24 July 2014

Macro
Currency Strategy

HSBC
Global Research

Currency Weekly

AUD-NZD: book your parity party, but not yet

Market focus pg 2

Since early 2011, AUD-NZD has fallen about 20% and for much of this year has been trading close to the lowest levels seen since the currencies were both floated in the 1980s. The fall in the cross rate reflects a combination of the AUD giving back ground and the NZD continuing to trend higher. The recent jump in AUD-NZD following the RBNZ meeting is not consistent with the fundamentals and we expect the fall to resume.

The main reason for the sustained fall in the cross has been the shift in relative interest rate expectations. While the RBA has been on hold since its last rate cut in August 2013, the RBNZ has raised rates by a total of 100bp since the beginning of this year. For the next few months, both sets of policymakers are likely to keep rates on hold, and AUD-NZD may continue to tread water for now. Both central banks are trying to talk their respective currencies down.

Beyond the short term, we expect the cross to head lower again, and to challenge parity by the end of the year. This view is based on three factors:

1. **Relative growth prospects**: The New Zealand economy continues to grow faster than long-term potential, whereas higher unemployment suggests Australia still has slack in the economy.
2. **Relative commodity prices**: Slower growth in China has hit Australia's commodity export prices much more than those in New Zealand. The Australian mining investment boom is fading, and the rebalancing of growth has been very slow.
3. **Relative valuation**: Although both currencies remain 'overvalued' relative to PPP, and both central banks would like to see their currencies lower, AUD is about 10% more 'overvalued' than NZD.

It may not yet be quite time to book your parity party, but you should at least be checking out venues.

Quant indicators pg 10

Regular updates of our quantitative indicators. This includes an overview of the correlations between all G10 exchange rates; a series of indicators that measure the dominance of the 'risk on – risk off' phenomenon, including new emerging markets RORO analysis; and indices that quantify the market's appetite for risk.

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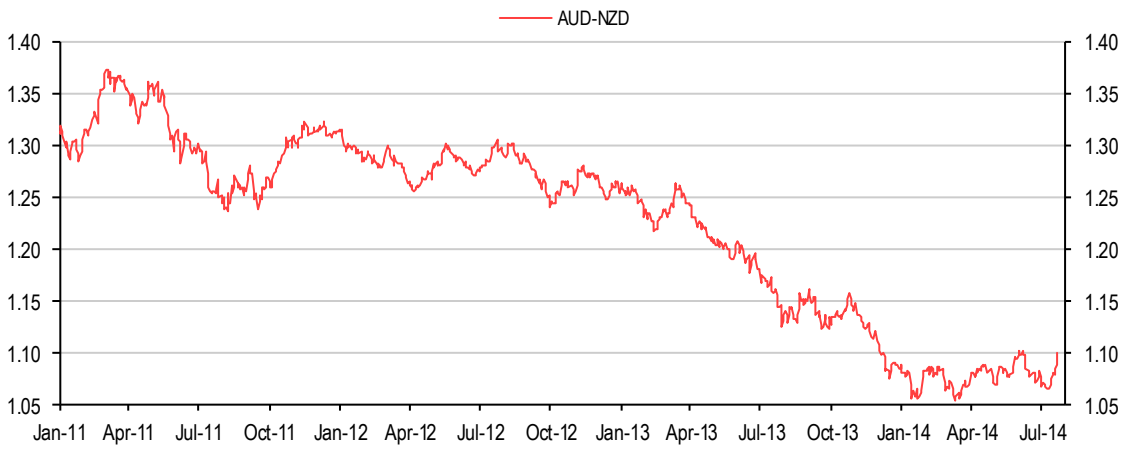
Market focus

AUD-NZD: book your parity party, but not yet

The weakness of the NZD in the immediate aftermath of the Christchurch earthquake took the AUD-NZD cross to a high of about 1.38 in March 2011. Since then, as the New Zealand economy has bounced back and Australia has seen its mining boom begin to fade, the cross has fallen by about 20%, getting close to 1.05 earlier this year (chart 1).

1. AUD-NZD down about 20% since early 2011



Source: Bloomberg, HSBC

Chart 2 shows the performance of both the AUD and NZD against the USD since 2011. The AUD remained mostly above parity against the USD until the "taper tantrum" in early 2013 caused significant weakness in some EM currencies and there were signs that China (Australia's largest trading partner) was starting to see a slowing in economic growth. This took AUD down to about USD 0.90, and the recovery from there was met by RBA comments that the currency was too strong for an effective rebalancing of the economy. The more recent recovery to about USD 0.95 has also been met by RBA protests.

The NZD, in contrast, saw some recovery as re-building in Christchurch got underway, was less severely hit by EM weakness in 2013, and has more recently been supported by the RBNZ's moves to tighten monetary policy by raising rates on four occasions since the beginning of the year. It has recently been trading at close to multi-year highs against the USD, despite RBNZ disquiet. This anxiety about the currency was expressed in the latest RBNZ meeting (23 July 2014) when RBNZ noted the currency is "unjustified and unsustainable".

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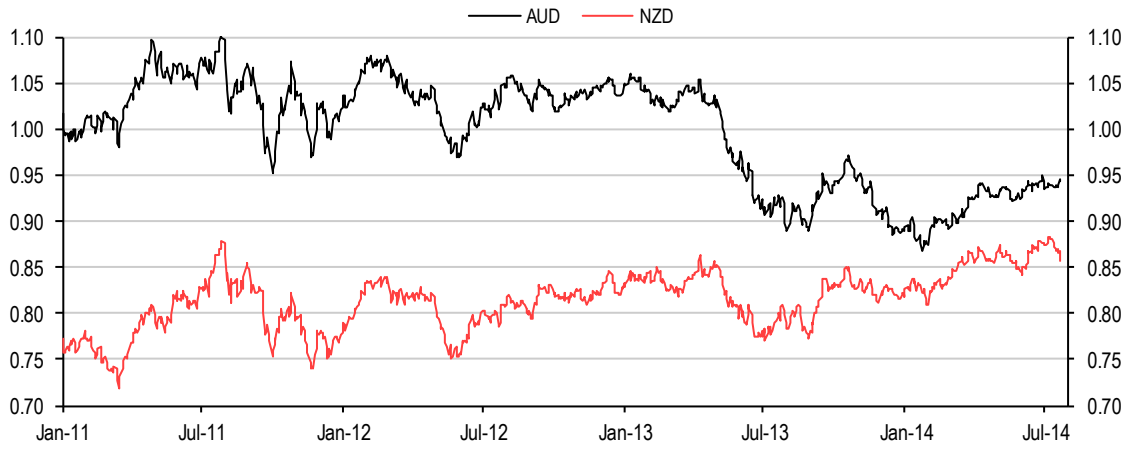
2. AUD is well off its highs, but NZD is still trending up

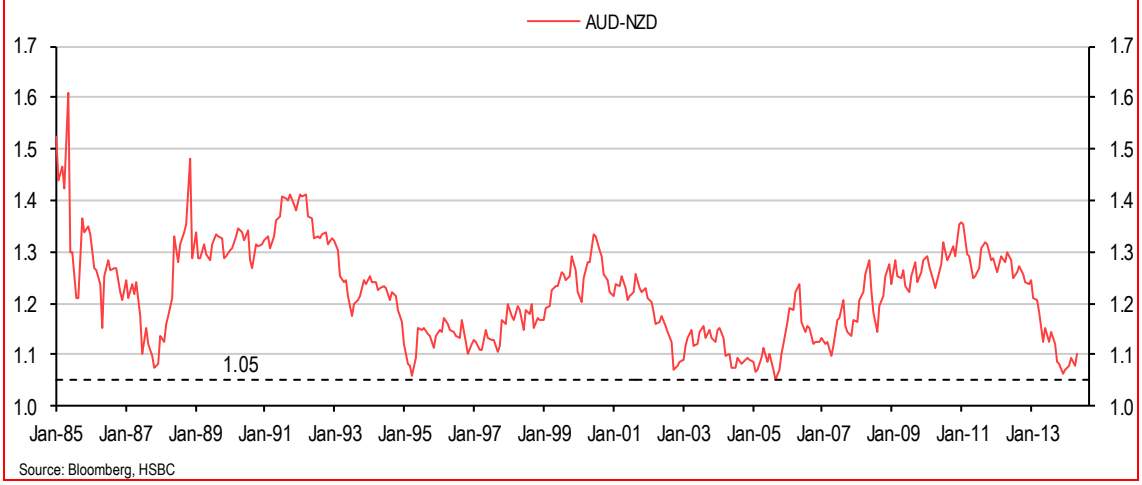


Source: Bloomberg, HSBC

Can the cross make new lows?

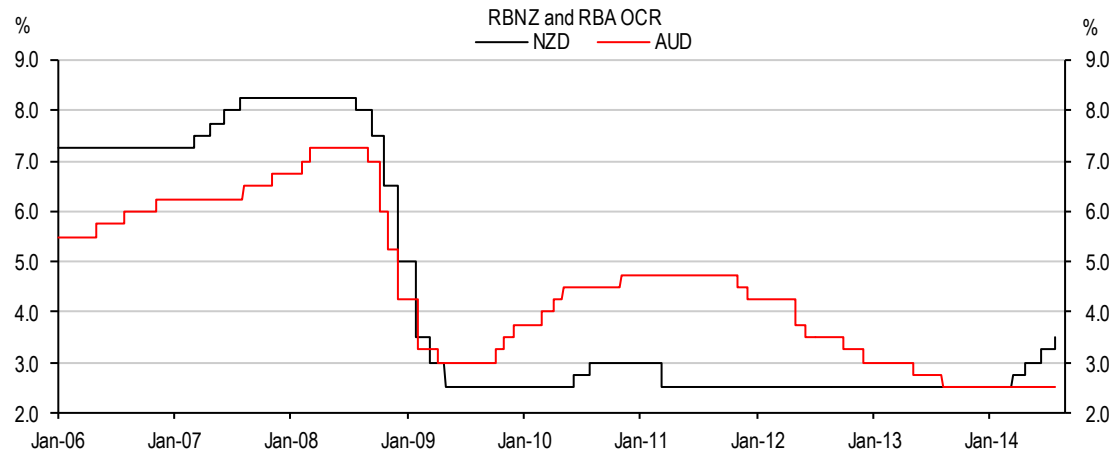
Both the AUD (1983) and NZD (1985) became freely floating currencies in the 1980s. Since then, the cross has traded between 1.05 and 1.60 and has averaged about 1.21. The cross has been at or close to 1.05 on three occasions – July 1995, May 2005 and January 2014. The lows of 1995 and 2005 were both immediately followed by sharp rallies of 15% and 10%, respectively. Will the cross make new lows, or should we expect to see it head back towards 1.20 as it did on the previous two occasions? Following the recent RBNZ comments it may feel that way, but their actions will eventually overcome their words. While it is always dangerous to claim that 'this time, it's different', we believe there are good reasons for expecting new lows in the cross, even if not in the immediate future.

3. Below 1.05 would be a new post-float low for AUD-NZD



Source: Bloomberg, HSBC

4. RBNZ the first to tighten

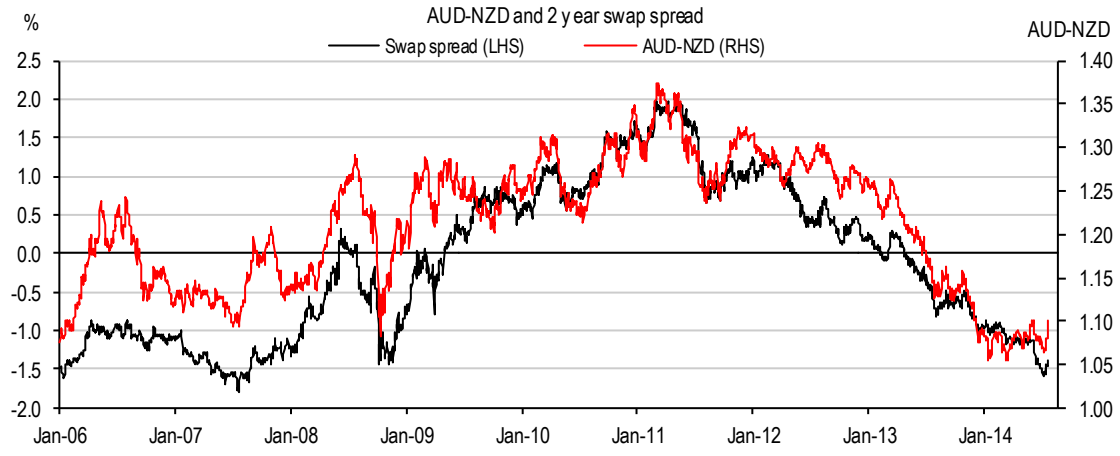


Source: Bloomberg, HSBC

The policy driver

The main driving force behind the cross rate in recent months has been a change in interest rate expectations driven by a shift in relative monetary policy positions. While the RBA has been on hold since it finished cutting rates in 2013, the RBNZ has become the first industrial economy central bank to raise rates, and has increased rates by 25bp on four occasions since the beginning of the year (chart 4).

5. Interest rate expectations have been a powerful driver of the AUD-NZD cross



Source: Bloomberg, HSBC

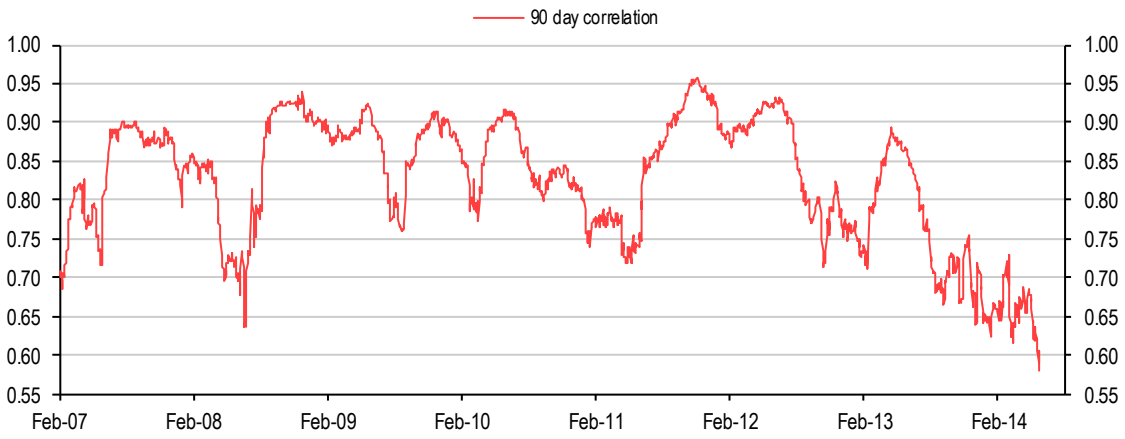
The relationship between the cross rate and the shifting relative interest rate expectations is shown in chart 5. This shows the two-year swap rate spread against the cross. Two-year swaps are often taken as a good proxy for market expectations about future short-term rates. As can be seen from the chart, the spread has moved from about 200bp in favour of the AUD to about 150bp in favour of the NZD since early 2011 as the cross has fallen from 1.35 to its current levels.

AUD and NZD are divorcing

The changing perception on interest rates has meant that the AUD and NZD have no longer been trading in lockstep as they have often done in the past. Both currencies have been seen as 'commodity currencies' and both were very much 'risk-on' currencies when that paradigm dominated the markets. Because of this, they have often tended to move together.

Chart 6 shows the 90-day correlation between daily changes in AUD-USD and NZD-USD. This has often been as high as 0.90, indicating an extremely high degree of correlation, but it has fallen in recent months, and is now around 0.60. While the two currencies have often been driven by very similar forces in the past, this seems no longer to be the case, and they are now behaving in a more independent manner. This is obviously important if we are going to see significant further shifts in the cross rate.

6. AUD and NZD no longer moving in lockstep



Source: Bloomberg, HSBC

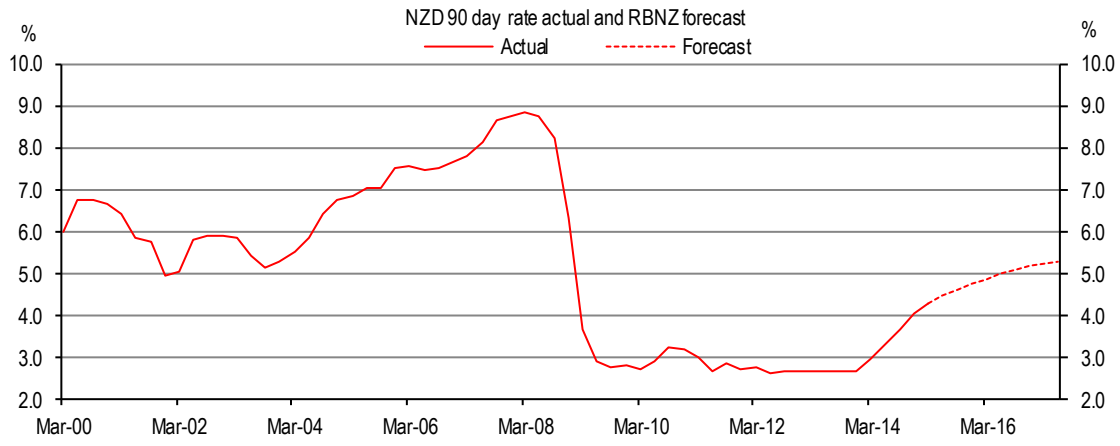
Policies on hold for now

For the next few months it seems likely that both the RBA and the RBNZ will keep policies on hold. Strangely the RBNZ actually admitting to a pause caused an outsized reaction in the cross. Meanwhile, in its most recent Monetary Policy Meeting (1 July), the RBA concluded that "with the significant degree of monetary stimulus already in place to support economic activity, the Board judged that, on present indications, the most prudent course was likely to be a period of stability in interest rates." Growth over the next year is expected to be below trend, and it seems unlikely that the RBA will move to tighten policy before the end of 2014.

Stability in New Zealand policy – aside from the short-term pause – is somewhat less certain as the 'forward guidance' given by the RBNZ suggests further gradual increases in interest rates over the next two years (chart 7). However, having increased rates in four consecutive meetings, the RBNZ thinks that a short pause is in order. Their recent statement noted that "it is prudent that there now be a period of assessment before interest rates adjust further towards a more-neutral level". (See *'See RBNZ Observer Update'*, 24 June) Inflation in Q2 came in a little below expectations, which reduced the impetus for immediate further action. In addition, the New Zealand general election will be held on 20 September, just 11 days after the next RBNZ meeting, so it may be considered prudent to keep policy on hold at least

until the 30 October meeting. A pause was therefore to be expected, however, the explicit talk of pause for a period of "assessment" and the jawboning of the currency saw a knee-jerk market reaction in AUD-NZD.

7. RBNZ sees further rate rises ahead



Source: RBNZ, HSBC

With both central banks likely to be on hold for the next few months, the cross rate may tread water for a while longer. However, we believe there are good reasons to expect the cross to head lower again later in the year, and to be challenging parity by the end of the year.

The push to parity

There are three main reasons why we expect the AUD-NZD cross to resume its downward trend later this year;

1 Relative growth prospects

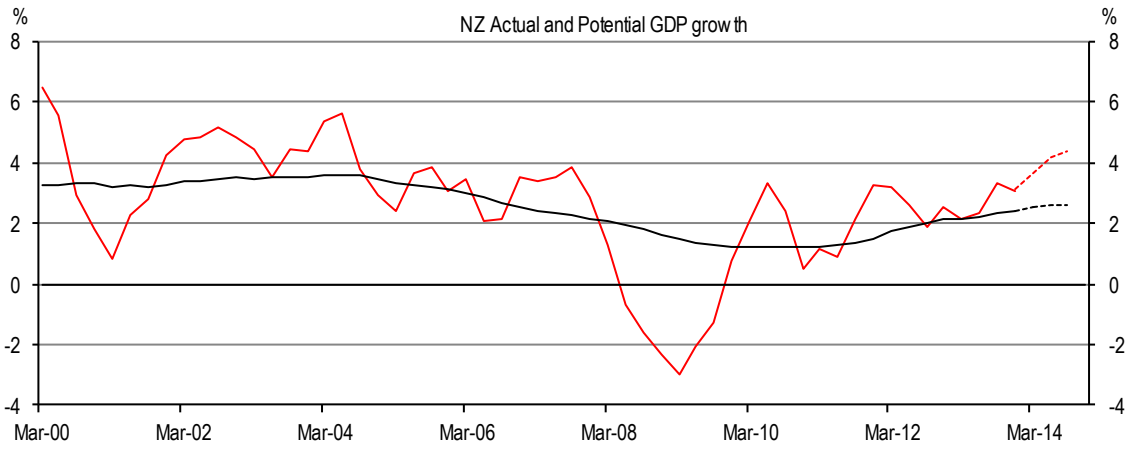
2 Relative commodity prices

3 Relative valuation

1. Relative growth prospects

The strength of the New Zealand economy is based on accelerating construction both for Christchurch rebuilding and, more generally, increased net immigration increasing housing and consumption demand, and still-high prices for commodity exports. Growth is currently about 4% pa, and the RBNZ sees that as well above the potential growth rate of about 2.5% pa (chart 8). Because of this, the expectation is that inflationary pressures will build unless policies are put in place that will bring growth back into line with potential. Although inflation has remained well-contained so far, this cannot be assured longer term, so the pressure for tighter policy remains. Although the RBNZ sees the exchange rate as unsustainable at current levels, it is very unlikely to do more than repeat the 'smoothing' intervention it has engaged in in the past.

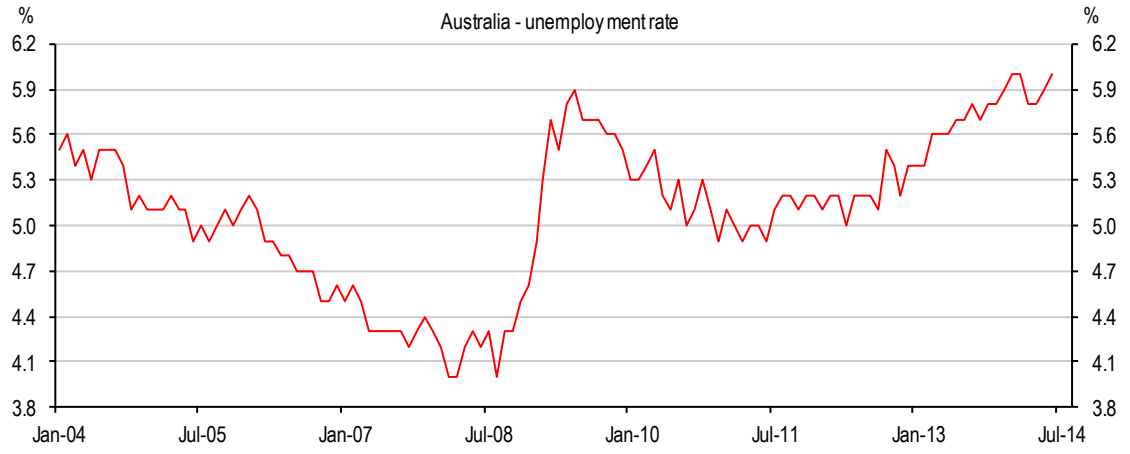
8. RBNZ sees the economy continuing to grow faster than potential



Source: RBNZ, HSBC

In Australia, the fading of the mining boom has seen the economy soften somewhat, and the gradual trend towards higher unemployment rates (chart 9) suggests that there is sufficient slack in the economy to make upward pressure on inflation unlikely anytime soon. As in New Zealand, the RBA believes the exchange rate is too high, but it also sees this as potentially a major problem in that it hinders the economy's rebalancing. Downward pressure on the AUD-NZD cross rate from the continued difference in growth prospects is likely to continue for some time.

9. Australian unemployment has moved higher again



Source: Bloomberg, HSBC

2. Relative commodity prices

Both Australia and New Zealand have exports which are dominated by commodities, and shifts in commodity prices have important effects on the terms of trade, and on economic growth. The mix of commodities exported is very different, and both central banks produce commodity price indices that reflect the weights of different commodities in their own exports. Chart 10 shows these indices rebased to January 2006. As can be seen from the chart, both indices have fallen back this year, but the New Zealand

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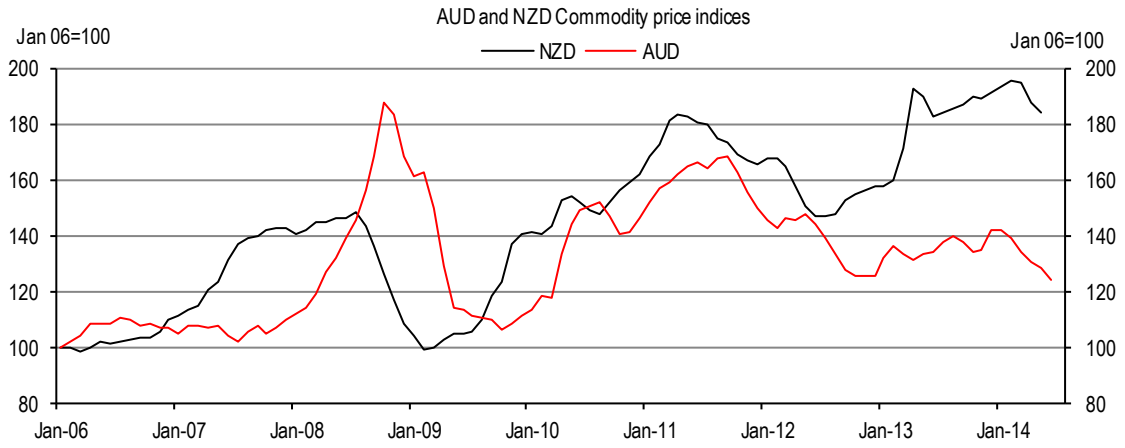
index remains at a much higher level than the Australian index. Although foreign exchange flows related directly to trade are much smaller than those related to financial flows, the more damaging fall in commodity prices experienced in Australia is likely to make investors more cautious about Australia than about New Zealand. For a more detailed look at Australia's commodity exports see *'Australia's growing links to Asia: Powering growth'* (18 July 2014). The RBNZ has suggested that the NZD should fall in line with dairy and timber prices, however, given the relative falls in commodity prices this still suggest a lower AUD-NZD.

10. AUD mix of commodities have fallen much further than NZD mix

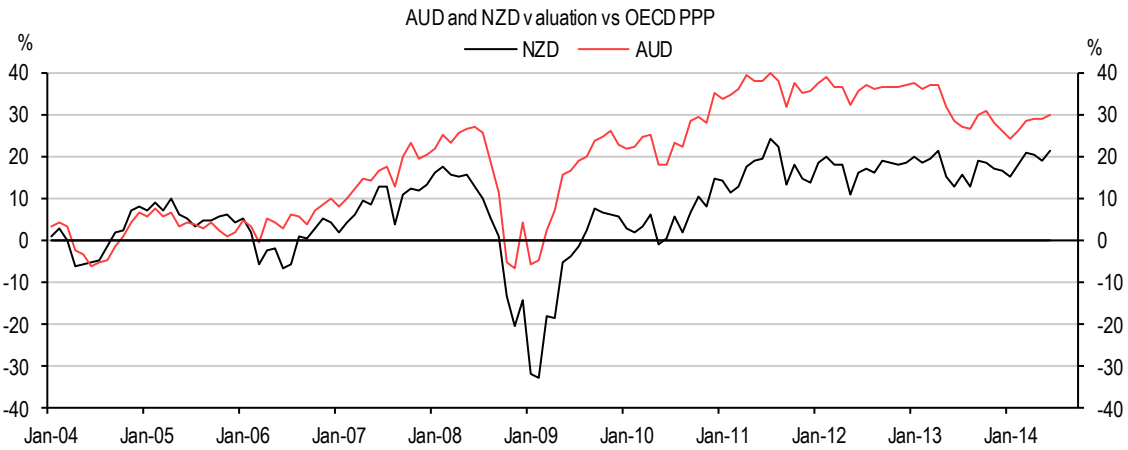


Source: RBNZ, Bloomberg, HSBC

3. Relative valuation

Although **both** central banks see their currencies as 'overvalued' and unsustainable at their current levels (against the USD), the degree of overvaluation is not the same. Chart 11 shows AUD and NZD measured against the OECD's PPP values. Both currencies are 'overvalued' on this basis, but the AUD is about 10% more overvalued than the NZD. While valuation is not a good guide to currency prospects in anything other than the very long term, it does suggest that there will be more pressures on the Australian economy from the exchange rate than on the New Zealand economy.

11. AUD remains more 'overvalued' than NZD



Source: Bloomberg, HSBC

Conclusion – Parity is a marathon not a sprint

Since the 2011 high, the AUD-NZD cross has fallen about 20% and has come close to making new post-float lows. The latest increase in interest rates from the RBNZ was widely expected but the jawboning of the currency lower as well as the announcement of a rate pause caused a knee-jerk AUD-NZD spike. More importantly it took downward momentum away from the cross in the short term. Nevertheless, we believe that there are sufficient structural forces in place to put the cross under renewed downward pressure later this year. Growth prospects seem much stronger in New Zealand than in Australia, Australia has seen much bigger falls in its commodity export prices and the AUD remains more overvalued than the NZD. We expect the cross to challenge parity by the end of the year, so pencil in dates for your parity party now.

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Quant Indicators

1. HSBC Positioning Indicators (pg 11)

The HSBC Positioning Indicators measure the degree to which the momentum community is either long or short of a currency pair. For exchange rates where position data is available from the IMM, we compare the two sources of data. Discrepancies between these two sources of data can be particularly informative about positioning and sentiment of fundamental FX traders.

2. Correlation Analysis: Multi-Asset (RORO) & G10 FX (pg 16)

(a) RORO Index – multi-asset correlations

The RORO Index is at moderate levels. Correlations are higher than in pre-crisis times but far weaker than was typical during the crisis.

(b) Emerging Market RORO Indices

Regional correlations within EM regions are at moderate levels. The regional EM-common-factors remain risk-on but correlations within EM regions have weakened.

(c) Equity RORO Index

The Equity RORO index measures the strength of correlations within the main "risky" asset class of equities. The Equity RORO Index is significantly lower than the all-time highs seen in late 2011, but is still above pre-crisis levels.

(d) High-frequency G10 FX correlations

We show the strength of the correlations between all G10 exchange rates, calculated using hourly FX price data.

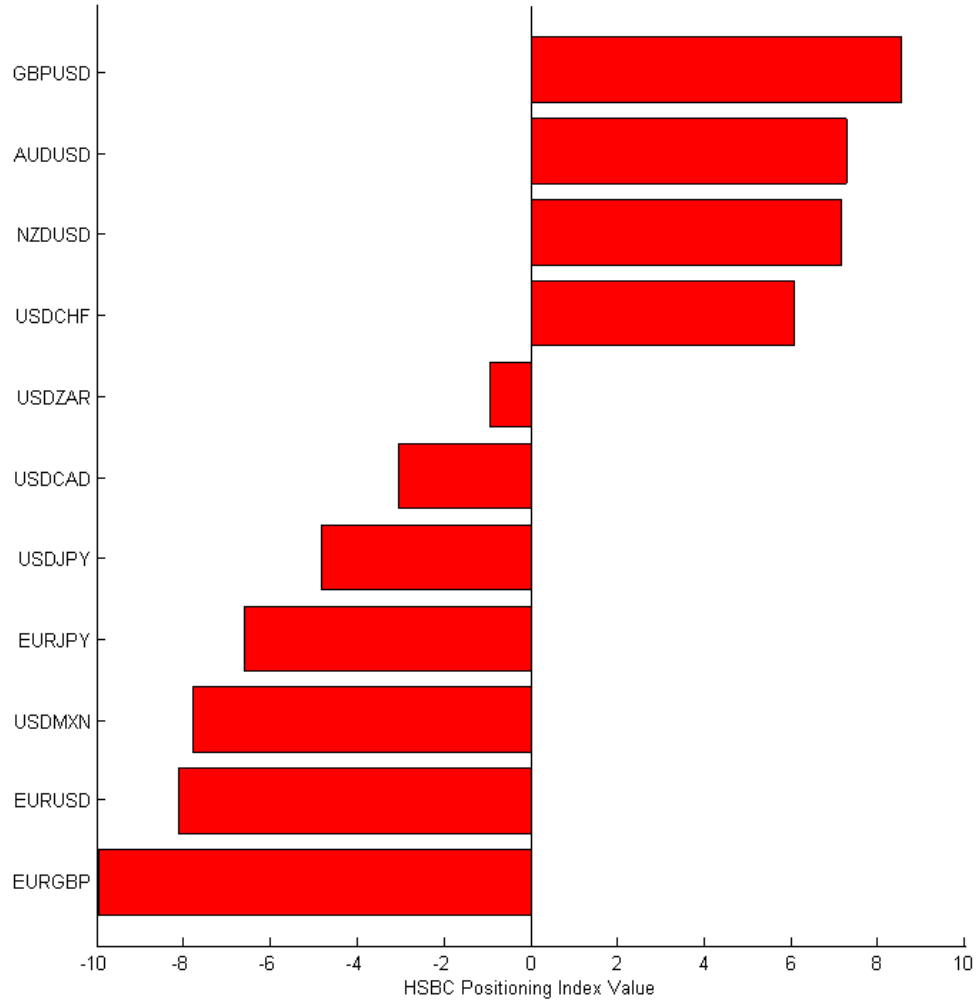
3. Risk Appetite: OPRA Index and MRAI (pg 25)

The OPRA index measures risk appetite based on the positions held in contracts with varying degrees of risk by speculative traders on US futures exchanges. The OPRA Index is **in neutral territory**; this indicates that speculative traders on the US futures exchanges have shifted their exposure in a way unrelated to the risk of holding them.

The MRAI has generally moved sideways with high volatility since May 2010. This is indicative of **neutral risk appetite** and is consistent with the RORO phenomenon.

HSBC Positioning Indices

Current Value of HSBC Positioning Indices



Source: HSBC, Bloomberg

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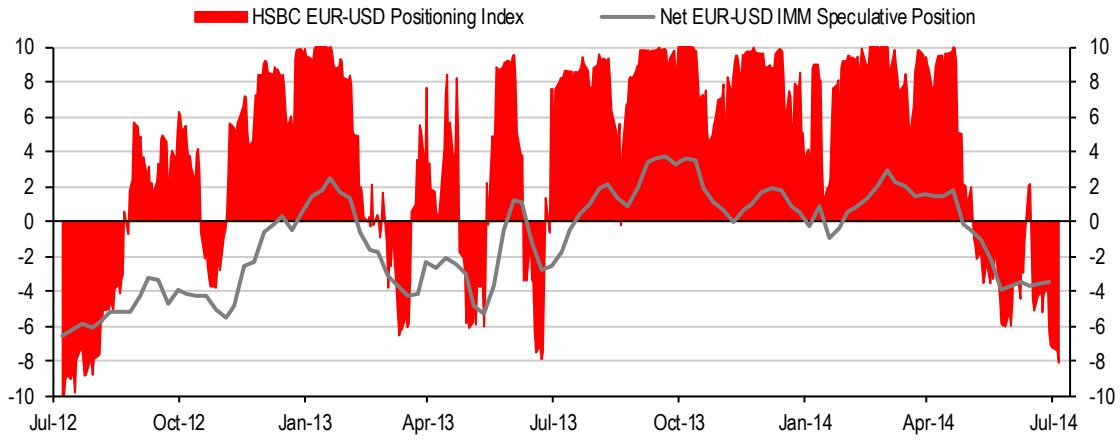
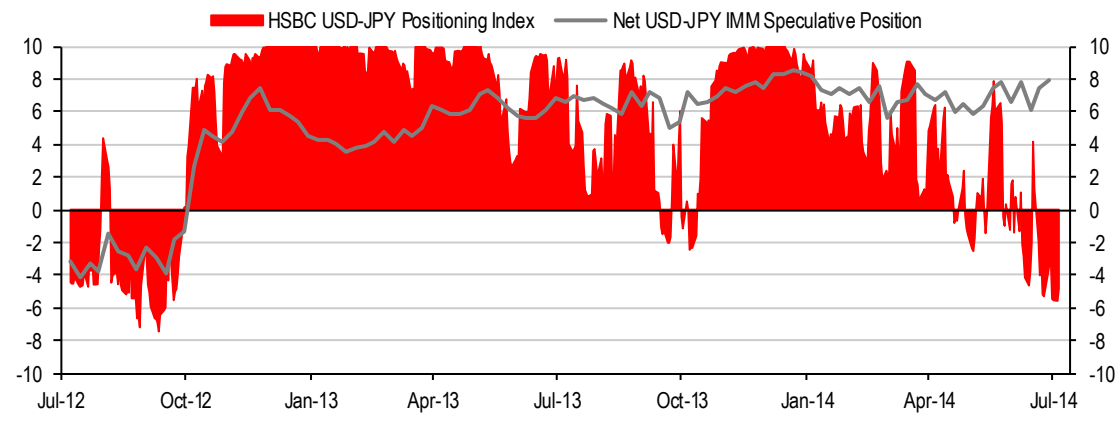
HSBC EUR-USD Positioning Index



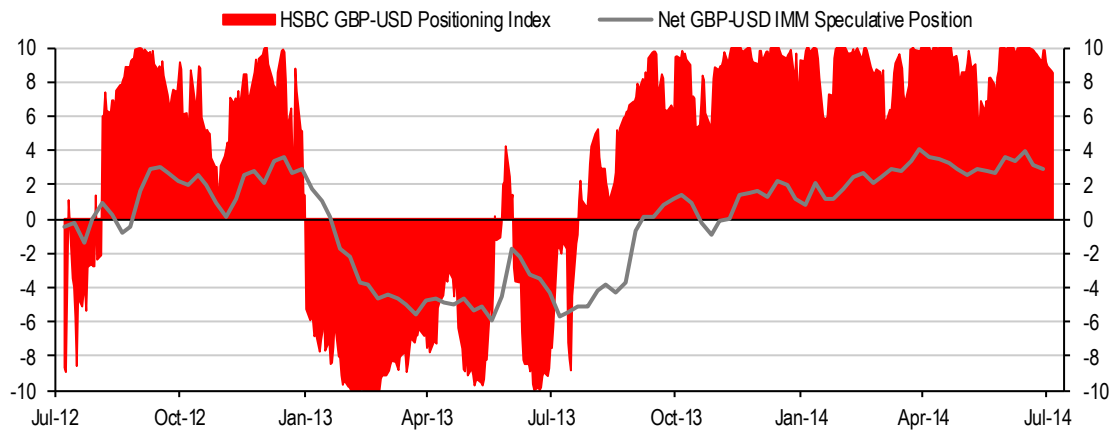
Source: HSBC, Bloomberg

HSBC USD-JPY Positioning Index



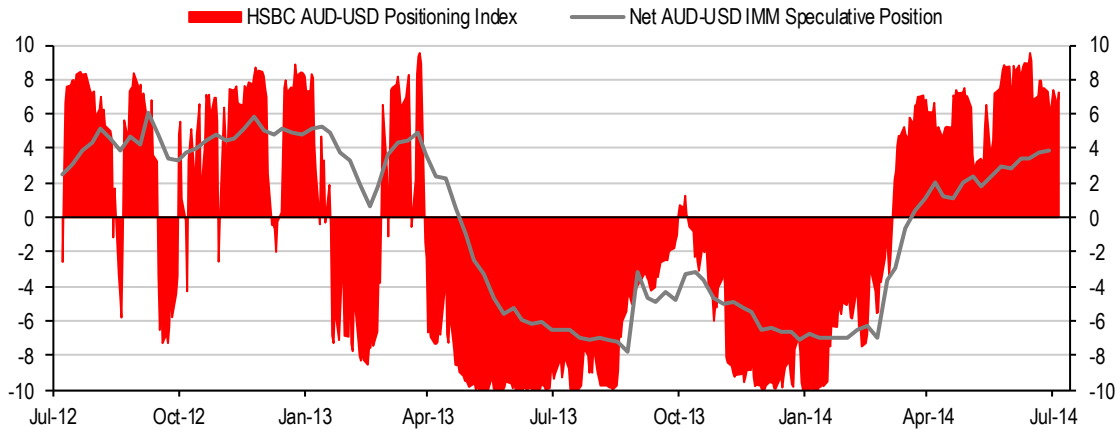
Source: HSBC, Bloomberg

HSBC GBP-USD Positioning Index



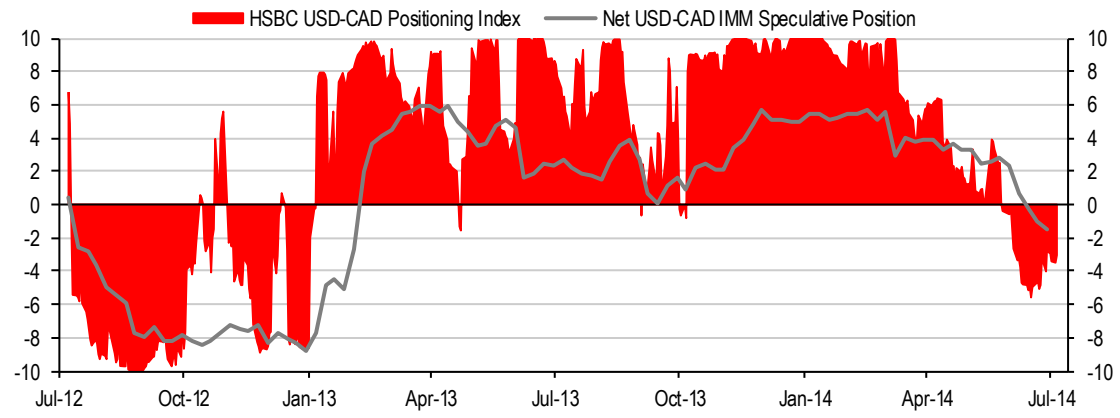
Source: HSBC, Bloomberg

HSBC AUD-USD Positioning Index



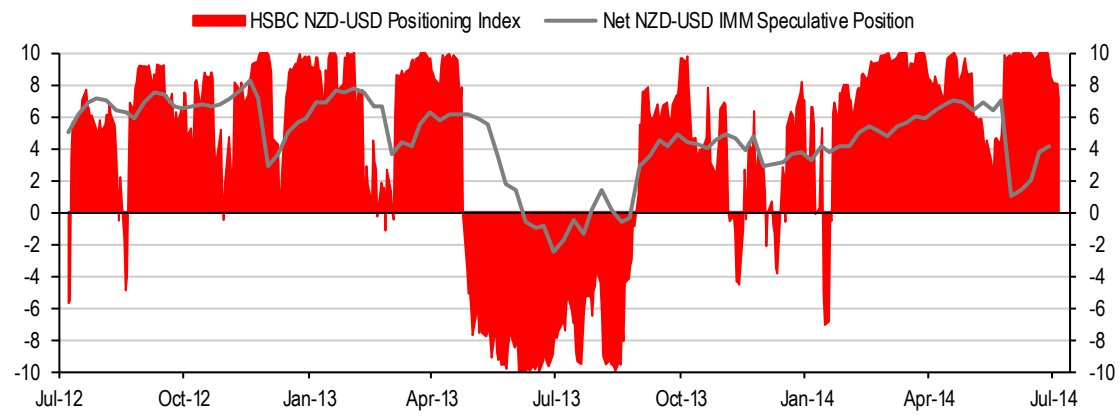
Source: HSBC, Bloomberg

HSBC USD-CAD Positioning Index



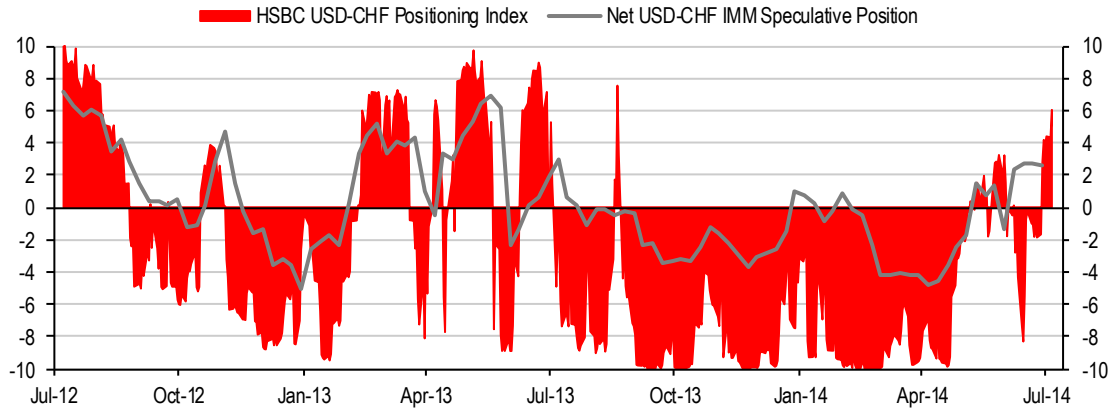
Source: HSBC, Bloomberg

HSBC NZD-USD Positioning Index



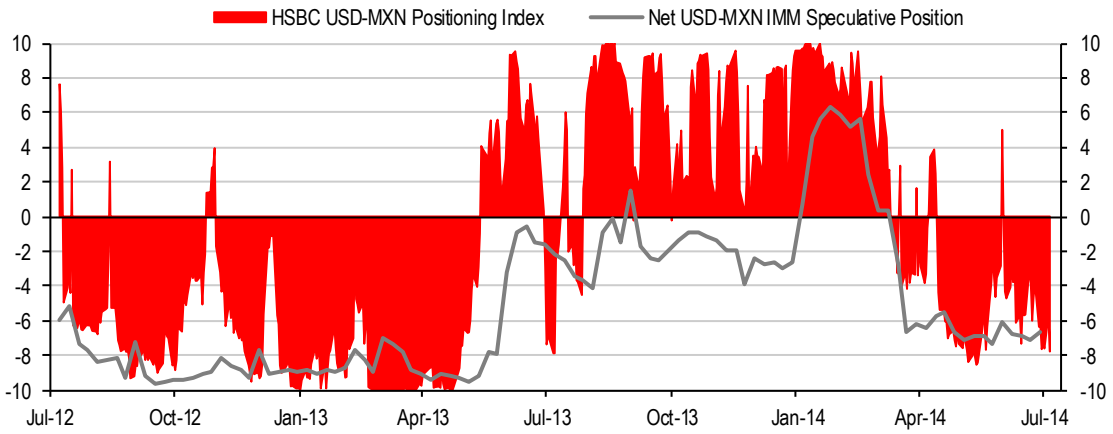
Source: HSBC, Bloomberg

HSBC USD-CHF Positioning Index



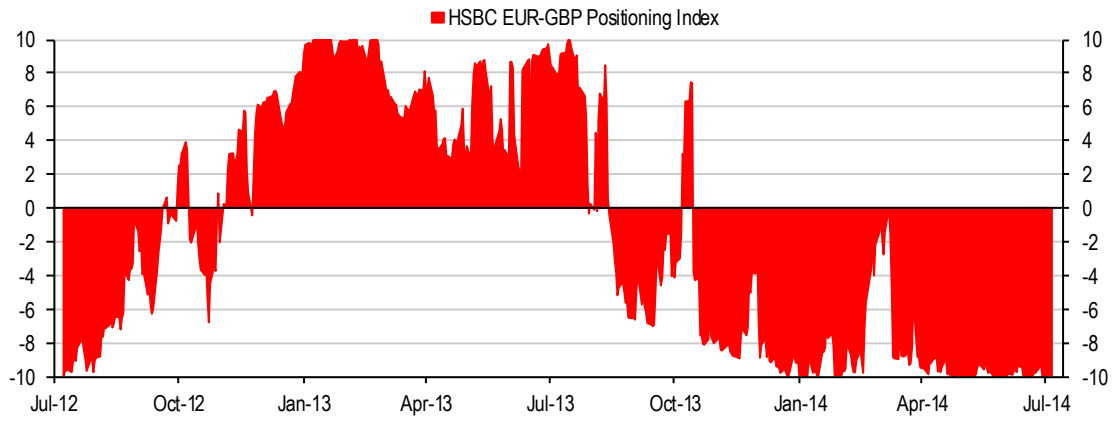
Source: HSBC, Bloomberg

HSBC USD-MXN Positioning Index



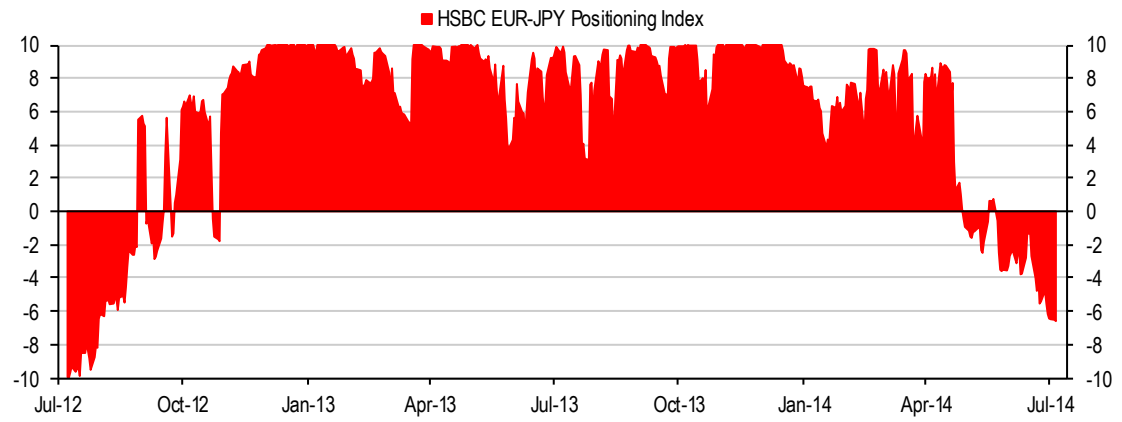
Source: HSBC, Bloomberg

HSBC EUR-GBP Positioning Index



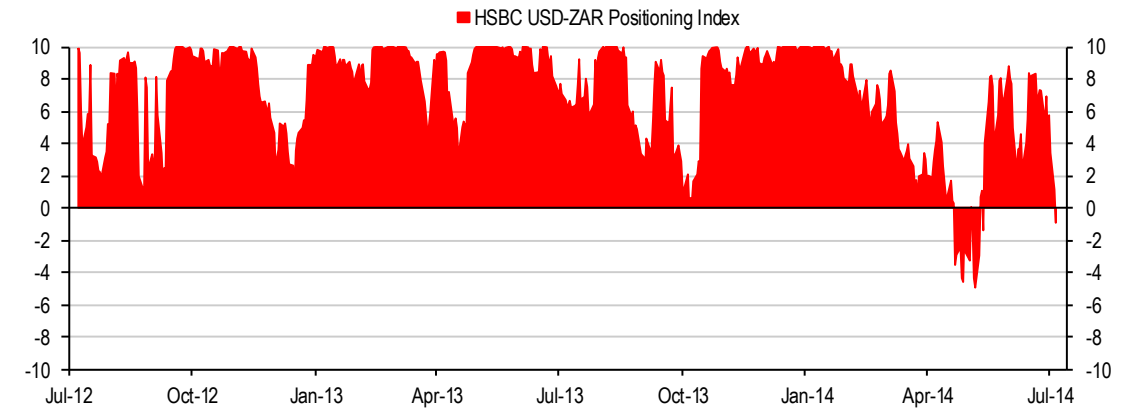
Source: HSBC, Bloomberg

HSBC EUR-JPY Positioning Index



Source: HSBC, Bloomberg

HSBC USD-ZAR Positioning Index



Source: HSBC, Bloomberg

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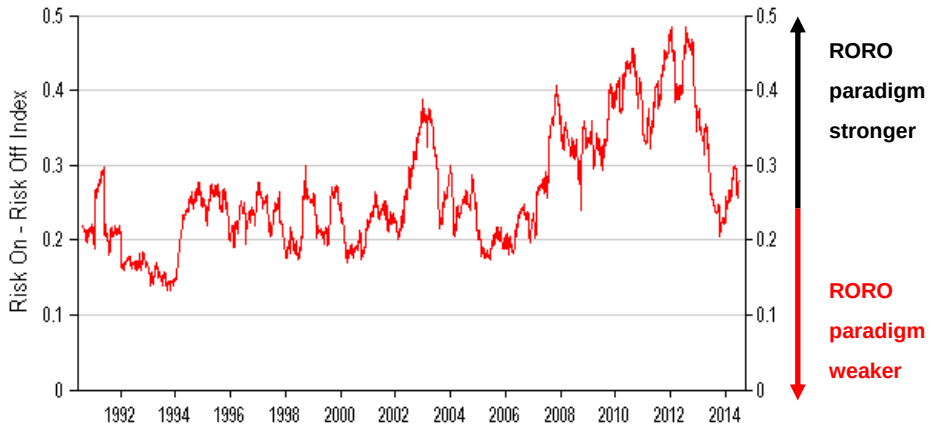
HSBC Risk On – Risk Off Index

Risk On – Risk Off Index



Source: HSBC, Bloomberg

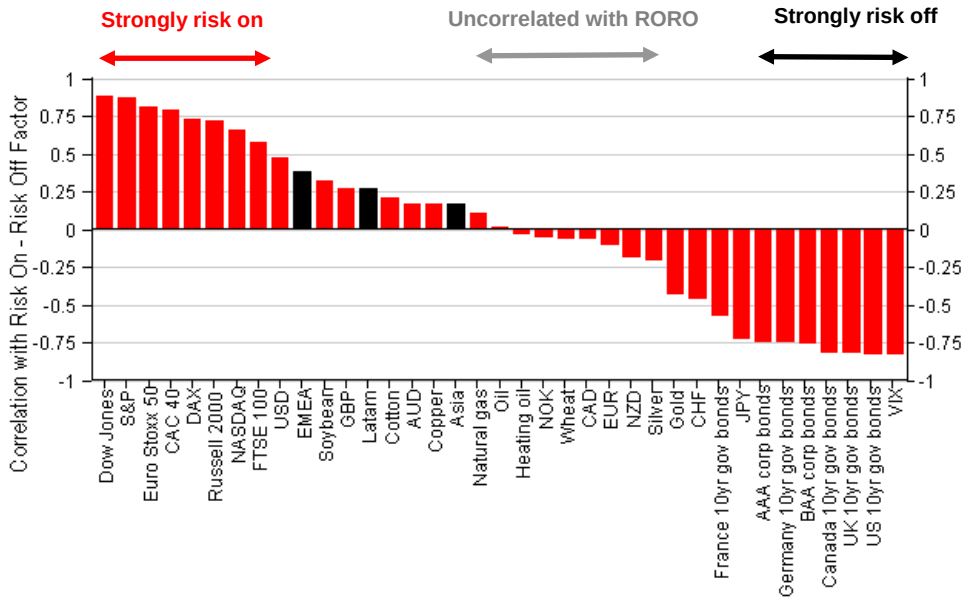
RORO Index

The RORO index is at moderate levels.

This indicates that the risk on – risk off phenomenon is not as dominant as during the height of the crisis.

See Appendix A1 for more details of the methodology.

Asset correlations with the risk on – risk off factor



Source: HSBC, Bloomberg

RORO Correlations

The assets that were most highly correlated with the risk on – risk off factor during the previous 20 weeks were:

Risk-on assets
- Dow Jones
- S&P 500

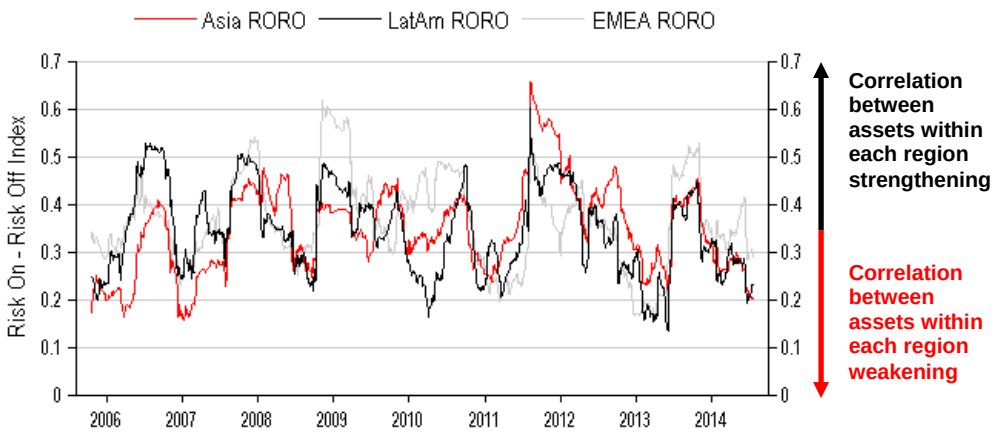
Risk-off assets
- VIX
- US Government Bonds

Uncorrelated with RORO
- Oil
- NOK

EM regions are all positively correlated with RORO.

HSBC Emerging Market RORO Indices

Emerging market risk on – risk off indices



Source: HSBC, Bloomberg

EM RORO Indices

The regional indices have fallen recently.

This indicates that correlations within EM regions have weakened.

Countries included:

Asia: *Hong Kong, South Korea, Singapore, India, Taiwan, Malaysia, Thailand*

Latam: *Brazil, Mexico, Chile*

EMEA: *Czech Republic, Hungary, Poland, South Africa, Turkey*

Interpretation

Risk on – risk off is a truly global phenomenon that drives returns and causes high correlations across many different markets and geographic regions. However, there can still be variations in the strength of correlations between assets from different markets, as well as differences in the extent to which these correlations are driven by risk on – risk off rather than region-specific factors.

To quantify the strength of correlations in different emerging markets, we construct three EM RORO indices (shown in the chart above). A high index level indicates strong correlations between assets in that region. For example, when the Asia RORO index is high this implies that a single factor is driving returns across Asia, which leads to strong correlations between Asian assets. Similarly, high levels of the Latam and EMEA RORO indices imply that correlations are high in Latin America and EMEA, respectively.

Strong correlations between assets in different regions can be caused by local phenomena as well as global RORO dynamics. To illustrate the importance of risk on – risk off rather than local factors in driving correlations, in the bar chart on the previous page we show the extent to which the different regions are driven by the RORO factor. When a region is strongly driven by risk on – risk off, it will have a high correlation with the RORO factor and will appear to the left of the bar chart. On the other hand, if regional correlations are not primarily driven by risk on – risk off, but instead by other local factors, a region will be only weakly correlated with the RORO factor.

The picture today

Correlations within EM regions have fallen recently.

Methodology

See Appendix A2 for more details of the construction methodology.

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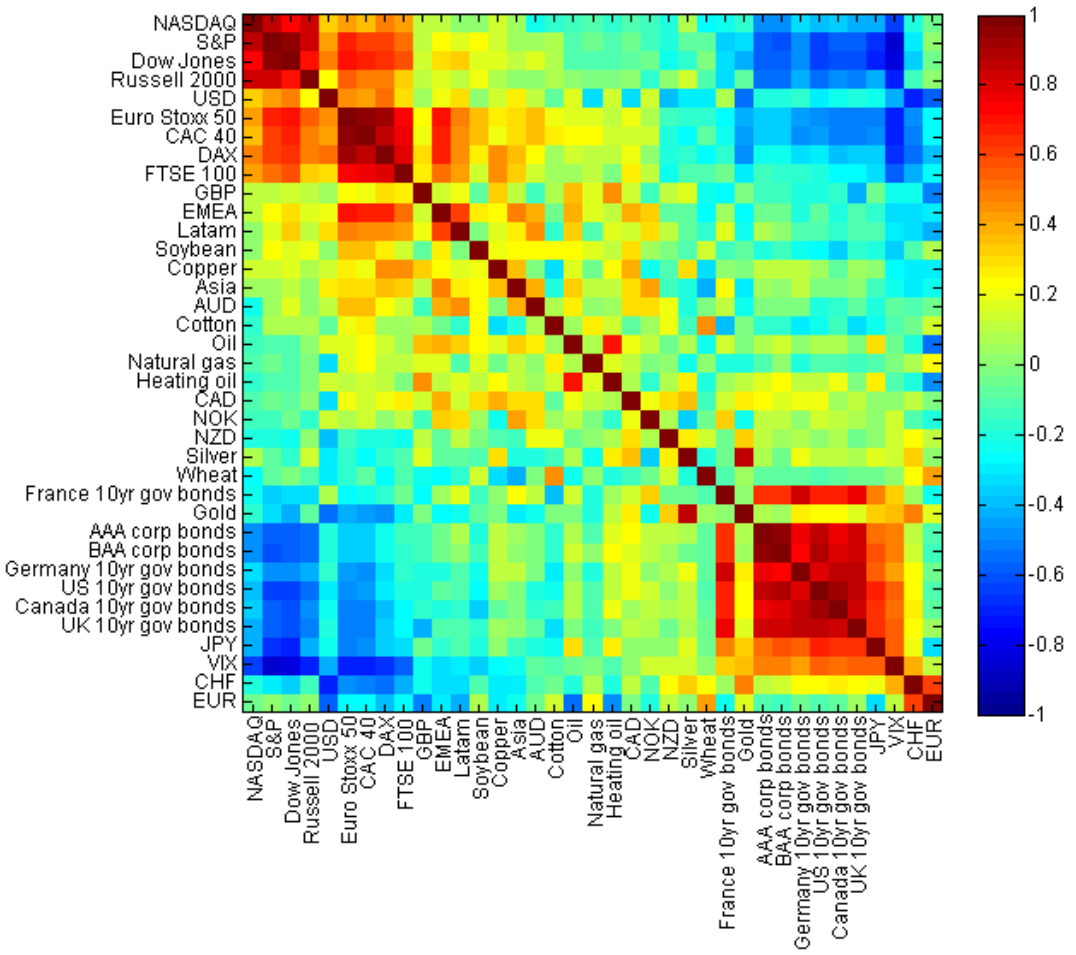
Correlation heat map

Heat map showing correlations over the last 80 days



Source: HSBC, Bloomberg

Reading the heat maps

The heat map shows the correlations between different assets during the last 80 days. **Dark red** regions indicate **strong positive** correlations. **Dark blue** regions indicate **strong negative** correlations. **Yellow** and **green** regions indicate **weak correlations/uncorrelated** assets.

The picture today

Despite the rise in the RORO Index this year, the typical RORO structure has not returned yet. Market structure looks quite similar to pre-crisis times, with lots of green elements in the heatmap.

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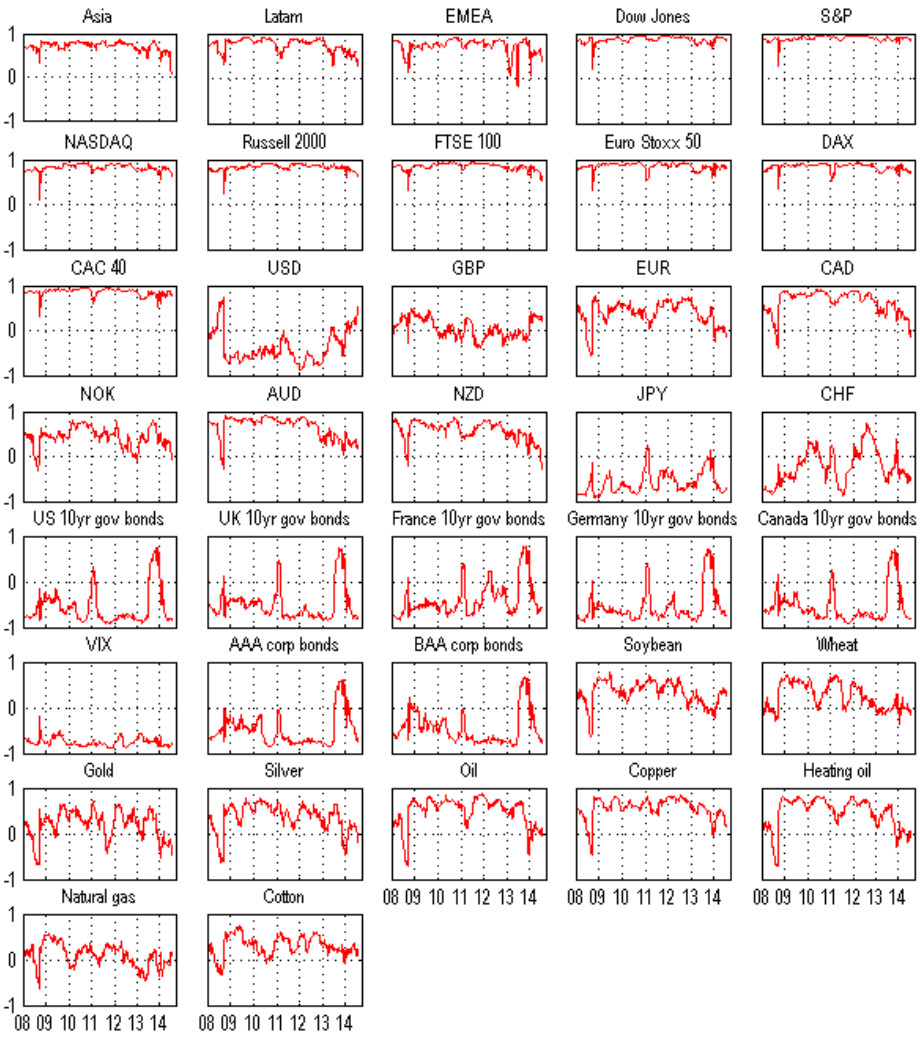
Correlations with the risk on – risk off factor through time

Rolling correlations of individual assets with the risk on – risk off factor

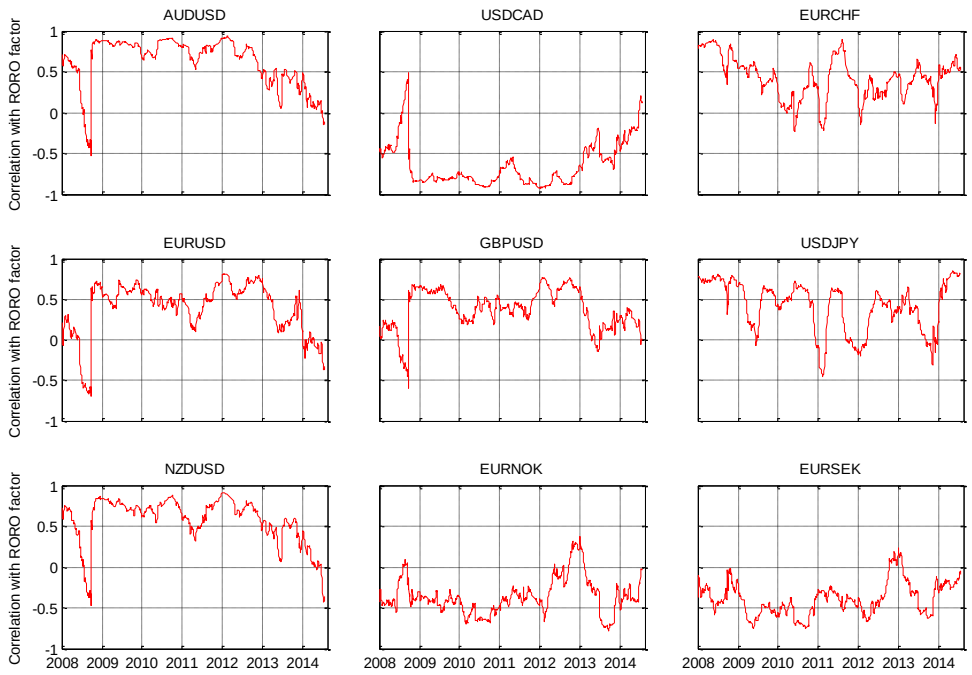


Source: HSBC, Bloomberg

The charts show the strength of the correlations between individual assets and the risk on – risk off factor through time. **These correlations quantify the extent to which the different assets are driven by risk on – risk off.** A correlation close to 1 implies that the asset is strongly risk on; a correlation close to -1 implies that the asset is strongly risk off; and a correlation near zero suggests that the asset is not primarily driven by the risk on – risk off phenomenon.

G10-FX Correlations with the RORO factor

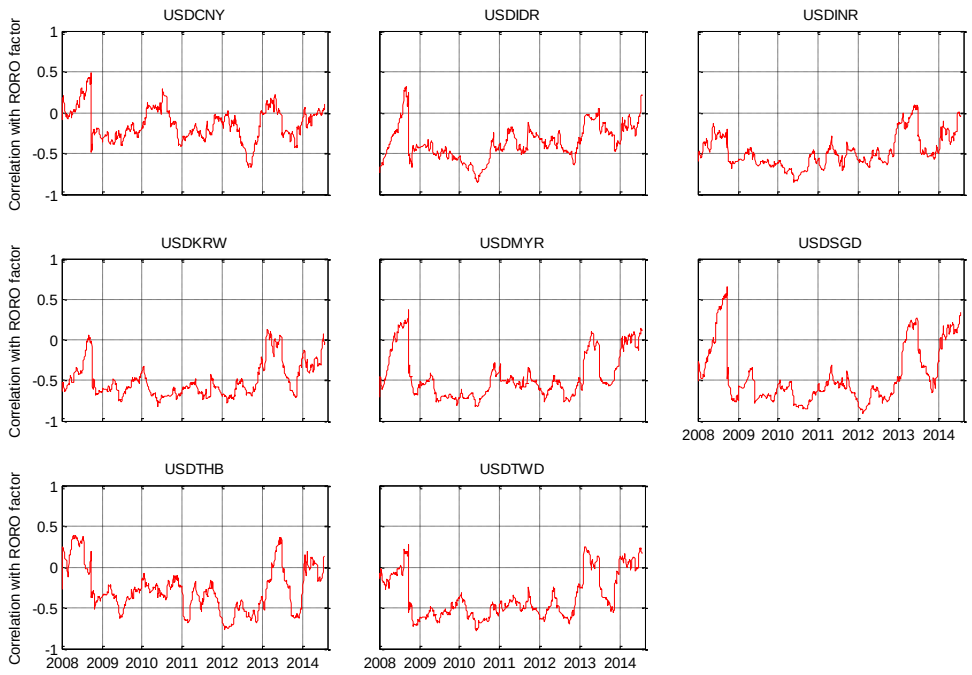
Rolling correlations of G10-FX with the risk on – risk off factor



Source: HSBC, Bloomberg

Asia-FX Correlations with the RORO factor

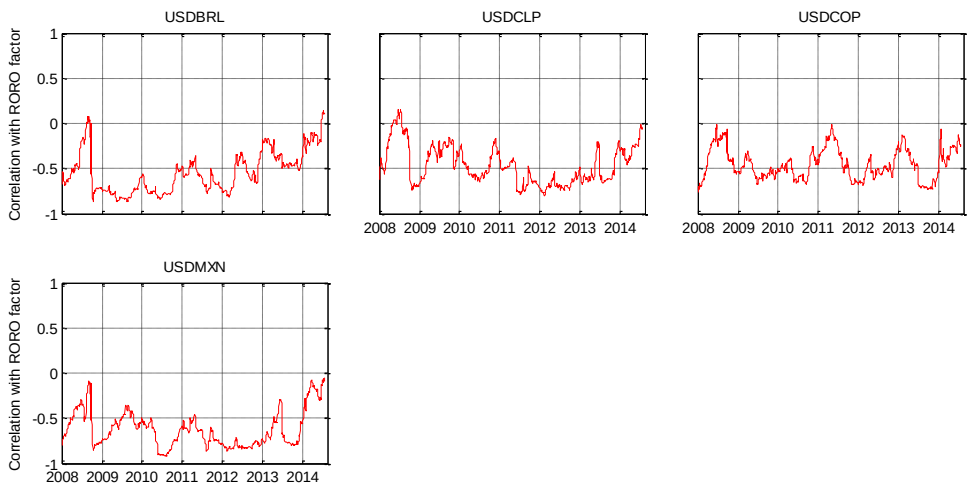
Rolling correlations of Asia-FX with the risk on – risk off factor



Source: HSBC, Bloomberg

LatAm-FX Correlations with the RORO factor

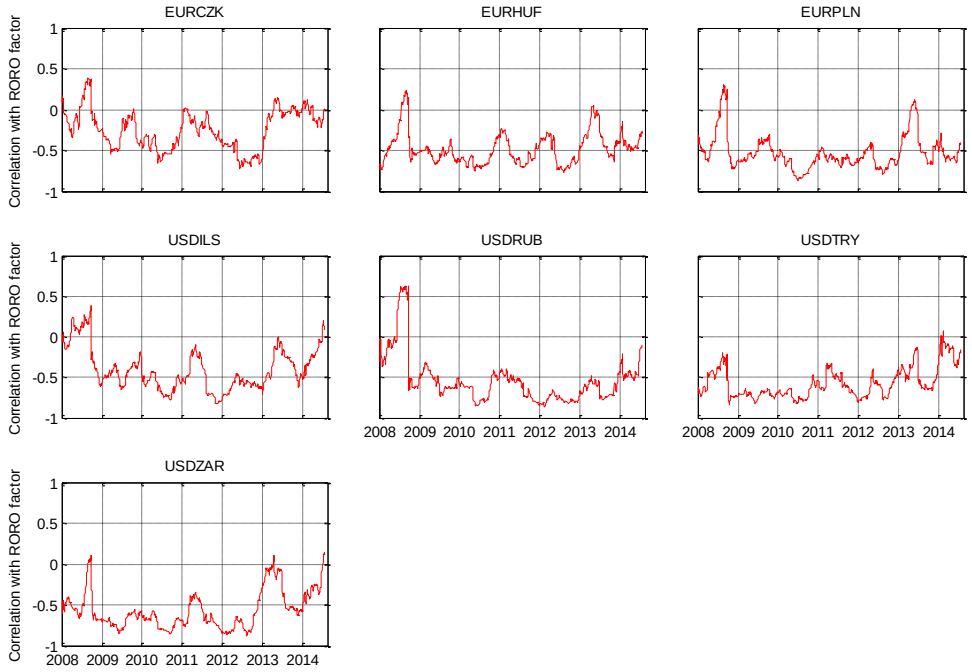
Rolling correlations of LatAm-FX with the risk on – risk off factor



Source: HSBC, Bloomberg

EMEA-FX Correlations with the RORO factor

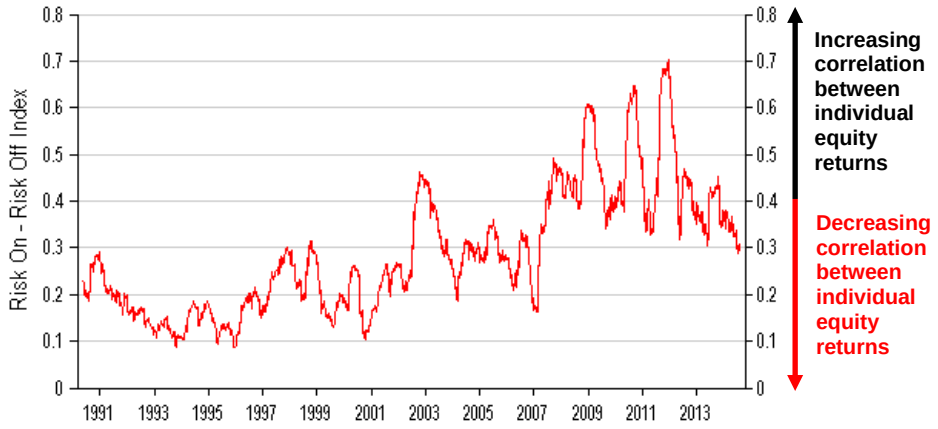
Rolling correlations of EMEA-FX with the risk on – risk off factor



Source: HSBC, Bloomberg

HSBC Equity RORO Index

Equity RORO Index



Source: HSBC, Bloomberg

EM RORO Indices

The Equity RORO Index is above pre-crisis levels. However, it is significantly below the all-time highs seen in late 2011.

This indicates that equity moves are showing significantly more dispersion than during late 2011, but are more similar than was typical in pre-crisis times.

See Appendix A3 for more details of the methodology.

Interpretation

Whilst risk on – risk off is inherently a cross-asset phenomenon, equities are the quintessential risk-on asset. When there is a perception in the market that correlations are high, it is important to determine whether it is simply a within-asset-class phenomenon or part of the wider global macro theme.

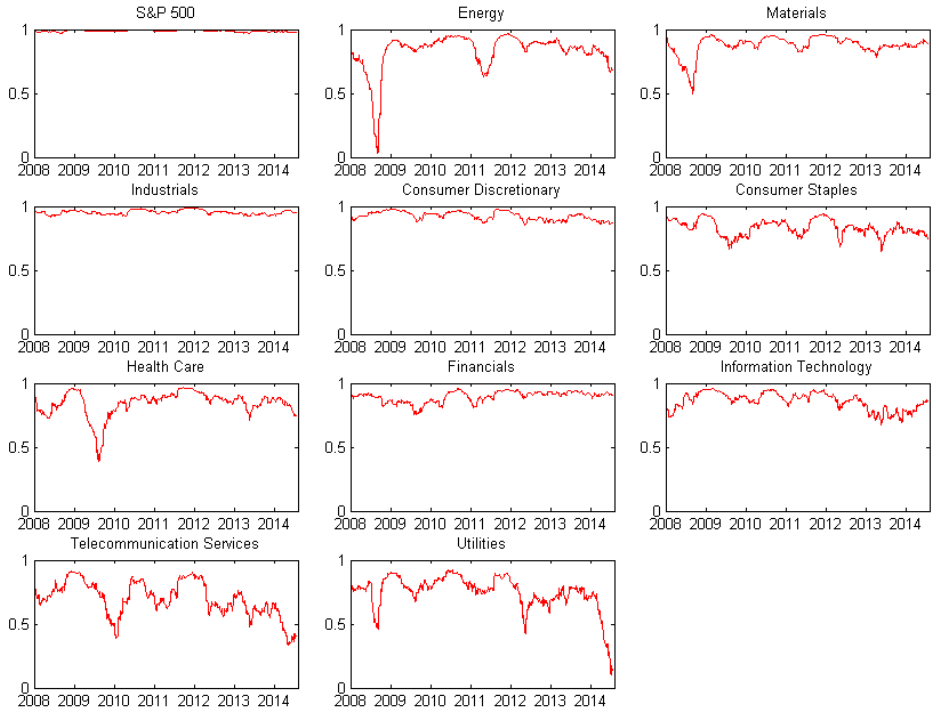
The HSBC Equity RORO Index allows us to distinguish between high correlations which are specific to this main "risky" asset class and high cross-asset correlations, as measured in the original RORO Index, which indicate broader macro stress.

The picture today

At the moment the Equity RORO Index is above pre-crisis levels, but is significantly lower than the all-time highs seen in late 2011. This indicates that movements in individual equities are showing significantly greater dispersion than in late 2011, but are more similar than was typical in pre-crisis times.

Correlation of sectors with Equity RORO factor

Rolling correlations of individual sectors with Equity RORO factor



Source: HSBC, Bloomberg

These charts show the rolling correlations between the returns of individual equity sectors and the Equity RORO factor. Values close to +1 indicate that the sector is simply moving in response to changes in the Equity RORO factor. The closer the value is to 0, the more that sector is displaying sector-specific character.

Interpretation

Some sectors are currently showing low correlations to the Equity RORO factor. This is consistent with the level of the Equity RORO index being much lower than the all-time highs seen in late 2011.

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G10 Exchange Rate Correlations

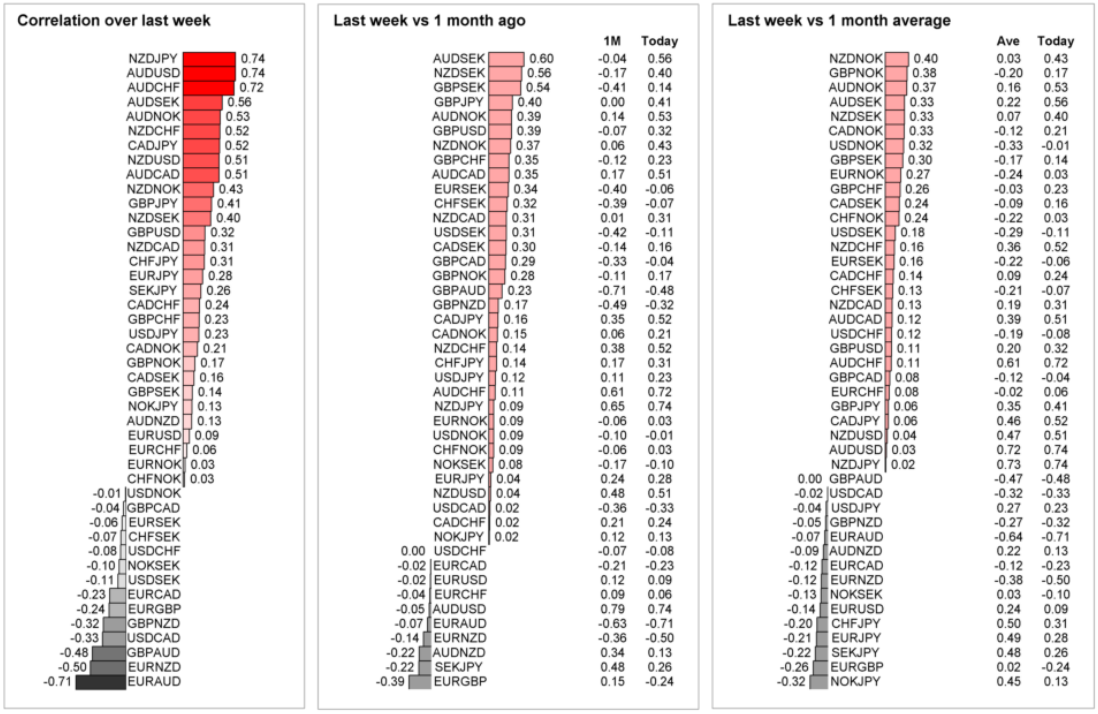
In the linked document at the following url (*http://www.research.hsbc.com/midas/Res/RDV?p=pdf&ao=20&key=kb9EfBBATQ&n=423774.PDF*), we show the strength of the correlations between all G10 exchange rates. If one has a view on how an exchange rate is going to move, this can be used to identify other trading opportunities by highlighting other currency pairs that move independently or in the same (or opposite) direction.

The chart below is an example page from this document for AUD-JPY. The three bar charts show:

- The correlation of AUD-JPY with all other G10 crosses during the previous week;
- A comparison of AUD-JPY correlations during the previous week with a 1-week period 1-month ago; and
- A comparison of last week's AUD-JPY correlations with the average correlation during the previous month.

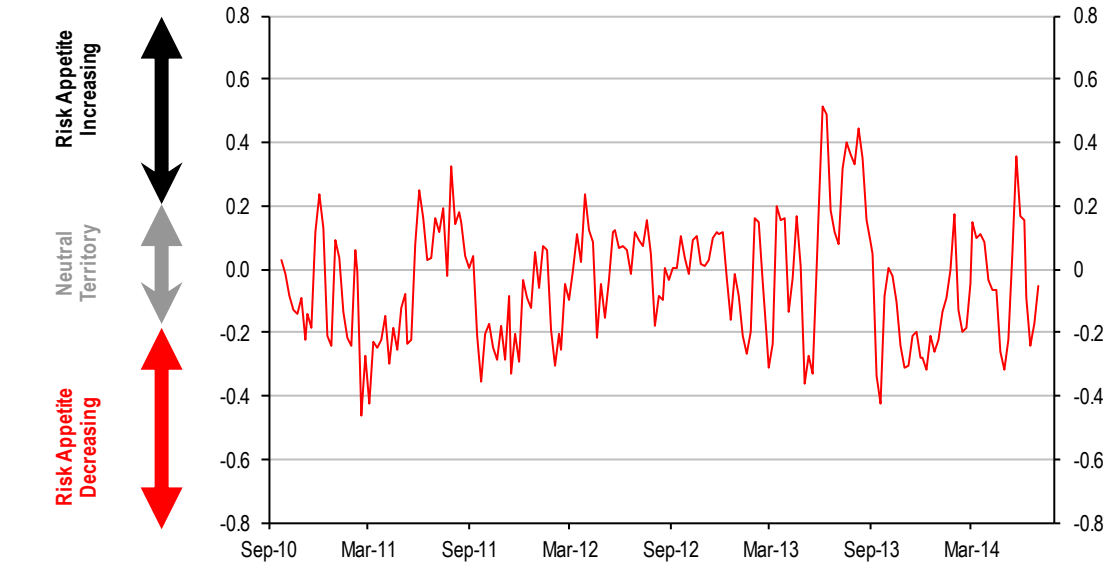
To enable us to calculate correlations over periods as short as a week, we have used hourly price data. In the linked document, we provide similar charts for all other G10 crosses and more details of the methodology that we use to construct the charts.

Example page from the linked correlation document: AUD-JPY correlations over the last week and versus the previous month



Source: HSBC

OPRA



Source: HSBC, Bloomberg

Interpretation

When the OPRA index is close to 1 it indicates that speculators have increased their exposure to risky assets, whereas a value close to -1 indicates that speculators have shifted their exposure to less risky assets.

The picture today

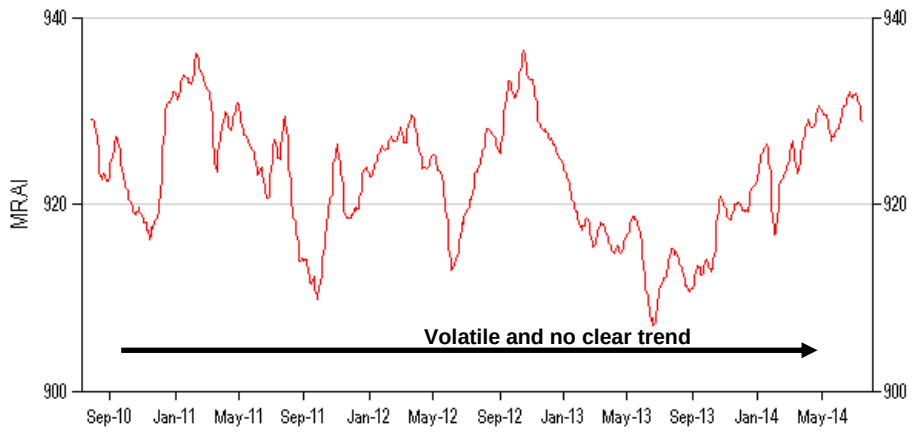
The OPRA Index is **in neutral territory**. This indicates that speculative traders on the US futures exchanges have shifted their exposure in a way unrelated to the risk. This is indicative of **neutral risk appetite**.

Methodology

The OPRA index is based on the relationship between changes in the futures positions held by speculative traders in various contracts and the risk associated with holding the contracts. See Appendix B for more details of the methodology.

MRAI

MRAI: Short-term picture



Source: HSBC, Bloomberg

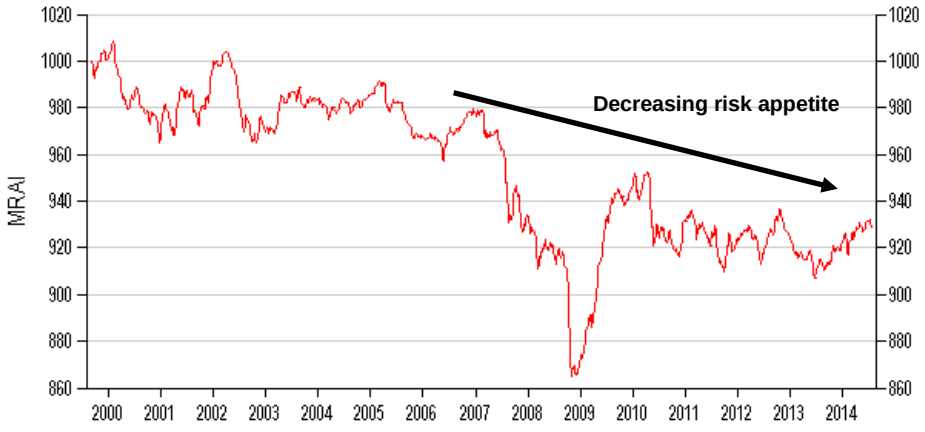
Short-term picture

The price-based risk appetite index has moved sideways with high volatility since May 2010.

This index is based on changes in prices and volatilities of assets that are known to be affected by risk appetite.

See Appendix C for more details of the methodology.

MRAI: Long-term picture



Source: HSBC, Bloomberg

Long-term picture

The MRAI is in a long-term downward trend.

Interpretation

A positive trend in the MRAI implies increasing risk appetite whereas a negative trend implies decreasing risk appetite.

The picture today

The MRAI has been volatile and has shown no clear trend since May 2010. This indicates that **there is constantly changing appetite for risk**, which is consistent with the risk on – risk off phenomenon.

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Appendix A1: RORO Methodology

Market-wide correlation index

HSBC Risk On – Risk Off (RORO) Index

The Risk On – Risk Off (RORO) index takes the rolling correlations between the daily returns of the 34 assets listed in the table below and combines them into a single index. We construct the index by using principal component analysis (PCA) to decompose the 34 asset return time series into 34 principal components (PCs), which are mutually uncorrelated variables that explain the observed asset returns.

The first PC represents the most important factor driving financial markets during a particular time period. In current market conditions, this factor can be considered to represent "risk on – risk off". That is, the paradigm in which the market either believes the future is bright – "risk on" – or that it is bad – "risk off". The proportion of the variance explained by the first PC then provides an indication of the strength with which this paradigm dominates markets. If the first PC dominates markets and explains a large proportion of the variance, this implies that market-wide correlations are strong, which is a key feature of the risk on – risk off paradigm. In this scenario, this single factor is driving synchronized changes amongst many different markets; hence correlations are high.

We define the RORO index as the variance in market returns explained by the first PC. An increase in the RORO index implies an increase in market correlations, whereas a decrease implies that market correlations have decreased. In constructing the index we focus on markets that have a large overlap in trading hours (Europe and North America and Asian currency markets). This enables us to track correlations on a daily basis without having to worry about the non-synchronicity of return time series.

We also consider correlations between the different assets and the risk on – risk off "factor". These are the correlations between the different return time series and the first PC, and can also be considered to provide an indication of the extent to which risk on – risk off is driving different assets.

Assets included in the RORO Index

Equities	Government bonds (10 year yields)	Corporate bonds (yields)	Currencies (trade weights indices)	Metals	Other
S&P	US	AAA	USD	Gold	VIX
Dow Jones	Canada	BAA	EUR	Silver	Oil
NASDAQ	UK		CHF	Copper	Natural Gas
Russell 2000	Germany		GBP		Heating Oil
FTSE 100	France		JPY		Wheat
Euro Stoxx 50			AUD		Soybean
DAX			CAD		Cotton
CAC 40			NZD		

Source: HSBC

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Appendix A2: EM RORO

Regional emerging market correlations

HSBC Emerging Market RORO Indices

We produce Emerging Market RORO Indices for Asia, Latin America, and EMEA. We construct the indices using a similar methodology to that described in Appendix A1 for the cross-asset RORO index. For each region, we perform a principal component analysis (PCA) on the returns of a range of assets from that region. We then define each regional index as the proportion of the variance in the returns of assets in that region explained by the first principal component (PC).

For the original multi-asset RORO Index the first PC represents the most important global macro factor driving returns across a wide range of different assets. When the RORO index is high, this factor is strong. The regional EM indices have an analogous interpretation. For example, when the Asia RORO index is high this implies that a single factor is driving returns across Asia, which leads to strong correlations between Asian assets. Similarly, high levels of the Latam and EMEA RORO indices imply that correlations are high in Latin America and EMEA, respectively.

For each of the regions, we use both bond and equity data for the countries listed in the table below. To enable us to compare the regional indices, we use weekly price data to eliminate any effects due to the different time zones. This also allows us to compare these indices to the cross-asset RORO. We consider the correlation between the dominant market factor in the different regions and the main risk on – risk off factor that we identify in our cross-asset analysis. This is the correlations between the first PC for each region and the first PC for the cross-asset returns. The strength of these correlations can be considered to provide an indication of the extent to which risk on – risk off is driving returns in the different regions.

Assets included in the EM RORO Indices

Asia	Latin America	EMEA
Hong Kong	Brazil	Czech Republic
South Korea	Mexico	Hungary
Singapore	Chile	Poland
India		South Africa
Taiwan		Turkey
Malaysia		
Thailand		

Source: HSBC

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Appendix A3: Equity RORO

Equity market correlations

HSBC Equity RORO Index

The HSBC Equity RORO Index looks at all current members of the S&P 500 Index that have an appropriate data history back to 1 January 1990. We use a similar construction methodology for this index to the one described in Appendix A1 for the RORO Index.

To construct the Equity RORO Index we perform a principal component analysis (PCA) on the returns of all of the equities that we consider. We define the index as the proportion of the variance in the returns of these equities that can be explained by the first principal component (PC).

This first PC is the most important factor driving the returns at any time. For the original multi-asset RORO Index the first PC represents the most important global macro factor driving returns across a wide range of different assets. When the RORO index is high, this factor is strong.

For the Equity RORO, there is an analogous interpretation; however, in this case we are only looking at the risky asset class of equities. When the Equity RORO index is high it indicates there is a "supercharged" market beta dominating stocks – correlations are high and individual identity is reduced.

We use the two indices together to characterise the stress in the global macro environment. High correlations are generally an indication of market strain and have consequences for most asset classes. The two indices help understand the extent to which stress is confined to risky assets or is more comprehensive.

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Appendix B: OPRA Methodology

Position-based risk appetite index

Open Positions Risk Appetite (OPRA) Index

We use speculative positions from the CFTC Commitments of Traders report to measure risk appetite. We track changes in exposure of the speculative community to the various contracts listed in the table below and relate these changes to the risk associated with the contracts.

We view it as a sign of high risk appetite when the speculative community has increased its exposure to the more risky assets more than for less risky assets. To measure this we calculate the rank correlation between changes in the speculative open interest and volatility. A rank correlation is used since this is less susceptible to outliers than a standard correlation.

Since this is a correlation, the index will lie between -1 and +1. A value close to +1 indicates that speculators have been increasing their positions in risky assets across the board, with the largest percentage increase in exposure being in the riskiest assets. A value close to the minimum value of -1 indicates the opposite. If speculative positions have been changing in a way unrelated to risk, then the value of this index will be close to zero.

Contracts included in OPRA Index

Agricultural	Drinks	Metals	Currencies	Oil	Other
Corn	Cocoa	Platinum	AUD	LSCrude	Lumber
Oats	Coffee	Silver	CAD	Unleaded	
Rough Rice	OJ	Copper	CHF	Heating Oil	
Soybeans			EUR	Natural Gas	
Soybean Oil			GBP		
Soybean Meal			JPY		
Wheat					
Cotton					
Lean Hogs					
Live Cattle					

Source: HSBC

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Appendix C: MRAI Methodology

Price-based risk appetite index

Market Risk Appetite Index (MRAI)

The MRAI measures the aggregate level of risk appetite in the financial system using risk premia from various markets. The index is based on changes in price and volatility of several assets that are known to be strongly affected by risk appetite. A positive trend in the MRAI implies an increasing appetite for risk whereas a negative trend in the MRAI implies a decreasing appetite for risk.

We construct the index using equally weighted z-scores of changes in the level of six inputs: the VIX and VDAX volatility indices; the Global Hazard Index, which aggregates the 3-month implied volatilities for EURUSD, USDJPY, and EURJPY; BAA and AAA corporate bonds spreads; and interest rate swap spreads.

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Disclosure appendix

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