	✓	✓
OpenCall	Open interest in call options	✓	-	Could act as a contrarian indicator	✓	✓	✓	✓	✓
TURN	Monthly share turnover	✓	+	Higher turnover can be an indicator of bullish market	✓	✓	✓	✓	✓
Illiquidity	Market level of Amihud ratio	✓	-	Increase in illiquidity may signal a bear market	✓	✓	✓	✓	✓
ImpliedVol	Market implied volatility (VIX)	✓	-	The "fear" indicator	✓	✓	✓	✓	
Variety	Cross-sectional volatility	✓	-	Higher cross sectional volatility corresponds to more volatile markets typical during distress	✓	✓	✓	✓	✓
ForeignFlow	Net new fund flow from foreign investors		+	Foreign / global institutional investors may have an influence on local sentiment		✓	✓	✓	
DivPrem	Dividend premium: P/B for dividend payers versus non-payers	✓	-	Increase in dividend premium means investors prefer the "safety" of dividend paying stocks	✓	✓	✓	✓	✓
NIPO	Number of IPOs	✓	+	Increase in number of IPO reflects a confidence in the market from issuers and investors	✓	✓	✓	✓	✓
RIPO	Average first day returns of IPOs	✓	+	Increase in first day returns of IPO reflects investor optimism	✓	✓	✓	✓	✓
EquityIssue	Size of total new equity issuance, including IPO, rights issue and secondary offering	✓	+	Increase in the size of equity issues reflects a confidence in the market from issuers and investors	✓	✓	✓	✓	✓

Source: S&amp;P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy

**An example: Sentiment in Korea**

- Investor sentiment is driven by all but one of the proxies we considered.
- The main drivers of sentiment are the surge in market turnover, increase in the proportion of stocks overbought as well as the positive KOSPI momentum.

Figure 73: Sentiment in Korea (as on 2016-02-10)



Source: S&amp;P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



## Bubbles

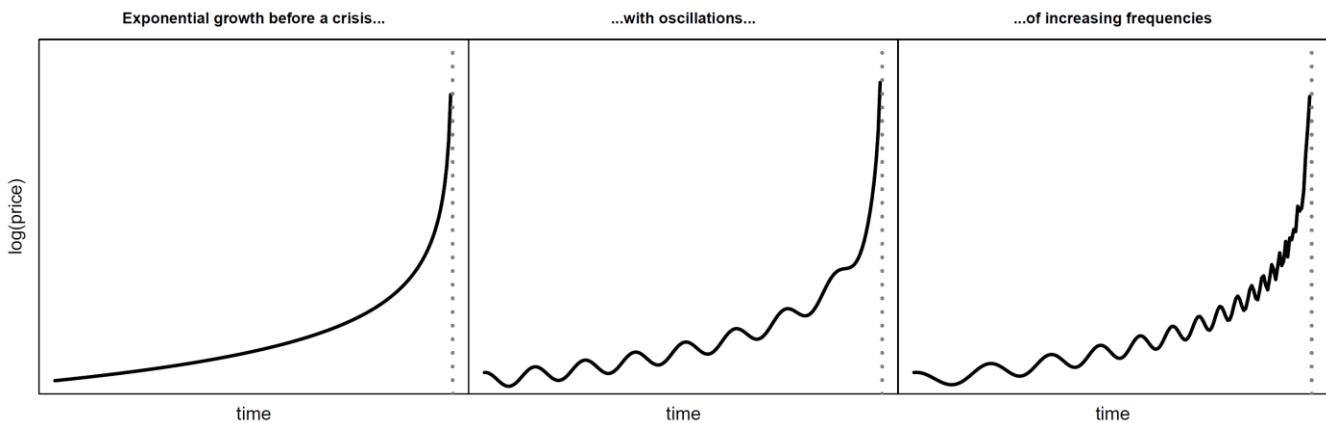
Empirical model: log-periodic power law

- During a bubble, we expect prices to rise at a super-exponential rate.
- We often see fluctuations as the bubble grows: investors are overly optimistic, then notice it and rein in their excitement, then think they have over-corrected their expectations, and the cycle starts again.
- As excitement spreads in the markets, the frequency of those oscillations increases.
- The log-periodic power law (LPPL) model models those features.
- For further details, please see Zoonekynd et al., "Quantfucius: Bubbles", 12 June 2014 on our Global Quantitative Strategy website at <https://eqindex.db.com/gqs/>

### References:

- [1] A stable and robust calibration scheme of the log-periodic power law model V. Filimonov and D. Sornette (2011), <http://arxiv.org/abs/1108.0099>
- [2] Clarifications to questions and criticisms on the Johansen-Ledoit-Sornette bubble model, D. Sornette et al. (2011), <http://arxiv.org/abs/1107.3171>
- [3] How we can predict the next financial crisis, D. Sornette (TEDGlobal, 2013), [http://www.ted.com/talks/didier\\_sornette\\_how\\_we\\_can\\_predict\\_the\\_next\\_financial\\_crisis](http://www.ted.com/talks/didier_sornette_how_we_can_predict_the_next_financial_crisis)

Figure 74: Features of pre-crisis prices captured by the LPPL model



$$\log(\text{price}) = \alpha + \beta(t_0 - t)^\gamma(1 + \varepsilon \cos(\omega \log(t_0 - t) + \phi))$$

Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



## Disentangling Markets

### Factor Performance: Truncated Graphs

- The "truncated graphs" are computed from the rank correlation matrix of the factor returns by drawing an edge between factors with a correlation beyond 0.5.
- The node colors correspond to the result of a greedy community detection algorithm [1], maximizing the modularity [2,3,4] of the partition into communities, i.e., trying to find communities with many edges inside communities, and fewer between communities.
- The layout of the nodes is computed using the union of the truncated graph (which need not be connected) and the minimum spanning tree, to avoid isolated nodes being placed at random.

### References:

- [1] Community structure in social and biological networks, M. Girvan M. and M.E.J. Newman (2002), <http://www.pnas.org/content/99/12/7821.abstract>
- [2] Social Network Analysis, L. Adamic (Coursera, 2012),  
<https://www.coursera.org/course/sna>
- [3] Social media mining, R. Zafarani et al. (Cambridge University Press, 2014)  
<http://dmml.asu.edu/smm>
- [4] Networks, Crowds, and Markets: Reasoning About a Highly Connected World, D. Easley and J. Kleinberg (Cambridge University Press, 2010)  
<http://www.cs.cornell.edu/home/kleinber/networks-book/>

Figure 75: Glossary of Factors

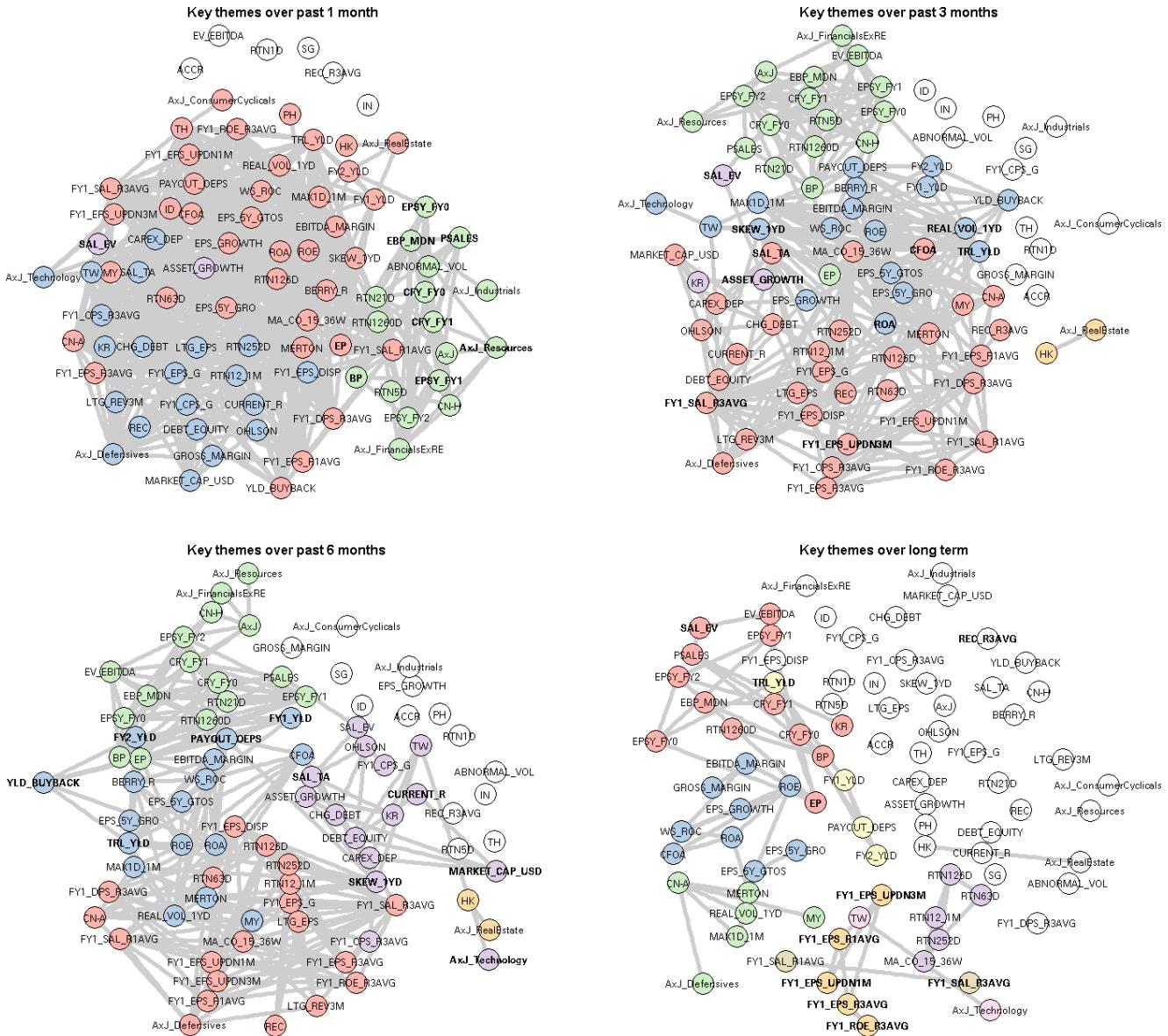
Item	Description	Group	Item	Description	Group
ASSET_GROWTH	Asset Growth	Growth	FY1_EPS_UPDN3M	FY1 EPS up/down ratio, 3M	Sentiment
EPS_GROWTH	EPS Growth	Growth	FY1_CPS_R3AVG	FY1 Mean CFPS Revision, 3M	Sentiment
EPS_5Y_GRO	EPS 5Y growth	Growth	FY1_DPS_R1AVG	FY1 Mean DPS Revision, 1M	Sentiment
EPS_5Y_GTOS	5Y EPS growth/stability	Growth	FY1_DPS_R3AVG	FY1 Mean DPS Revision, 3M	Sentiment
FY1_CPS_G	FY1 mean CFPS growth	Growth	FY1_EPS_R1AVG	FY1 Mean EPS Revision, 1M	Sentiment
FY1_EPS_G	FY1 mean EPS growth	Growth	FY1_EPS_R3AVG	FY1 Mean EPS Revision, 3M	Sentiment
FY2_DPS_G	FY2 mean DPS growth	Growth	FY1_ROE_R1AVG	FY1 Mean ROE Revision, 1M	Sentiment
LTG_EPS	Estimate Long Term Growth for EPS	Growth	FY1_ROE_R3AVG	FY1 Mean ROE Revision, 3M	Sentiment
RTN12_1M	12-month minus 1-month Total Return	Momentum	FY1_SAL_R1AVG	FY1 Mean SAL Revision, 1M	Sentiment
RTN252D	Total return, 252D	Momentum	FY1_SAL_R3AVG	FY1 Mean SAL Revision, 3M	Sentiment
MA_CO_15_36W	15W-36W Moving Average crossover	Momentum	LTG_REV1M	LTG Mean EPS Revision, 1M	Sentiment
CHG_DEBT	Change in Debt	Quality	LTG_REV3M	LTG Mean EPS Revision, 3M	Sentiment
CURRENT_R	Current Ratio	Quality	REC_R3AVG	Mean recommendation revision, 3M	Sentiment
DEBT_EQUIITY	Debt-to-Equity	Quality	REC	Recommendation average	Sentiment
GROSS_MARGIN	Gross Margin	Quality	PTG_RTN	Target price implied return	Sentiment
FY1_EPS_DISP	FY1 EPS dispersion	Quality	ABNORMAL_VOL	Abnormal Volume	Size
ROA	Return on Assets	Quality	MARKET_CAP_USD	Market Cap	Size
ROE	Return on Equity	Quality	CFY_FY0	Cash Flow Yield, FY0	Value
WS_ROC	Return on Invested Capital	Quality	CFY_FY1	Cash Flow Yield, FY1	Value
SAL_TA	Sales-to-Total Assets	Quality	FY1_YLD	Dividend yield, FY1	Value
EBITDA_MARGIN	EBITDA Margin	Quality	FY2_YLD	Dividend yield, FY2	Value
BERRY_R	Berry Ratio	Quality	TRL_YLD	Dividend yield, trailing 12M	Value
CAPEX_DEP	Capex to Depreciation	Quality	EBP_MDN	Est Book-to-price	Value
RTN1260D	Total return, 1260D	Risk and Reversal	EP	Earnings Yield (Worldscope)	Value
RTN1D	Total return, 1D	Risk and Reversal	EPSY_FY0	Earnings yield, FY0 (IBES)	Value
RTN21D	Total return, 21D	Risk and Reversal	EPSY_FY1	Earnings yield, forecast FY1 mean	Value
RTN5D	Total return, 5D	Risk and Reversal	EPSY_FY2	Earnings yield, forecast FY2 mean	Value
REAL_VOL_1YD	Realized vol, 1Y daily	Risk and Reversal	SALES_P	Sales to Price	Value
SKEW_1YD	Skewness, 1Y daily	Risk and Reversal	BP	Trailing Book yield	Value
MAX1D_1M	Lottery Factor	Risk and Reversal	EV_EBITDA	EV to EBITDA	Value
FY1_EPS_UPDN1M	FY1 EPS up/down ratio, 1M	Sentiment	SAL_EV	Sales/EV	Value

Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



## Key themes in Asia ex Japan

| Figure 76: Asia ex Japan factor performance (as of 2016-02-19)

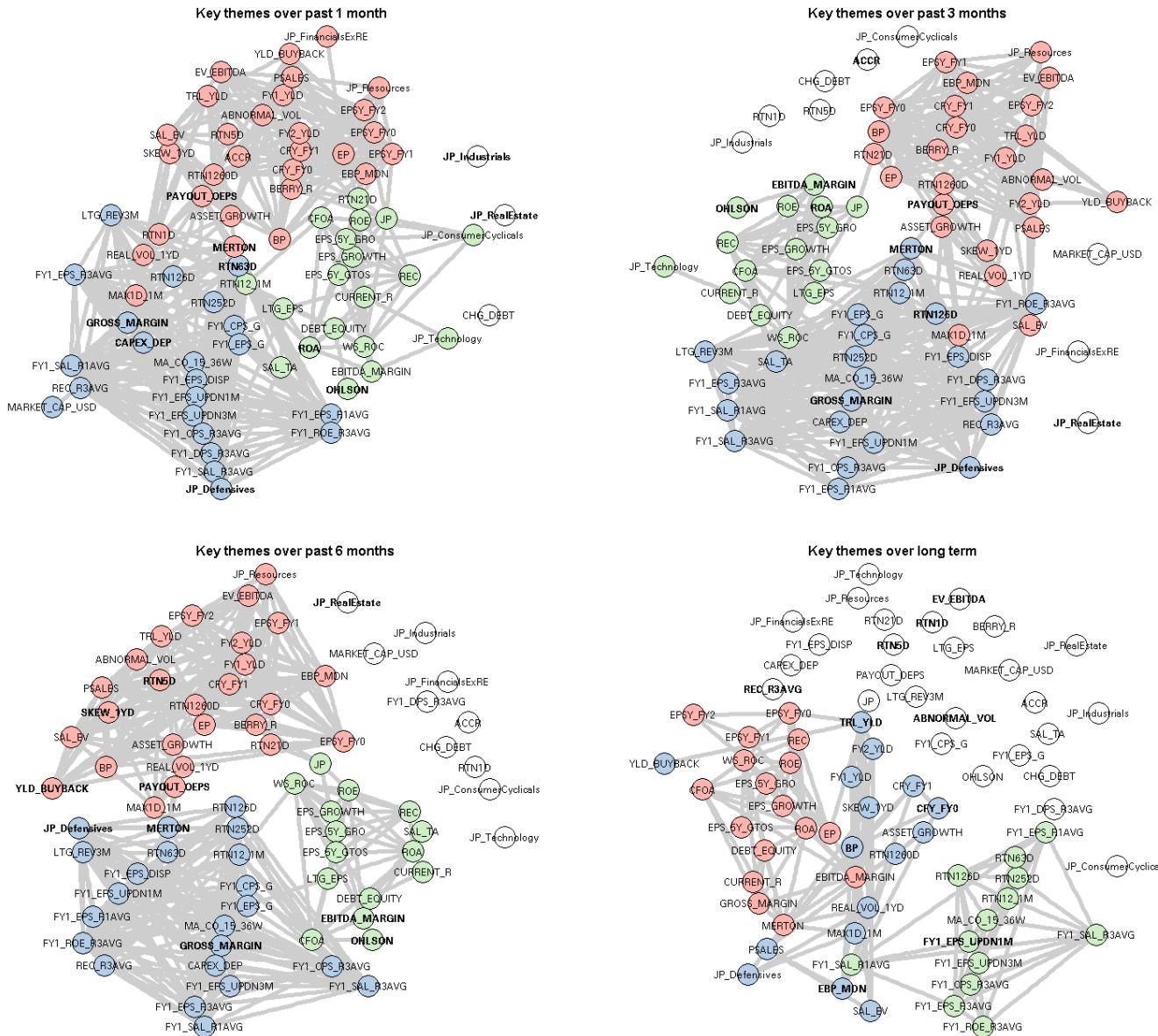


*Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy*



## Key themes in Japan

Figure 77: Japan factor performance (as of 2016-02-19)

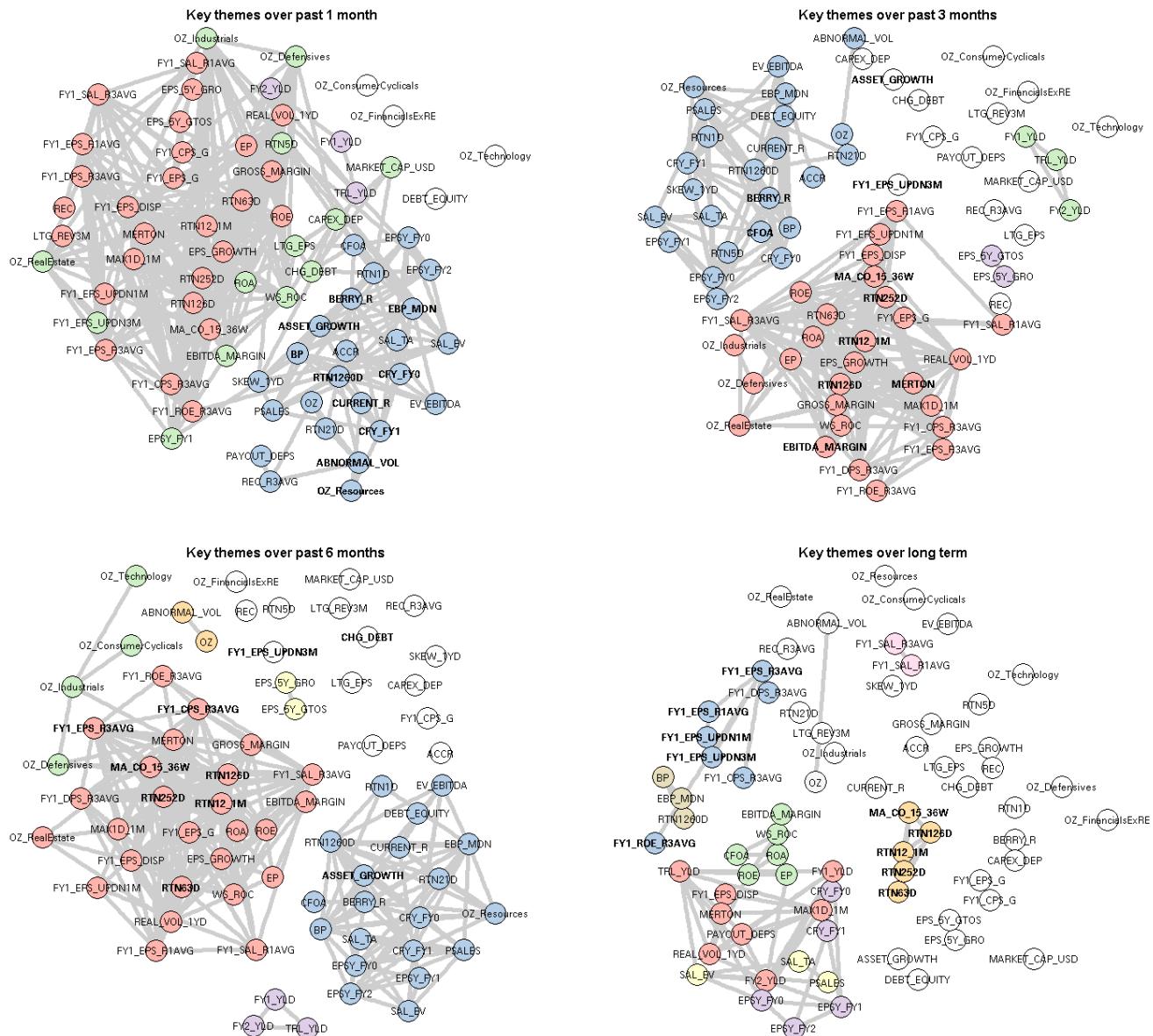


Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



## Key themes in Australia/New Zealand

Figure 78: Australia/New Zealand factor performance (as of 2016-02-19)



Source: S&P, Thomson Reuters, Bloomberg Finance LP, Deutsche Bank Quantitative Strategy



## Valuation Premia – What's cheap, what's expensive?

### Valuation drivers in Asian markets

We introduce characteristics to explain valuation discount and premia variables to capture risk (country, sector, size), sentiment (analyst recommendation, earnings revisions and dividends-to-book equity) and fundamental drivers of drivers of ROE, as identified by the DuPont decomposition: profitability (measured by the profit margin), operating efficiency (measured by asset turnover), and financial leverage.

$$\log\left(\frac{V_{k,t}}{B_{k,t}}\right) = \alpha_t + \beta_t^{PM} \cdot \log(PM) + \beta_t^{TURN} \cdot \log(TURN) + \beta_t^{LEV} \cdot \log(LEV) + \sum_X \beta_t^X \cdot X_{k,t}$$

Sectors are defined by reviewing the GICS classification:

- Resources (a combination of the Energy and Basic materials sectors)
- Defensives (a combination of Consumer Staples, Healthcare, Telecom and Utilities)
- Industrials, Consumer Cyclicals, Technology
- Financials ex Real-Estate, Real Estate

### Valuation premia

We also add the following constraints to have a unique solution that will be useful to interpret the differences in valuation (i.e. premia) among countries and sectors

$$\sum_{X \in Countries} \beta_t^X = \sum_{X \in Sectors} \beta_t^X = 0$$

The model above disentangles country, sector, fundamental and sentiment effects. Each coefficient represents the valuation premium for a given characteristic.

### Estimation

- Each month, we run a cross-sectional regression as specified in the model, fitting the current market price

$$\log\left(\frac{P_{k,t}}{B_{k,t}}\right) = \alpha_t + \beta_t^{PM} \cdot \log(PM) + \beta_t^{TURN} \cdot \log(TURN) + \beta_t^{LEV} \cdot \log(LEV) + \sum_X \beta_t^X \cdot X_{k,t} + \varepsilon_{k,t}$$

- Explanatory variables except the dummies are normalized in the cross-section
- The residual  $\varepsilon_{k,t}$  can be interpreted as a stock specific premium, or a "mispricing" since it is a deviation from the expected fair value
- We will be able to assess whether or not a particular characteristic is priced by investors at a given time in their valuation of stocks by looking at the statistical significance and the magnitude of its associated coefficient
- For further details, please see Le Binh et al., "Quantiles: Value focused, value driven", 11 December 2012 on our Global Quantitative Strategy website at <https://eqindex.db.com/gqs/>



# Appendix 1

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Raj Hindocha  
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FICC Research & Global Macro Economics

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Deutsche Bank Research, Germany

Andreas Neubauer  
Regional Head  
Equity Research, Germany

---

**International Locations**

**Deutsche Bank AG**  
Deutsche Bank Place  
Level 16  
Corner of Hunter & Phillip Streets  
Sydney, NSW 2000  
Australia  
Tel: (61) 2 8258 1234

**Deutsche Bank AG**  
Große Gallusstraße 10-14  
60272 Frankfurt am Main  
Germany  
Tel: (49) 69 910 00

**Deutsche Bank AG**  
Filiale Hongkong  
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