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GLOBAL STRATEGY PAPER NO. 33

Disentangling Risk Appetite

Drivers of mini-cycles and asset allocation implications

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- In 2018 there was a round trip in risk appetite, with investors starting the year extremely bullish and ending it very bearish. After our global risk appetite indicator (RAI) reached a new high in January 2018, by December 2018 it had reached one of its lowest levels. Such extreme levels indicate an overshoot relative to macro fundamentals and give a contrarian signal. **Our RAI has rebounded sharply YTD, but investor participation has lagged somewhat due to the speed of the recovery and concerns over the drivers of risk appetite from here.**

- We develop a model to disentangle and quantify the macro drivers of risk appetite - recent mini-cycles were driven by a combination of expectations for global growth, monetary policy, the Dollar and Euro area risk. In 2018 global growth de-rated as the Fed tightened policy and the Dollar strengthened, all weighing on risk appetite. Fading US recession fears alongside easier monetary policy globally have been the key drivers of risk appetite YTD. **We believe better global growth needs to take over as a driver of risk appetite - but the eventual recovery might disappoint and there is potential for further shocks from politics and rates.**

- Benchmarking cross-asset performance to those drivers of risk appetite shows that bonds underperformed at the margin during the 'risk off' in 2018, but have performed in-line YTD. **The sensitivity of bonds to growth has declined while for equities it has been stable - multi-asset portfolios might be less well diversified in the event of growth shocks.**

Our global risk appetite indicator (RAI) is now available on Bloomberg. The ticker for the RAI level is: **GSRAII Index** and the ticker for RAI momentum is: **GSRAIM Index**.

WHAT'S INSIDE

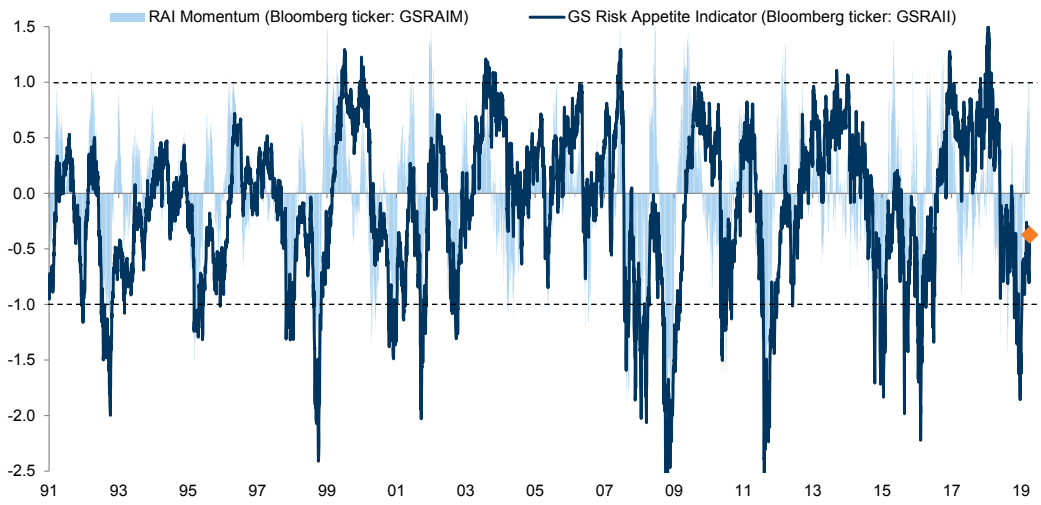
Risk-appetite cycles and the recent round trip

A round trip for risk appetite in 2018...and a very strong start to 2019

In 2018 there was a round trip in risk appetite with investors being extremely bullish early in the year, but becoming very bearish at the end. After our global risk appetite indicator (RAI) reached a new high in January 2018, by December 2018 it reached one of the lowest levels, close to those reached during bear markets like the GFC, the Tech Bubble and the EM/oil crisis in 2015/16 (Exhibit 1). And in 4Q18 the 3-month decline in risk appetite proxies, so-called RAI momentum, was one of the worst since 1990.

Strong risk appetite tends to build up slowly and can remain positive for a long time, while 'risk-off' episodes tend to be sharp and fast. Sentiment and positioning are seldom a catalyst, but they increase the risk of a reversal at extremes as markets often overshoot, in particular on the downside during 'risk-off' episodes. Indeed, with the dovish Fed pivot in January 2019 and easier monetary policy globally, risk appetite stabilised and recovered sharply toward more neutral levels.

Exhibit 1: After the sharp decline in December 2018, risk appetite has recovered



Note: Our RAI indices aggregates 1-year rolling z-scores of levels and changes in risk premia and pair trades across assets that reflect risk appetite (see Appendix 1 for details).

Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

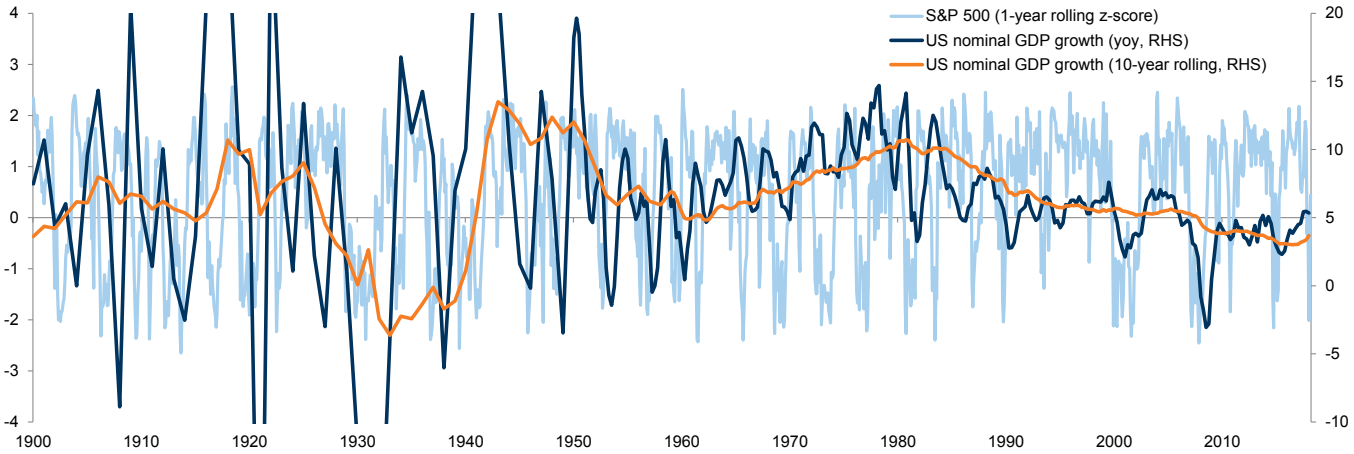
Cycle psychology - risk-appetite cycles vs. macro fundamentals

There are multiple interrelated and overlapping cycles that affect markets: (1) structural cycles, which condition long-term expectations of trend growth and inflation and other factors that might affect the medium-term outlook for returns, (2) the global and US business cycle, i.e. changes in growth and inflation relative to trend and (3) mini-cycles in risk appetite, which are often driven by material growth or rate shocks that might be due to geopolitical or political risks or material shifts in monetary policy.

Risk-appetite cycles are shorter and tend to occur more frequently relative to business cycles and often have larger swings compared to growth (Exhibit 2); also

see grey box below on a discussion of macro vs. market volatility). Risk appetite often overshoots, driving disconnects to macro cycles - from bullish levels it can collapse even outside of recessions if the perception of risk changes or it can soar from very bearish levels despite weak macro fundamentals, both cyclically and structurally.

Exhibit 2: Frequent and large swings in risk appetite around slower moving macro cycles

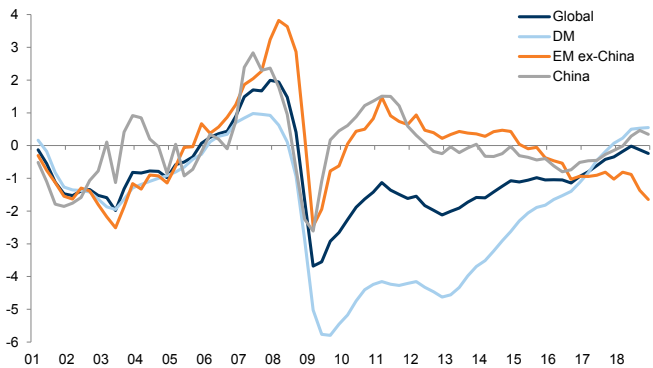


Source: GFD, Goldman Sachs Global Investment Research

Despite the strong start to the year, the medium-term outlook for returns across assets is still relatively poor. The lack of inflation risk since the 90s has driven lower real yields, which have boosted valuations across assets and weighed on medium-term return expectations and increases the risk of drawdowns (see The Balanced Bear - Part 1: Low(er) returns and latent drawdown risk, November 28, 2017).

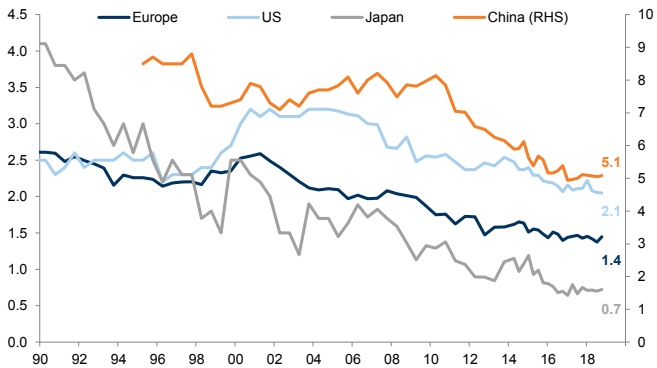
And as DM economies have moved further late cycle, with positive output gaps the prospects for strong growth acceleration seem limited even as recession risk appears low due to the lack of inflation (Exhibit 3). In addition US nominal GDP growth has declined since the 1980s with a more negative trend in real growth post GFC fuelling secular stagnation fears. The downtrend in LT growth expectations has been more pronounced in Europe and Japan as well as more recently China (Exhibit 4).

Exhibit 3: Outside of EM ex China output gaps have closed
Output gap estimates (actual vs. potential GDP)



Source: Goldman Sachs Global Investment Research

Exhibit 4: LT growth expectations have declined
LT (6-10y) real GDP growth consensus estimates



Source: Consensus Economics, Goldman Sachs Global Investment Research

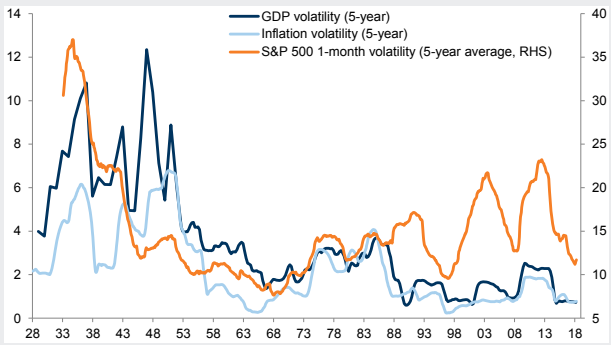
Macro vs. market volatility - a growing disconnect

Since the 1990s there has been an increase in market relative to macro volatility. Business cycles have become longer and with the 'Great Moderation' macro volatility, i.e. swings in GDP, inflation and unemployment have declined. Rising inflation has been a key ingredient for US recessions since WW2 as it forces central bank tightening and deleveraging. But anchored inflation, also due to fewer oil shocks after the shale revolution, has allowed central banks to err on the side of caution and buffer the business cycle more proactively. In addition, better inventory management and the shrinking output share of the most cyclical sectors have reduced the impact of industrial fluctuations. Fiscal tightening has also become a less important contributor to US recessions since the 1970s. Our economists believe that financial imbalances and asset price crashes are the key sources of recession risk, which is closely linked to risk-appetite cycles.

While macro volatility has been low since the 90s, S&P 500 volatility has actually trended up as markets have gone through pronounced risk-appetite cycles (Exhibit 5). S&P 500 volatility has been higher on average when in a high vol regime (>15%), such as during the Tech Bubble and the GFC (Exhibit 6). With more anchored inflation and lower real yields there have been more frequent 'Goldilocks' periods than previously (the mid-1990s, 2005-07, the post-GFC recovery and more recently 2014 & 2017). In those types of periods volatility tends to be anchored and boost corporate releveraging as well as investor risk appetite, which increases vulnerability to growth or rate shocks. And sharp declines in risk appetite tighten financial conditions, which further weigh on growth and can increase recession risk, like during the Tech Bubble and the GFC. And global financial conditions have become more correlated, which can increase the risk of negative feedback loops between markets and the global economy.

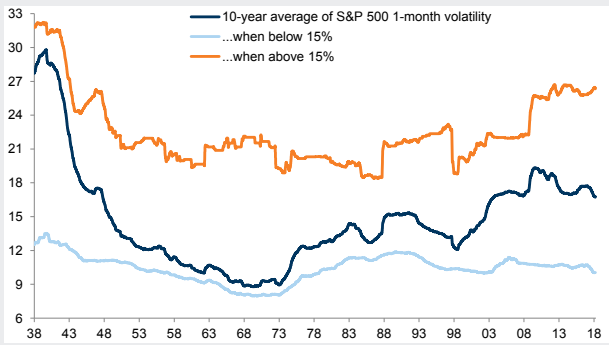
Changes in market microstructure and regulation might have contributed to sharper swings in risk appetite. First, more investors are investing pro-cyclically and based on volatility, for example managed volatility funds or risk parity funds - and there has been material growth in systematic volatility selling strategies; a simultaneous unwind of such 'short-volatility' strategies could trigger or exacerbate a serious market crash. At the same time, liquidity provision tends to be cyclical and transaction costs are higher during periods of higher volatility. This may in part reflect more systematic market making and high-frequency trading, which pulls back during periods of higher volatility (see Global Strategy Paper: A Taste of the High (Vol) Life, April 18, 2018).

Exhibit 5: While macro volatility has been low since the 90s, S&P 500 volatility has moved in large cycles and trended up



Source: GFD, Bloomberg, Goldman Sachs Global Investment Research

Exhibit 6: When vol is high, it has been higher on average since the 1990s



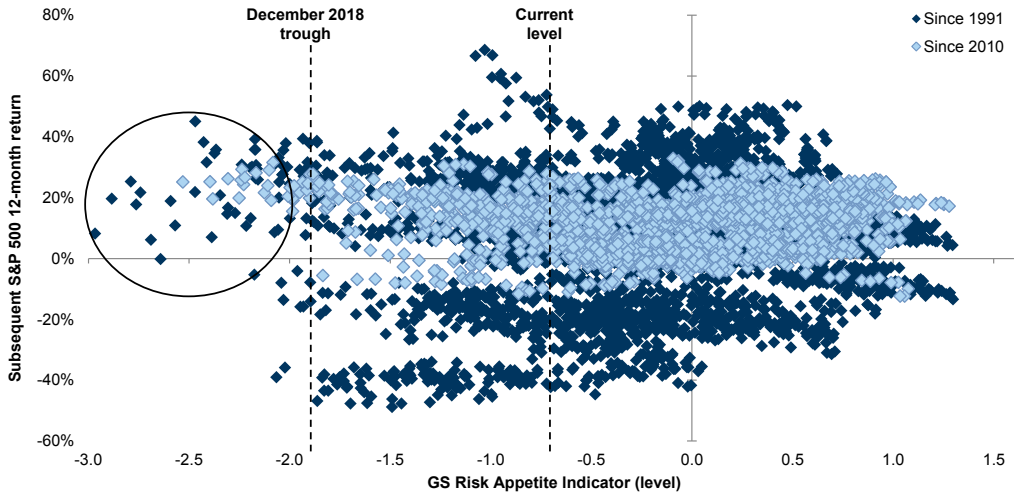
Source: Bloomberg, Goldman Sachs Global Investment Research

Contrarian signals at extreme levels in our risk appetite indicator

From bearish levels of risk appetite there can be sharp recoveries despite a poor medium-term outlook. We showed that our **RAI signals positive return asymmetry for the S&P 500 when it reaches extremely low levels below -1.5, with levels closer to -2.0 giving the clearest signal over longer time horizons.** From those levels the S&P 500 seldom had negative 12-month returns, especially since the GFC (Exhibit 7).

Similarly, a RAI above 1, i.e. very bullish levels, indicates the chance of a correction is higher. In the recent mini-cycle our RAI has provided particularly good signals - in January 2018, close to peak in the S&P 500, it reached the highest level since the 90s while in December 2018 it dropped close to -2 (excluding safe havens). However, while such extreme values can provide contrarian signals, they are fairly seldom reached. And after the recent recovery the RAI is at more neutral levels again.

Exhibit 7: From very low RAI levels (below -2), the likelihood of negative S&P 500 returns is relatively low



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 8: Extreme levels of our risk appetite indicator can provide a contrarian signal
Data since 1991

RAI above...	Time spent	S&P 500 returns in the subsequent... 1 month	3 months	6 months	1 year	Hit ratio positive returns in subsequent... 1 month	3 months	6 months	1 year
1.20	0.6%	-2.5%	-3.1%	1.3%	3.5%	29%	24%	59%	32%
1.00	1.8%	-0.6%	0.3%	5.3%	5.3%	53%	52%	77%	58%
0.80	6.6%	0.3%	2.2%	5.9%	7.9%	62%	67%	87%	71%
0.60	15.4%	0.6%	2.4%	5.0%	8.3%	64%	73%	82%	74%
0.40	25.3%	0.8%	2.4%	4.7%	9.4%	65%	72%	79%	78%
0.20	36.0%	1.0%	2.6%	5.1%	10.5%	65%	73%	79%	81%
0.00	47.5%	0.8%	2.4%	5.1%	10.7%	63%	71%	79%	81%

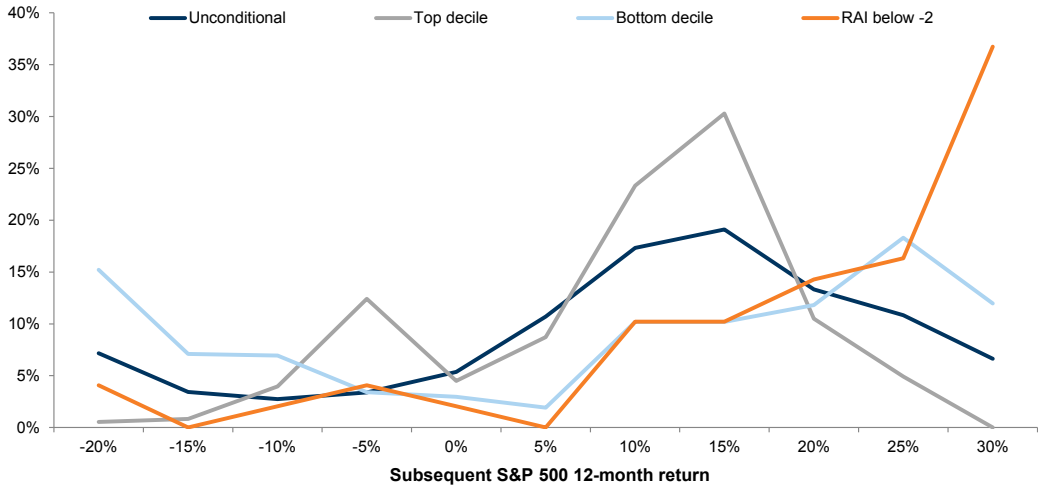
RAI below...	Time spent	S&P 500 returns in the subsequent... 1 month	3 months	6 months	1 year	Hit ratio positive returns in subsequent... 1 month	3 months	6 months	1 year
0.00	52.5%	0.7%	1.9%	3.7%	7.6%	63%	68%	71%	74%
-0.25	38.1%	0.9%	2.1%	3.7%	6.7%	65%	69%	70%	73%
-0.50	27.0%	1.3%	2.7%	4.6%	7.6%	68%	72%	72%	74%
-0.75	17.9%	1.4%	3.3%	5.5%	7.6%	68%	73%	71%	71%
-1.00	10.8%	1.2%	3.4%	6.5%	7.5%	66%	72%	71%	69%
-1.25	5.9%	1.0%	2.8%	6.7%	7.0%	63%	69%	72%	71%
-1.50	3.3%	1.1%	2.5%	8.4%	12.1%	66%	64%	75%	79%
-1.75	2.2%	1.6%	2.3%	9.8%	16.5%	66%	61%	76%	85%
-2.00	0.9%	1.8%	1.7%	9.1%	20.9%	63%	51%	66%	91%
Unconditional		**0.8%**	**2.1%**	**4.3%**	**9.0%**	**63%**	**69%**	**74%**	**79%**

Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Also market timing based on sentiment and positioning measures like the RAI alone is difficult. It can stay at elevated levels for a long time during a strong bull market which is supported by macro fundamentals. And of course, not all bear markets come from high levels of risk appetite - usually risk appetite starts declining ahead of bear markets. We find average returns and hit ratios over a 6-12 month horizon show the changing asymmetry (Exhibit 8) - from very bullish levels average subsequent returns tend to be lower and higher from bearish levels.

The distribution of subsequent S&P 500 returns has positive but few negative fat tails from very low RAI levels (Exhibit 9). From bottom decile levels there are also negative fat tails as the on-going 'risk off' move can continue before the RAI troughs. However, from RAI levels below 2 there were very few negative tails but lots of positive ones. From top decile RAI levels positive tails are limited and the distribution is more negatively skewed.

Exhibit 9: From high RAI levels return potential is limited - from low levels asymmetry is positive
Distribution of subsequent 12-month S&P 500 returns conditional on RAI level, Data since 1991



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

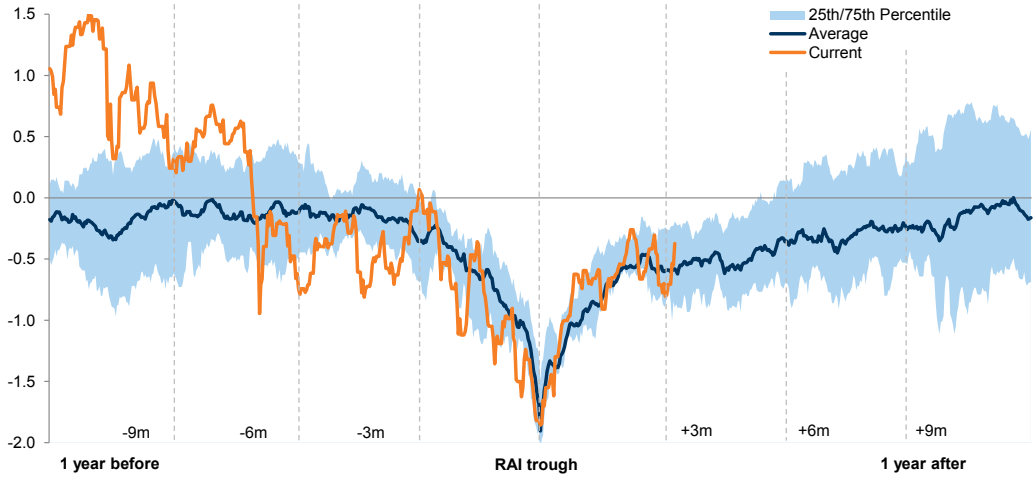
Risk appetite reversal - sentiment more bullish but positioning lagging

Risk appetite has rebounded sharply since December 24 and is tracking the average recovery since 1990 relatively closely (Exhibit 10). However, after 3 months there tend to be larger differences in recoveries as macro fundamentals take over as a driver relative to sentiment and positioning - this indicates in the next 3-6 months the uncertainty on the path for risk appetite increases. In other words, 'the easy money' has been made with the risk appetite overshooting to the downside in December and recovering again - the RAI is nearly back to levels from early Q4 2018.

Our risk-appetite indicator tends to be closely linked to sentiment surveys and positioning or fund flow measures although there can be material disconnects (see Appendix 2 for an overview and details). The RAI has several advantages: (1) it is available on a daily basis as it purely based on market prices, (2) sentiment surveys and positioning and fund flow measures can lag (due to delayed publication or behavioral

lags) or have other data biases[1] and (3) due to the cross-asset nature of the RAI it is possible to identify potential lead/lags for risk appetite across assets.

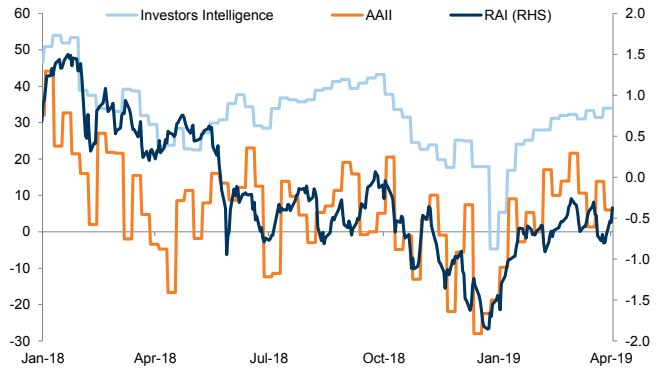
Exhibit 10: The risk appetite increase YTD tracks the average recovery post a sharp decline
RAI recoveries after falling below -1 (15 instances since 1990)



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

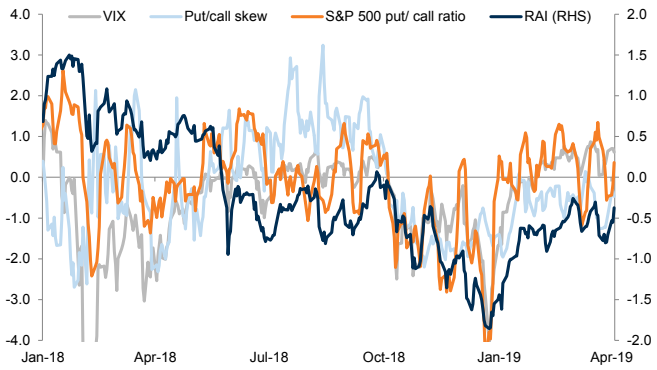
Similar to our RAI, most other sentiment and positioning indicators have turned more bullish YTD (Exhibit 11-14). But while sentiment measures have been closely correlated with our RAI YTD, positioning has lagged somewhat, especially for equities. CFTC US equity futures positioning has picked up, which likely reflects positioning from macro and systematic investors such as CTAs (Exhibit 13). But participation from investors more broadly has been relatively limited, resulting in one of the largest gaps between equity performance and equity fund flows since the GFC (Exhibit 14) - normally flows tend to be closely linked to performance and risk appetite.

Exhibit 11: Based on surveys, investor sentiment has rebounded materially YTD
Bull vs. Bear spreads from sentiment surveys



Source: Bloomberg, Datastream, Goldman Sachs Global Investment Research

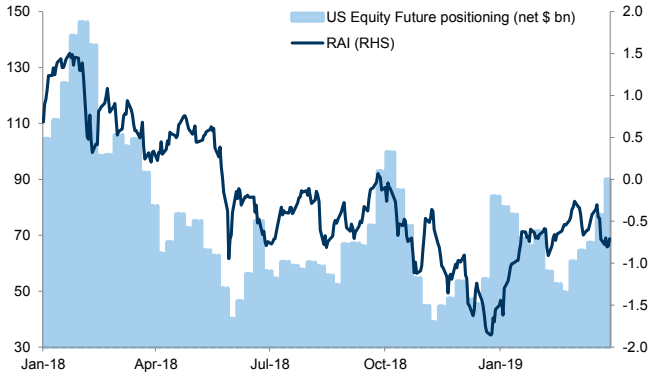
Exhibit 12: There also has been a sharp reset in sentiment measures in options markets



Source: Bloomberg, Goldman Sachs Global Investment Research

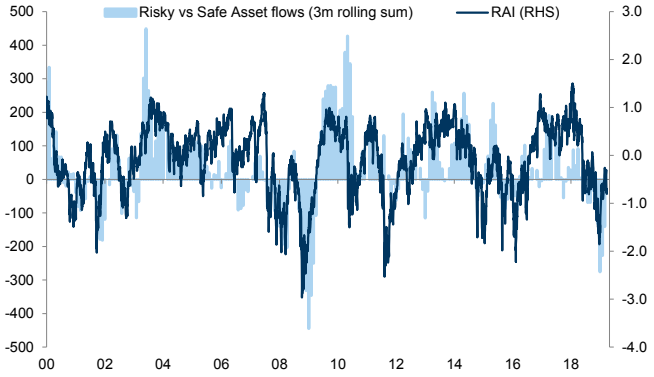
[1] For example the sentiment surveys or positioning/ fund flows data might only be representative of a particular investor group like retail for fund flows and hedge funds for CFTC positioning data. Also on sentiment surveys investors' answers might be biased by market moves or other incentives.

Exhibit 13: S&P 500 futures positioning declined in 2018, but has picked up more recently



Source: Bloomberg, CFTC, Goldman Sachs Global Investment Research

Exhibit 14: Fund flows to risky assets tend to follow our risk appetite indicator but they have lagged YTD

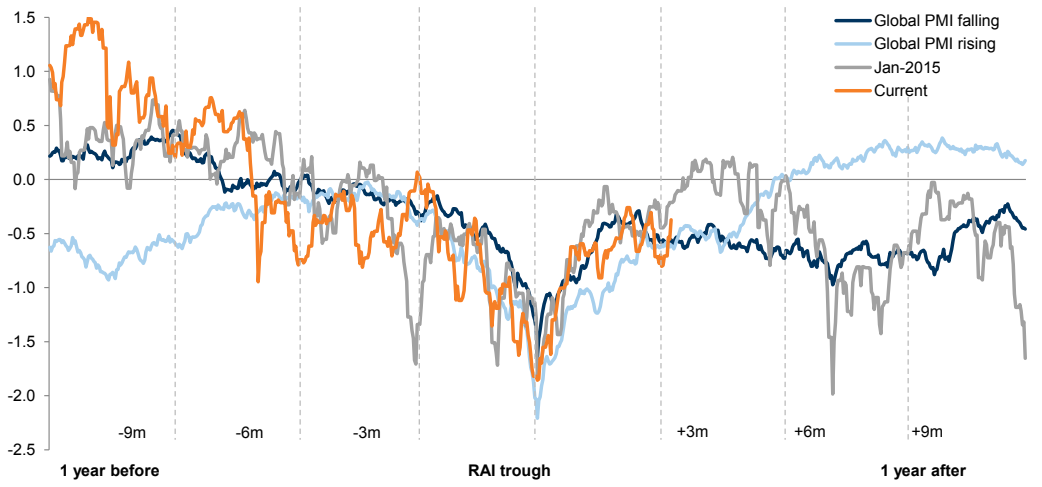


Source: Morningstar, ICI, Goldman Sachs Global Investment Research

In our view the lack of investor participation has been due to the very fast recovery in risky assets coupled with the initial lack of positive growth momentum. It also suggests the 'pain trade' might still be up, which can support risk appetite further. But without a sustained pick-up in global PMIs in the coming months, we believe risk appetite is unlikely to turn positive and remains vulnerable to shocks, similar to 2015, and might be driven by speculation on political risks in Europe, a US-China trade deal or secular stagnation fears (Exhibit 15). To understand the path from here, we need disentangle and quantify the drivers of risk appetite and benchmark them to different macro scenarios.

Exhibit 15: Without rising PMIs it is unlikely risk appetite will increase materially from here and there is risk of reversals

RAI recoveries after falling below -1.5 split depending on global PMI falling/ rising (9 and 7 instances, respectively)



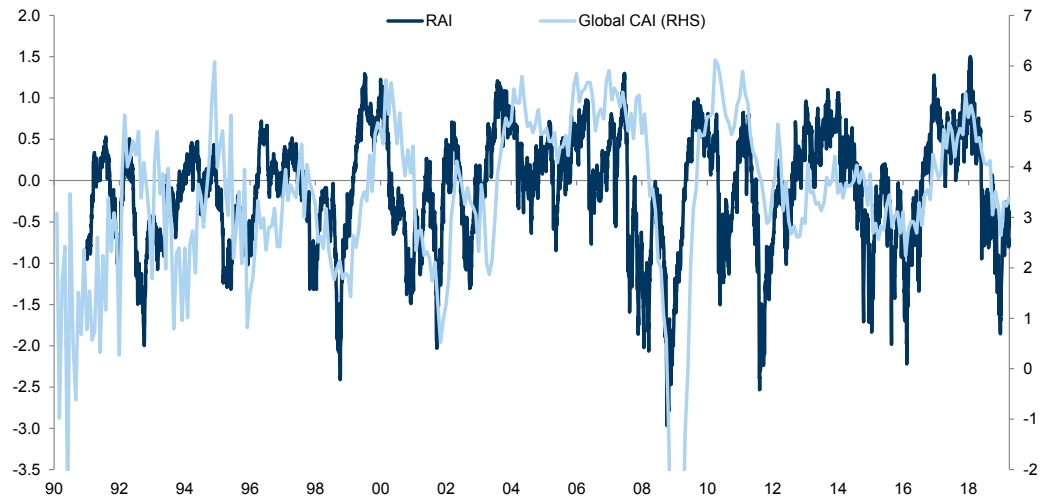
Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Disentangling macro drivers of risk appetite

Growth has been the most important driver of risk appetite since the 90s

Investor risk appetite tends to be conditioned by the growth/ inflation mix but with anchored inflation since the 90s it has been more linked to growth. And the RAI tends to lead growth, as measured by our Global Current Activity Indicator (CAI) (Exhibit 16). This is also due to the link between growth and financial conditions, which tend to ease in periods of rising risk appetite and in turn support growth.

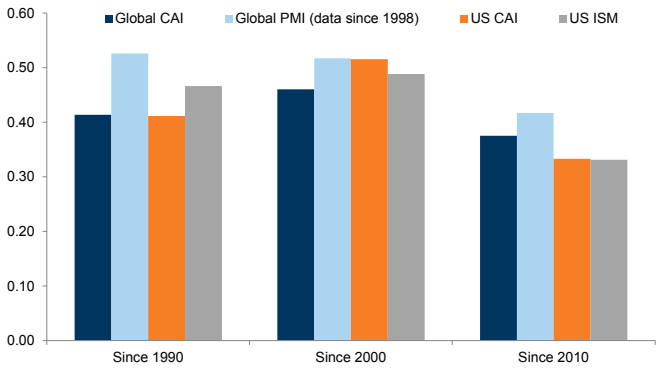
Exhibit 16: Risk appetite tends to be closely linked to, and leads, global growth



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

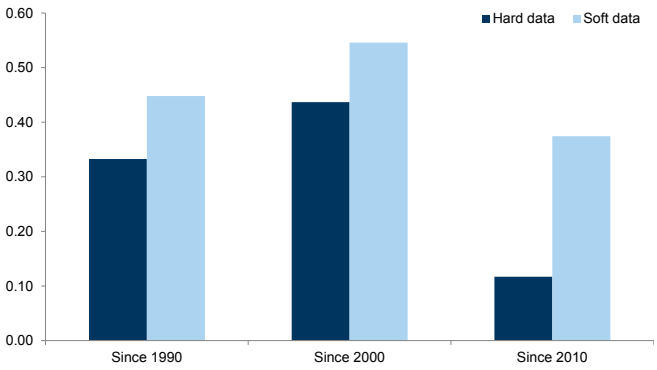
But the RAI has been less correlated with global and US growth since 2010 (Exhibit 17). And hard data has become less important compared to soft data since 2010, suggesting that growth 'sentiment' matters more (Exhibit 18). In part this might be due to less macro volatility in hard data since the 'Great Moderation', but regardless it complicates the link to growth due to the multiple overlapping cycles affecting investor sentiment.

Exhibit 17: Risk appetite closely correlated with growth
Correlation of RAI with different measures of growth



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 18: Soft data more important vs. hard data since 2010
Correlation of RAI with US CAI hard and soft data

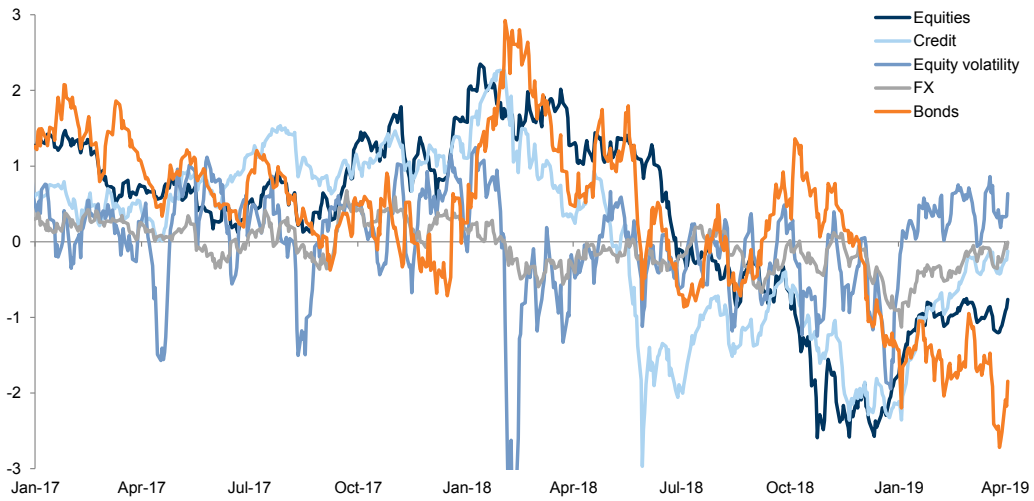


Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Monetary policy matters - 'Goldilocks' rally post the dovish Fed pivot

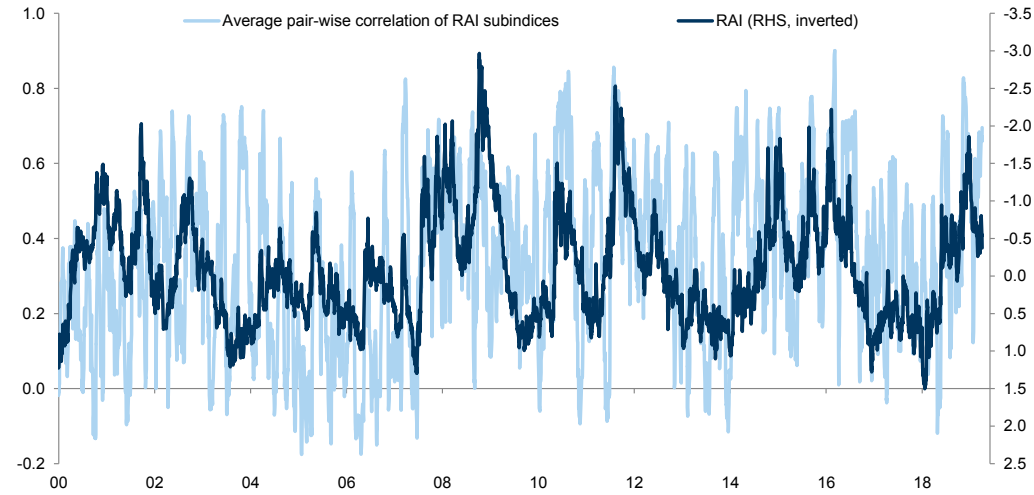
Even with anchored inflation, central bank policy can still materially affect risk appetite - in 2018 the competition from cash for most assets increased as a result of Fed tightening, weighing on investor sentiment. And the recovery in risk appetite post the dovish Fed pivot came with a 'Goldilocks' rally as both risky assets and 'safe assets' have posted positive returns YTD - bonds have not sold off materially YTD.

Exhibit 19: Risk appetite across assets has picked up with the exception of bonds
RAI subindices for different asset classes



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 20: During 'risk off' the RAI subindices are very correlated, but less during 'risk on'
1-month correlation of weekly changes in RAI subindices for different asset classes



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

The lack of sell-off in bonds has created discomfort for investors as lower bond yields might also signal weaker growth. The subcomponents of our RAI have been closely correlated on average - especially during 'risk-off' episodes bonds have rallied (Exhibit 20). Since the late 1990s equity/bond correlations have been negative with the

advent of the 'central bank put' with lower bond yields signalling weaker growth, either cyclically or structurally. However, changes in that relationship provide insight on the drivers of risk appetite: growth and monetary policy.

Material shifts in monetary policy result in a more positive relationship between equities and bonds. For example late in recent business cycles equity/bond correlations often turn less negative as central banks aim to normalise policy, which can move the 'central bank put' more out of the money. Similarly, a combined rally of bonds and equities is quite common when the Fed stops hiking: around the end of the past five Fed hiking cycles (1984, 1989, 1995, 2000 and 2006), the S&P 500 did well on average and bonds rallied in every case.

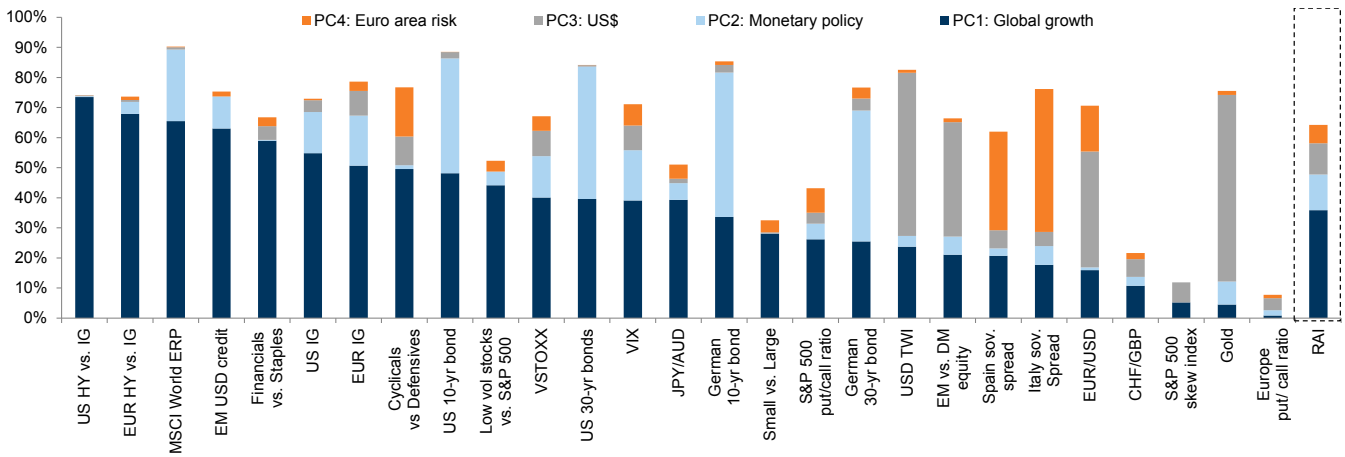
Disentangling the growth/rates mix and other drivers of risk appetite

To disentangle and quantify the different drivers of global risk appetite we use principal component analysis (PCA) - it breaks down the changes in our 27 RAI components, i.e. proxies for risk appetite across the different assets, into common 'factors' that explain their variation (see Appendix 3 for details). We can then benchmark those to macro fundamentals to understand disconnects and which trends are likely to extend. **We find four factors, ranked by importance, which we interpret as follows:**

1. **'Global growth' (PC1),**
2. **'Monetary policy' (PC2),**
3. **'US$' (PC3) and**
4. **'Euro area risk' (PC4).**

Together they explain 65% of the variation in the 27 RAI components since 2000. It goes without saying that a wide and changing range of factors are driving risk appetite over time - 4 factors clearly abstract from a complex reality. And for components that directly contribute to the factors (e.g. USD TWI to PC3: US$) there is some circularity.

Exhibit 21: A large part of the variation in risk appetite since 2000 can be explained by four factors
Cumulative R2 since 2000

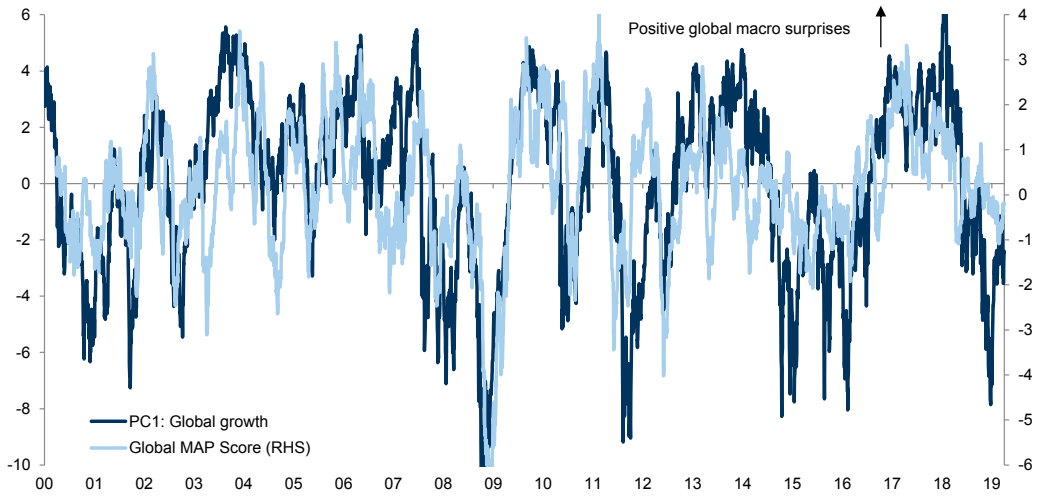


Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

The main driver of risk appetite have been macro surprises

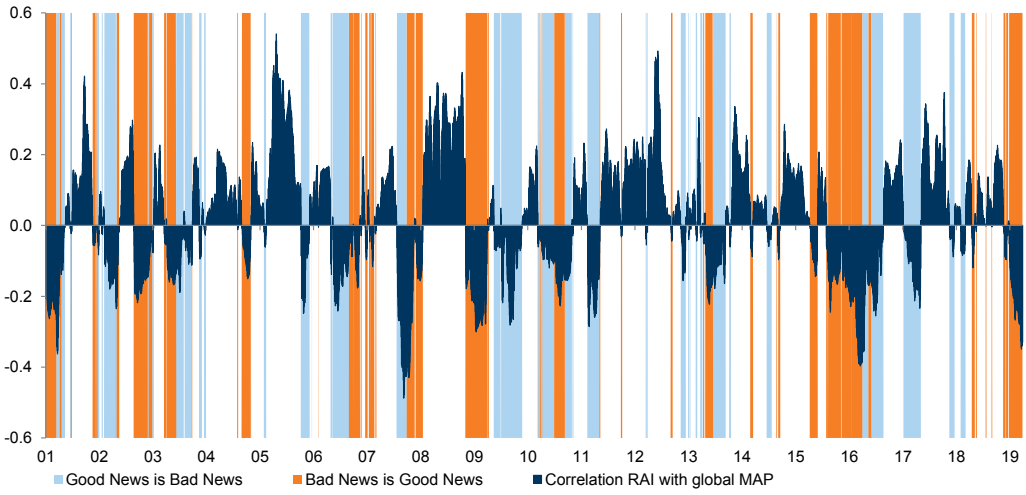
The first principal component (PC1) explains the majority of variation of the RAI components, in particular for risky assets - in fact it is very close to our RAI itself, which is a simple average of the RAI components. And the most important driver of broad risk appetite is unsurprisingly 'global growth' - we find **PC1 is closely linked to global macro surprises, especially at turning points** (Exhibit 21).

Exhibit 22: Risk appetite has closed the gap to macro surprises
PC1 vs. global macro surprise index (MAP score)



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 23: Bad news is not always bad news for risk appetite
6-month correlation of RAI (weekly changes) with global MAP scores



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

After our RAI undershot in December, it is now roughly in line with our global MAP score (Exhibit 22). But macro surprises have been negative YTD and thus have not been the driver of the risk appetite recovery indicating a 'bad news is good news' regime (Exhibit 23). **'Bad news' can be 'good news' if they drive a dovish monetary policy response - this has been the case with the recent dovish Fed pivot, in our view.**

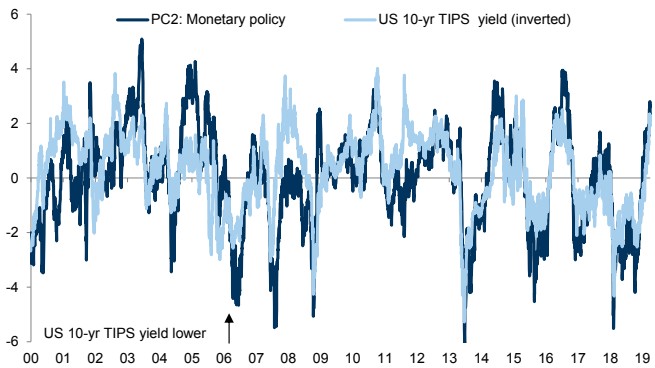
However, 'bad news is good news' regimes tend to be temporary as either the monetary stimulus runs out and weak growth weighs on risk appetite or growth eventually picks up driving more positive surprises. However, while more positive macro surprises are needed to stabilise risk appetite, a sustained, large pick-up in risk appetite usually also requires strong global growth trends, not just surprises relative to expectations.

Interplay of growth with monetary policy and the Dollar also matters

A 'bad news is good news' or 'good news is bad news' regime is conditioned by the interaction of growth with monetary policy. **This is captured by the second principal component (PC2), which we label 'monetary policy' - it has a close, inverse relationship with global bond yields.** We find a particularly strong link to US 10-year TIPS yields, which have declined materially YTD (Exhibit 24). Assuming somewhat stable growth expectations, lower real yields can support risk appetite via an increased search for yield and less deleveraging pressure. Unsurprisingly it explains a large part of the variation of bonds but also conditions risk appetite in credit, equities and equity volatility.

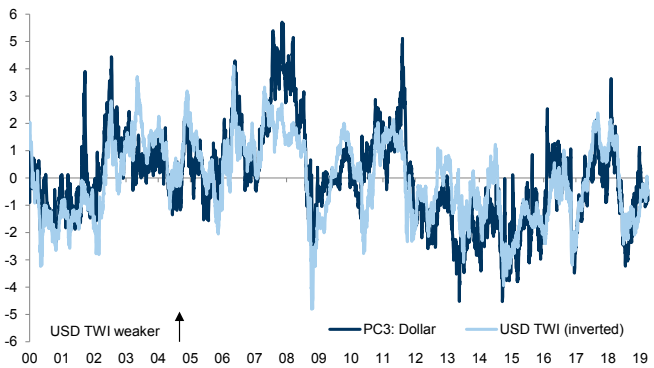
In a related camp is the third principal component (PC3), which we label 'US$' as it is closely correlated with the trade-weighted US$ (Exhibit 25). While this might also capture some monetary policy changes via rate differentials, the Dollar has increasingly become a proxy for the US vs. RoW growth differential. In 2017 a weaker Dollar reflected strong, synchronized global growth, which has been very supportive for risk appetite, especially for EM vs. DM assets. And Gold has become more linked to the Dollar due to EM demand while the link to US real yields has weakened.

Exhibit 24: Lower real yields usually support risk appetite via the search for yield
PC2 vs. US 10-year TIPS yield (1-year z-score)



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 25: A weaker US$ can ease global financial conditions and indicates strong global growth
PC3 vs. US$ trade-weighted index (1-year z-score)



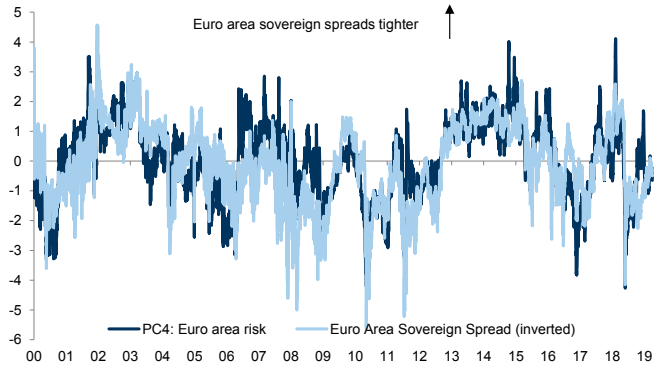
Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

European political risk has also affected risk appetite since the GFC

Finally, the fourth principal component (PC4) we label 'Euro area risk' as it is closely correlated with Euro-area sovereign spreads (Exhibit 26). After the GFC there were several periods where Euro area risk premia increased due to political risks - both during the Euro-area crisis in 2011/12 and in the EM/ oil crisis in 2015/16, which drove deflation and debt sustainability fears for EU peripherals. The impact on the RAI was material albeit temporary, as is often the case with political risks (Exhibit 27).

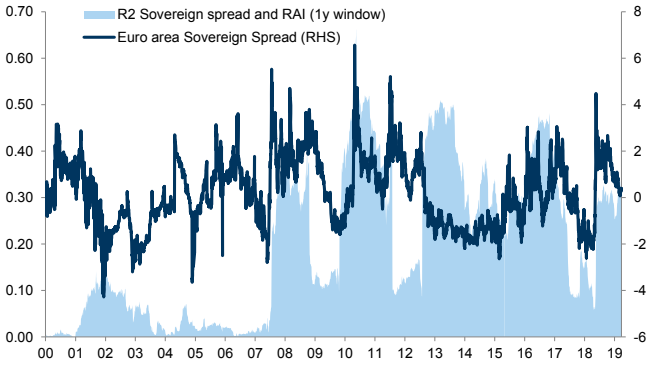
In 2018, with the Italian elections, Euro area sovereign spreads have again become a more important driver of our RAI although the moves and explained variation is much below the Euro-area crisis, likely due to the ECB backstop which has reduced systemic risk and thus reduced spillovers. Still in 2019 European political risks are likely to remain elevated with EU elections in May, several scheduled and possible snap national elections, as well as ongoing uncertainty related to Italy and Brexit. Finally there will be a new ECB president but also appointments at the EU Commission and EU council.

Exhibit 26: Since 2000 Euro- area risk has been a key driver of risk appetite
PC4 vs. Euro area sovereign spreads (average of Italy and Spain, 1-year z-score)



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 27: Political risks like the Euro area crisis can dominate risk appetite temporarily
Variation in RAI explained by Euro area sovereign spreads (1-year z-score)



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

After the 'Goldilocks' rally YTD, growth should take over as the driver

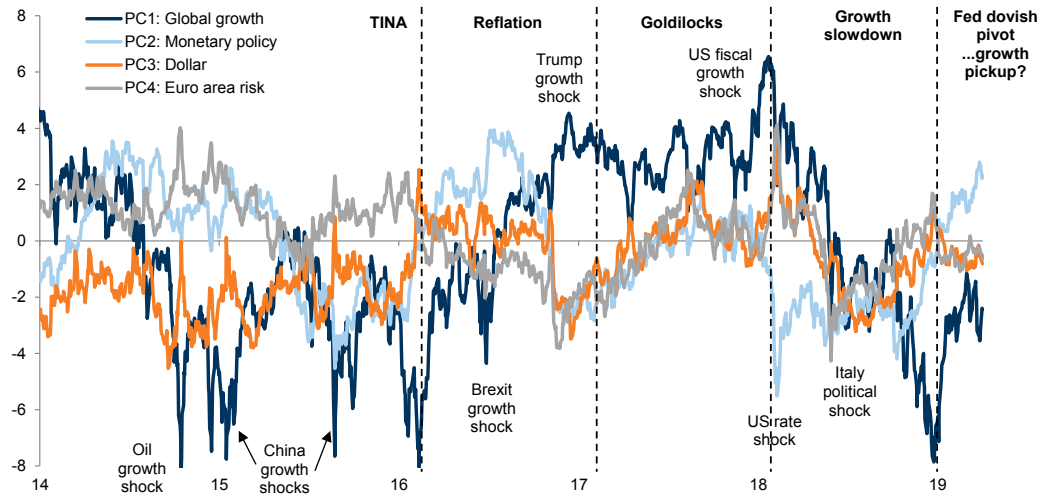
The sharp decline in risk appetite in 4Q18 ended the mini-cycle that started 3 years earlier. In 3Q15 risk appetite stabilised as a result of TINA (There Is No Alternative) - a strong search for yield driven by aggressive monetary stimulus following deflation concerns with the sharp oil price declines in 2014. But there were 2 major setbacks due to China growth shocks in 2015. Only in 2Q16 reflation followed, with a recovery in global growth, first in EM and then in the US. And global growth accelerated further and was broad-based (as indicated by a weaker Dollar) in 2017 as inflation pressures eased, resulting in a 'Goldilocks' backdrop that boosted risk appetite to new highs.

Throughout 2018 weaker global growth and a stronger Dollar due to the US decoupling weighed on risk appetite. And there were 2 US rate shocks due to the Fed tightening and a growth shock due to Italian political risk, which further weighed on risk appetite. We believe the recovery in risk appetite since December 2018 was driven by a sharp re-rating in global growth expectations and the dovish Fed pivot in January 2019 as well as easier monetary policy globally. But in March the continued bond rally started to weigh on growth expectations due to weaker US and Euro area core inflation, a manufacturing recession in Europe and the US yield curve inverting.

The market has moved from a 'bad news is good news' to a 'bad news is bad news' regime - we think stronger growth will be necessary to boost risk appetite further. We expect global growth to pick-up - this should drive a more traditional increase in risk appetite ('risky assets' up, bonds down). And we expect modest Dollar

weakness in the medium-term, supported by a global growth pick-up relative to the US, which should further support risk appetite. Recent data has been supportive - while Euro area March PMIs were poor, China March PMIs have rebounded, in part due to Chinese New Year holiday timing, and the ISM manufacturing has picked up as well.

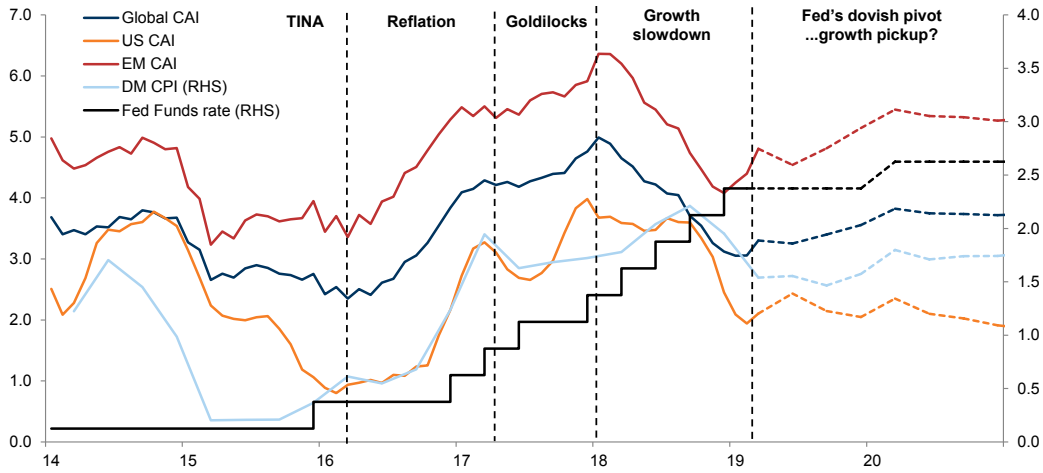
Exhibit 28: Risk appetite has stabilised after multiple headwinds in 2018
RAI principal components



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

However, we expect a more modest global growth acceleration compared to 2016 (Exhibit 29), due to headwinds from a weak structural cycle, with weaker nominal trend growth across markets, and a more late-cycle position in DM. This increases the risk of markets overshooting macro fundamentals again and eventual disappointments. Also, political risks such as Brexit and US-China trade negotiations remain. The interplay of growth and rates matters as well - our economists still expect another Fed hike early in 2020 and thus the current dovish pricing increases the risk of rate shocks.

Exhibit 29: Global growth/ inflation mix has worsened in 2018 and is expected to improve
Dotted lines are GS GDP growth forecasts (yoy) based on quarterly estimates.



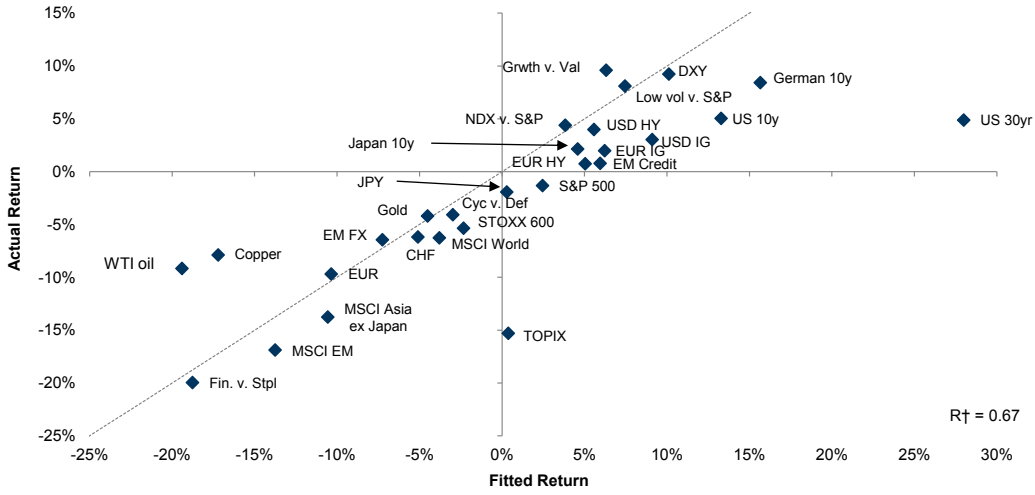
Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Asset allocation implications from changing risk appetite

Benchmarking cross-asset performance during the risk-appetite reversal

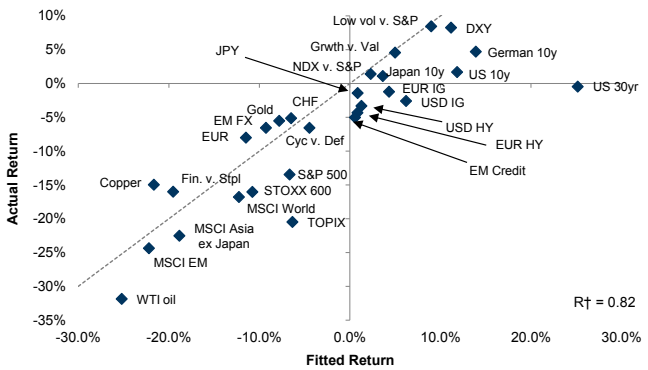
Benchmarking cross-asset performance during the recent risk-appetite cycle can help identify assets that have over- or undershot relative to the four drivers of risk appetite, which we call RAI factors. We extract betas since 2010 in a multi-factor model to estimate returns based on those four factors: PC1 'Global growth', PC2 'Monetary policy', PC3 'Dollar' and PC4 'Euro area risk'. **The biggest disconnect since January 2018 has been in the bond market with US 30-year bonds but also US and German 10-year bonds underperforming** (Exhibit 30). Also equities, in particular TOPIX, have underperformed while both oil and copper have outperformed. Bonds underperformed during the risk appetite decline in 2018 (Exhibit 31) and performed in line during the recovery (Exhibit 32).

Exhibit 30: Bonds, TOPIX and copper were outliers relative to expected returns based on the RAI factors
Performance January 26, 2018 to March 29, 2019 (fitted returns based on betas on RAI factors since 2010)



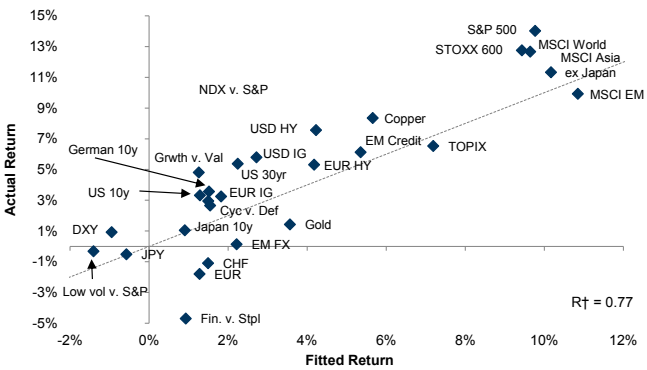
Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 31: Bonds lagged materially in 2018...
Performance January 26, 2017 to December 28, 2018



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 32: ...but closed some of the gap YTD
Performance December 28, 2018 to March 29, 2019



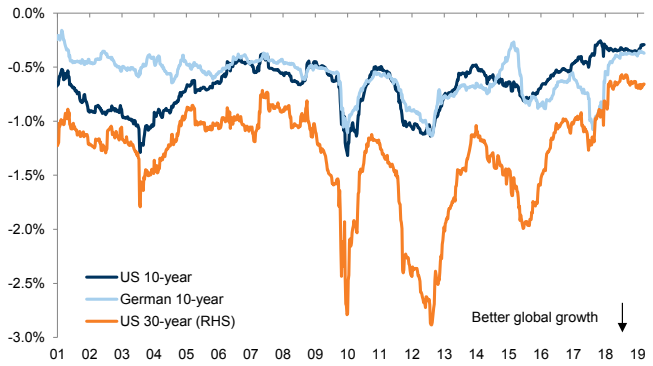
Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Sense and sensitivity - bonds less sensitive to 'growth', equity beta stable

Bonds have become less sensitive to 'Global growth'. The same was true in 2006/07 as central banks aim to normalise policy late cycle. But bonds also offer less yield and repricing potential to buffer 'growth shocks', in our view. For equities the sensitivity to 'growth' has been stable - **as a result multi-asset portfolios are more exposed to 'growth shocks' and investors should look for alternative ways to diversify and reduce risk** (see The Balanced Bear - Part 2: Chasing your tail risk and balancing the bear, October 2, 2018).

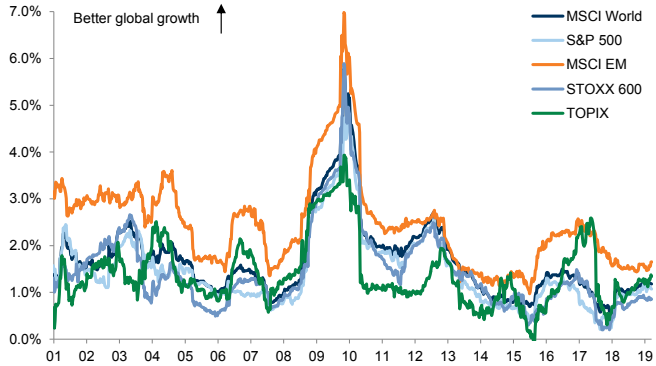
While US 10-year bonds had a pretty stable beta to 'monetary policy', equities seem to have become less sensitive to it. This indicates 'growth' might be the most important driver of from here. For Gold the sensitivity to the 'Dollar' is much higher than that to 'Monetary policy', which tends to be closely linked to real yields as we showed earlier.

Exhibit 33: The sensitivity of bonds to 'better global growth' has declined and was relatively low in the recent decline
1-year rolling beta to PC1 'Global growth' (weekly changes)



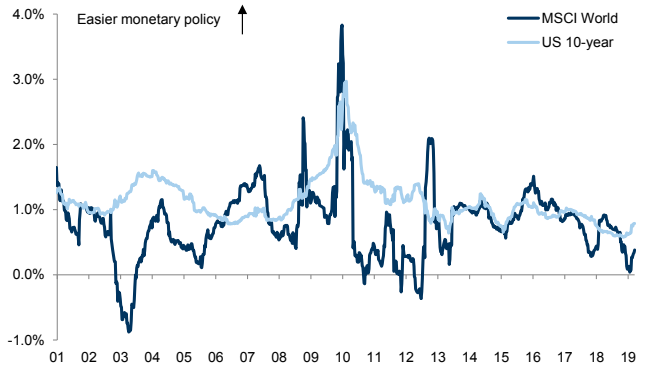
Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 34: Equities have been similarly sensitive to 'better global growth' with MSCI EM most geared to it
1-year rolling beta to PC1 'Global growth' (weekly changes)



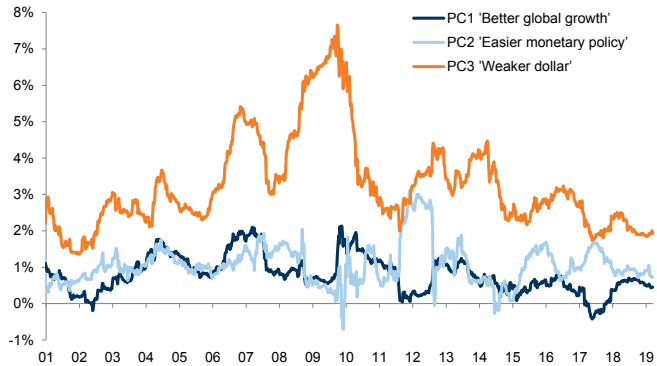
Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 35: Bond sensitivity to 'easier monetary policy' has been stable while for equities it has declined
1-year rolling beta to PC2 'Monetary policy'



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

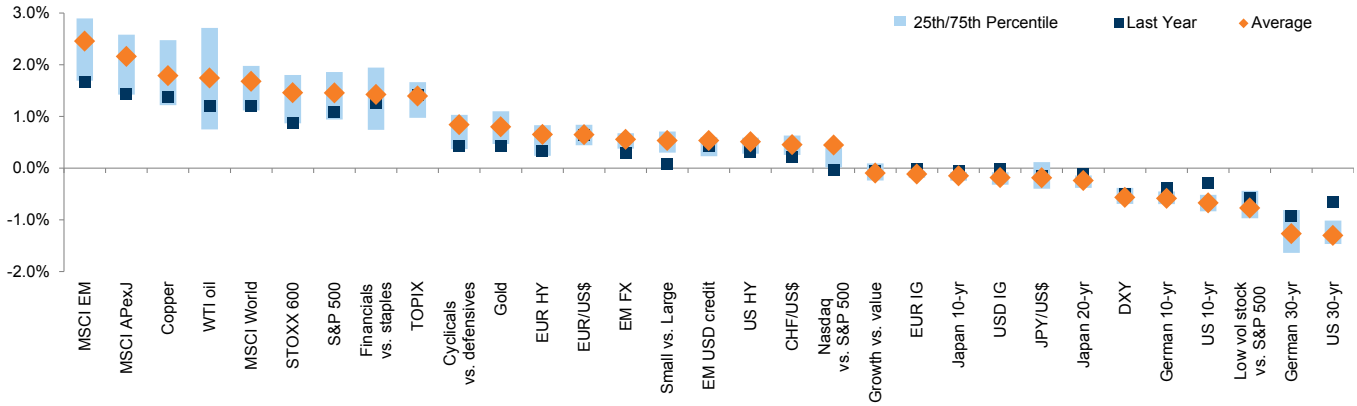
Exhibit 36: Gold is most sensitive to the Dollar
1-year rolling beta of Gold to different RAI factors (weekly changes)



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

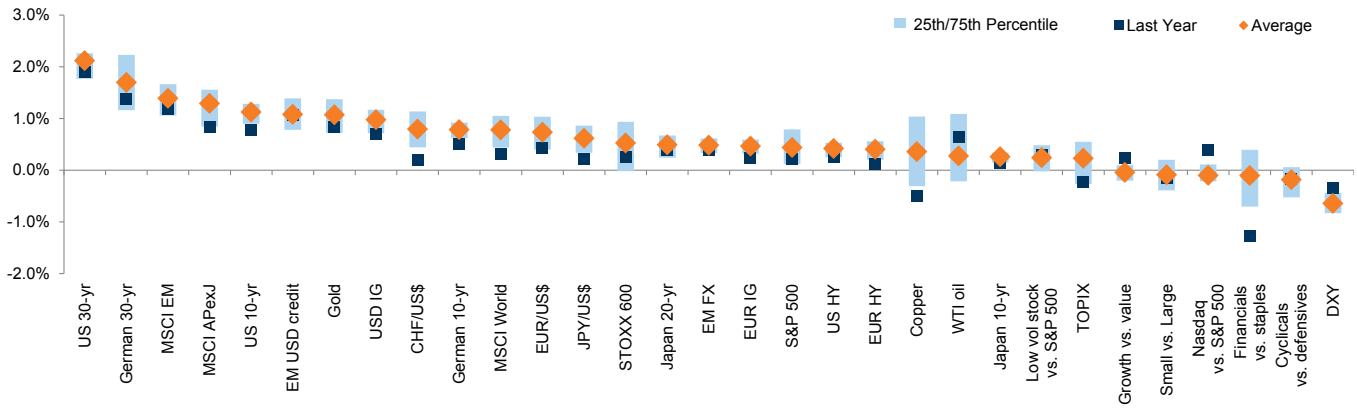
Cross-asset sensitivities with the RAI factors appear broadly sensible - Exhibits 37-39 show the 1-year rolling betas of different assets to the first three RAI factors (we leave out Euro-area risk as it has only mattered during periods of escalation). A wider range of betas indicates the sensitivity to the different RAI factors has been less stable.

Exhibit 37: Better global growth is supportive for equities, especially EM, copper and oil and 'risk on' sectors
1-year rolling beta to 'Better global growth' (PC1), Data since 2000



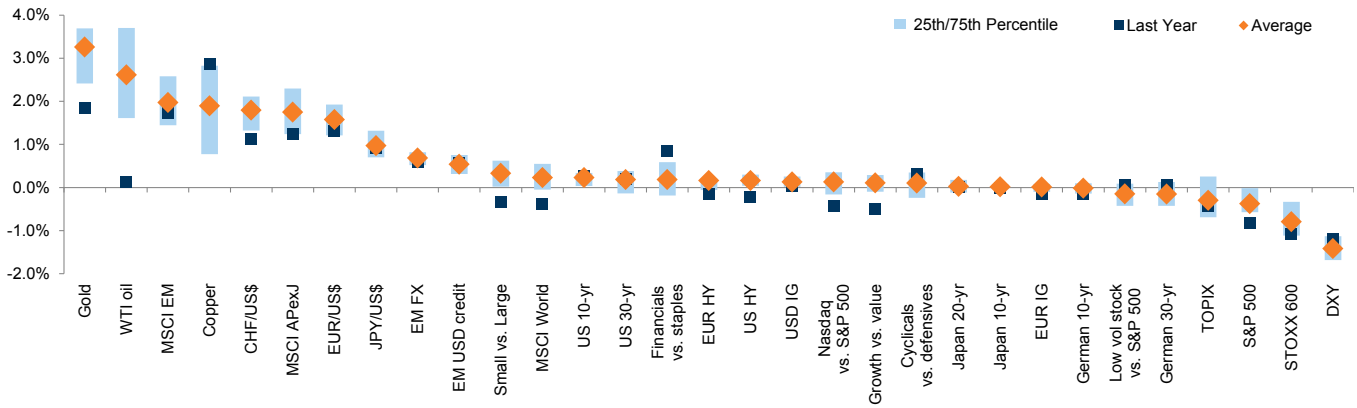
Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 38: Easier monetary policy is unsurprisingly supportive for bonds but also EM assets, gold and equities broadly
1-year rolling beta to 'Easier monetary policy', Data since 2000



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 39: Commodities and EM assets are most sensitive to moves in the Dollar
1-year rolling beta to 'Weaker US$' (PC3), data since 2000

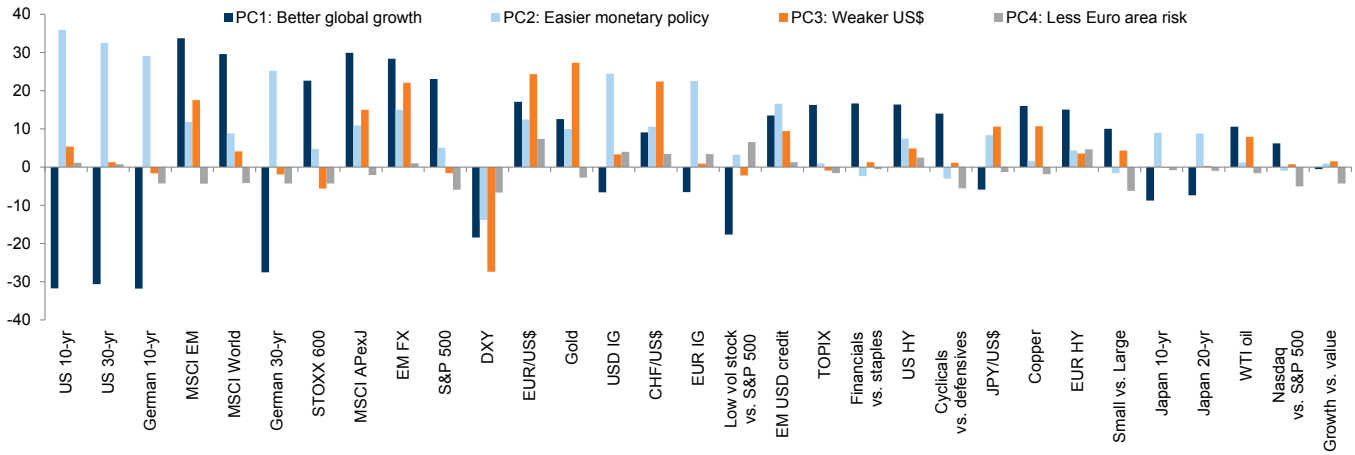


Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

'Growth' is unsurprisingly the most important driver for most assets

The strength of the statistical linkages to the different RAI factors varies across assets - Exhibit 40, which shows the t-statistics for different assets, highlights the relative importance of the four RAI factors. In line with standard conventions, a t-statistic much above 2 or below -2 suggests that there is a significant impact on the asset from a given risk factor. And again for those assets that directly contribute to the RAI factors, it is important to be aware of a degree of circularity, i.e., bond yields are unsurprisingly very closely linked to 'monetary policy' as they have a large weight in the factor.

Exhibit 40: The drivers of risk appetite are of varying importance to different assets
T-stats, Data since 2000 (positive value indicates a close relationship to the RAI factor)



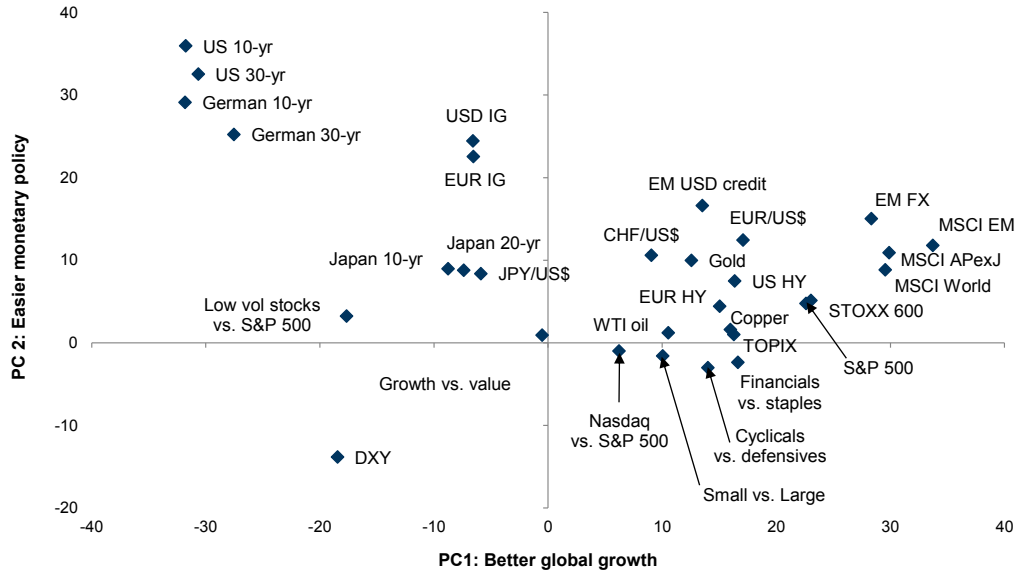
Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Bonds are very closely and negatively linked to better 'global growth' (albeit with a lower sensitivity) and very positively linked to 'easier monetary policy'. Equities are predominantly linked to global growth but also have a positive link to easier monetary policy. Credit total returns for both USD and EUR IG are dominated by their duration component relative to growth exposure. For both EUR and USD HY credit, even for total returns, growth is the more important driver (likely in part due to lower duration).

Somewhat surprisingly, as it is often perceived as a 'safe haven' in case of global recessions, Gold is positively linked to global growth when controlling for real yields and the Dollar. DXY is very negatively linked to both better global growth and lower real yields, which seems to drive the opposite relationships for CHF, Gold and EUR. Procyclical equity styles such as financials vs. staples are positively linked to global growth but negatively linked to real yields, while the opposite is the case for low vol stocks vs. S&P 500.

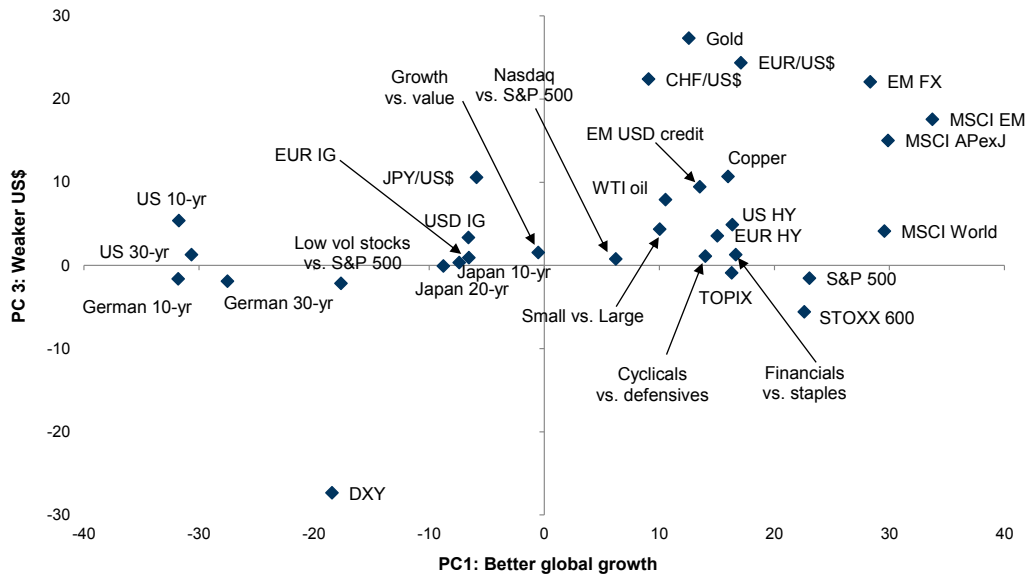
We find that the Dollar, which is more reflective of the growth differential between the US and RoW, is a much more important driver for CHF, Gold and EUR than global growth alone. Gold seems to be the most levered asset to a weaker US$, with higher t-stats than both for global growth and real yields. In addition, EM assets, both EM FX and equities, are very levered to the Dollar. The Yen is one of the few assets that benefits from both a weaker Dollar and weaker global growth.

Exhibit 41: Easier monetary policy tends to be more important for bonds and credit, while growth is the most important driver of equities
T-stats, Data since 2000 (positive value indicates a positive relationship to the factor)



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 42: A weaker US$ coupled with stronger global growth is the best backdrop for EM assets but also commodities
T-stats, Data since 2000 (positive value indicates a positive relationship to the factor)



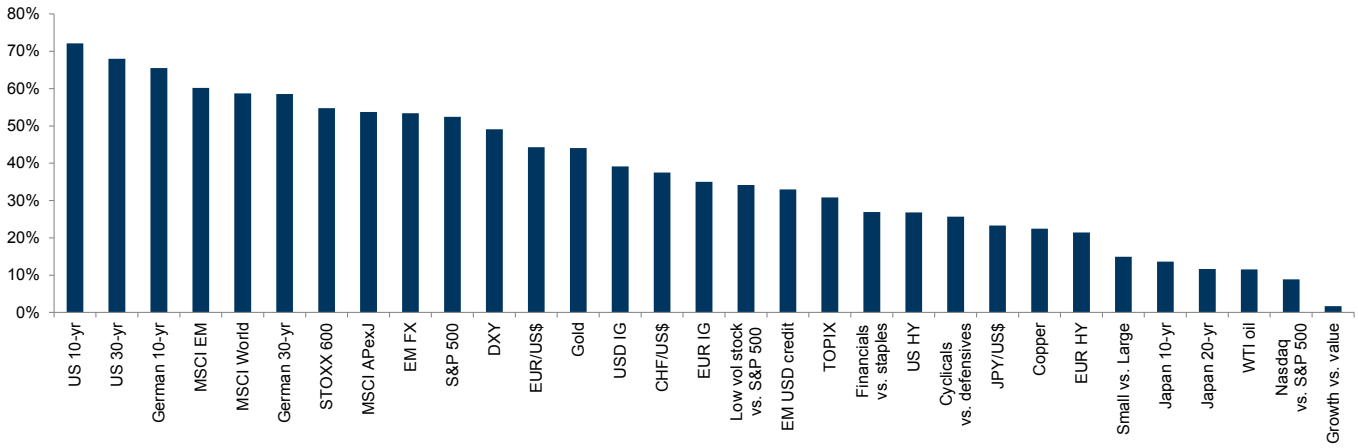
Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

A large part of cross-asset returns can be explained by the 4 RAI factors

The four RAI factors alone cannot explain all of the variation across assets: that said, **the 4 RAI factors can explain more than half of the variation for most bond and equity markets.** They have done a less good job for commodities such as oil and copper, and

for equity styles such as growth vs. value and small vs. large cap. Part of this could be due to a strong underlying trend in those equity styles - as the RAI factors are based on 1-year rolling z-scores, they are 'de-trended' and thus this information is lost.

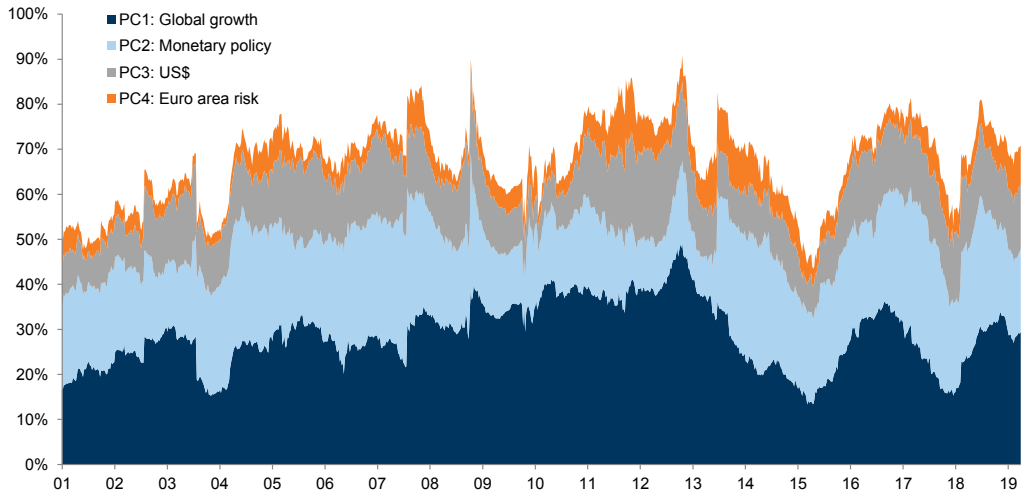
Exhibit 43: The four RAI drivers can explain a large part of the variation in bonds and equities
R2 of a regression of weekly returns on the 4 RAI factors, Data since 2000



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

In addition, the explanatory power of the RAI factors varies over time: **in periods of strong swings in global growth, the Dollar or monetary policy, the respective importance of a factor can increase**. That said, Euro area risk, while important during the Euro area crisis, has contributed comparatively little on a relative basis to explain the variation in cross-asset performance since 2000. This is likely in part because the other variables were picking up growth and rates shocks that were related to Euro area risk. And there have been several periods when cross-asset performance (and likely swings in risk appetite) could not be explained by those fundamental drivers, e.g., in Q1 2015 and Q1 2018.

Exhibit 44: The explanatory power of RAI factors for cross-asset performance varies over time
Rolling partial R2



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Appendix 1: Construction of our Risk Appetite Indicator (RAI)

Our Risk Appetite Indicator (RAI) is purely based on market prices and was first introduced in July 2016 with history back to 1991 (see GOAL: Risky risk appetite reversal, July 11, 2016). In short, we take the equal-weighted average of 1-year rolling z-scores of the several risk premia and pair trades that reflect risk appetite in different asset classes. While sentiment and positioning are seldom a catalyst, they can help assess the risk of a reversal at extremes as markets often overshoot, especially on the downside during 'risk off' episodes. Strong risk appetite tends to build up slowly and can remain positive for a long time; 'risk off' episodes tend to be sharp and fast. The components included are:

- **Equities** (all for MSCI World except S&P 500 vs. low volatility stocks): single-stage DDM equity risk premium (ERP), EM vs. DM, Cyclicals vs. Defensives, Small vs. Large, Financials vs. Staples, S&P 500 vs. low volatility stocks.
- **Equity volatility:** VIX, VSTOXX, CBOE skew, CBOE put/call ratio (5-day average), EUREX put/call ratio (5-day average).
- **Credit:** USD HY vs. IG spread, EUR HY vs. IG spread, EUR IG spread, USD IG spread, Spain and Italy sovereign spreads, EM USD credit spreads.
- **Bonds:** Germany 10- and 30-year, US 10- and 30-year.
- **FX:** JPY/AUD, CHF/GBP, EUR/USD, Gold, USD trade-weighted index.

RAI momentum is based on the 1-year rolling z-score of 3-month changes and helps assess the strength of a trend or reversal in risk appetite.

Appendix 2: Description of other Sentiment/Positioning metrics

Investors Intelligence Survey: Created in 1963. The survey is carried out by the investment services provider Investors Intelligence and covers the market views of 130 independent newsletters (brokerage house letters excluded), of which most are published weekly. The list of advisors is reviewed based on Barron's or web searches. The survey reports the findings as the percentage of advisors that are bullish / bearish/ expect a correction, and is based on the question "are they telling their readers to buy or sell?" The survey is released each Wednesday morning, with most of the opinions written prior to the previous Friday's market close in actuality.

AAII Sentiment Survey: Sentiment of individual investors (bullish or bearish) towards the stock market over the next 6 months. The question asked is "I feel that the direction of the stock market over the next 6 months will be". The data are weekly since 1987 and are collected by the non-profit organisation AAII (The American Association of Individual Investors) via a survey of a subset of their members. Response rates vary, but on average they obtained 315 responses each week to the start of 2013, for example, with the weekly period defined as from Thursday to Wednesday. During this window, AAII members participate by visiting the Sentiment Survey page on AAII.com and voting. The survey is open to all members, although a weekly email is sent to a rotating group of members reminding them to participate. Results are published online early each Thursday morning. Prior to the year 2000, members responded by physically mailing a postcard back to the AAII offices. The typical AAII member is a male in his mid-60s with a bachelor's or graduate degree. AAII members tend to be affluent with a median portfolio size in excess of $1 million. The typical member describes himself as having a moderate level of investment knowledge and engaging primarily in fundamental analysis. This said, AAII has in excess of 160,000 members and simply due to the sheer size of membership, there are wide variances in wealth, investment knowledge and investing styles.

VIX: The CBOE Volatility Index (or VIX) is a measure of 1-month forward volatility priced in options on the S&P 500 index. It is calculated by averaging the weighted price of puts and call over a wide range of strike prices to yield a constant, 30-day measure of expectation volatility for the S&P 500 index. It was introduced in 1993 (with subsequent data made available further back), and is calculated approximately every 15 seconds during regular and extended trading hours. It uses both standard and weekly SPX options that are listed for trading on the CBOE. Only options maturing on Friday and with more than 23 days and less than 37 days to expiration are used.

CBOE Put/Call SKEW Index: Options-based indicator that measures the perceived tail risk of the return distribution of the S&P 500 at a 30-day horizon. It was launched in January 1990 and is compiled on a daily frequency from the prices of a tradeable portfolio of out-of-the-money options on the S&P 500 index. High levels of the index are associated with higher tail-risk probability priced by the market.

CBOE Put/Call Ratio: Calculated as the ratio of put options volume traded relative to the call options volume traded as reported at the end of each day. It is compiled on a

daily frequency and comprises only single stock equity options. It was launched in 1997 and does not target a specific maturity. It excludes exchange-traded products.

CFTC US equity futures positioning: CFTC reports are published on Friday each week, reflecting current positioning as of the close on the previous Tuesday for markets in which 20 or more traders hold positions equal to or above the reporting levels established by the CFTC. Data are available from 2006 for the different type traders, i.e., Dealer/Intermediary; Asset Manager/Institutional; Leveraged Funds; and Other Reportables. US Equity futures positioning is an aggregation of net $ bn long positions of Asset Manager/Institutional and Leveraged Funds in S&P 500 mini, Dow Jones and Nasdaq 100 mini futures.

Risky vs. safe asset fund flows: Fund flows into risky (equity + credit) vs. safe (government bond + municipal bond + money market funds) assets. It is indicative of broad rotation from investors towards or out of 'risky assets' relative to 'safe assets'. The dataset includes US domiciled Mutual funds and ETFs based on Morningstar. Coverage is $22 trillion assets under management.

Appendix 3: Principal Component Analysis[2] of RAI components

Exhibit 45: Principal component analysis for the components of our risk appetite indicator (RAI)
Data since 2000

		Global growth	Monetary policy	US$	Euro area risk	Improvement in R^2 from adding…			
		PC1	PC2	PC3	PC4	PC1	PC2	PC3	PC4
Credit	EUR HY vs. IG	0.26	0.11	0.05	0.08	68%	4%	1%	1%
	US HY vs. IG	0.28	0.03	-0.03	-0.03	73%	0%	0%	0%
	EUR IG	0.23	0.23	-0.17	0.14	51%	17%	8%	3%
	US IG	0.24	0.21	-0.12	0.05	55%	14%	4%	0%
	Spain sov. spread	0.15	0.09	-0.15	0.44	21%	2%	6%	33%
	Italy sov. Spread	0.14	0.14	-0.13	0.54	18%	6%	5%	48%
	EM USD credit	0.26	0.18	0.02	-0.10	63%	10%	0%	2%
Equity	EM vs. DM equity	0.15	0.14	0.37	-0.09	21%	6%	38%	1%
	Cyclicals vs. Defensives	0.23	-0.06	0.18	-0.31	50%	1%	10%	16%
	Small vs. Large	0.17	0.02	-0.04	-0.16	28%	0%	0%	4%
	Financials vs. Staples	0.25	-0.03	-0.13	-0.14	59%	0%	5%	3%
	S&P 500 vs. low vol stocks	0.21	-0.12	0.00	-0.15	44%	4%	0%	4%
	MSCI World ERP	0.26	-0.27	-0.05	-0.04	66%	24%	1%	0%
Equity volatility	VIX	0.20	0.23	-0.17	-0.21	39%	17%	8%	7%
	VSTOXX	0.20	0.21	-0.17	-0.17	40%	14%	8%	5%
	S&P 500 skew index	-0.07	0.00	0.15	0.00	5%	0%	7%	0%
	S&P 500 put/call ratio	0.16	0.13	-0.11	-0.22	26%	5%	4%	8%
	Europe put/ call ratio	0.03	0.07	-0.12	-0.08	1%	2%	4%	1%
Bonds	US 30-yr bonds	0.20	-0.37	-0.04	0.02	39%	44%	0%	0%
	German 30-yr bond	0.16	-0.37	0.12	0.15	25%	44%	4%	4%
	US 10-yr bond	0.22	-0.34	-0.09	-0.02	48%	38%	2%	0%
	German 10-yr bond	0.19	-0.39	0.10	0.08	34%	48%	3%	1%
FX	JPY/AUD	0.20	0.13	0.07	0.17	39%	6%	1%	5%
	CHF/GBP	0.11	-0.10	-0.14	0.11	11%	3%	6%	2%
	EUR/USD	-0.13	-0.05	-0.37	-0.30	16%	1%	39%	15%
	Gold	-0.07	-0.15	-0.47	0.09	5%	8%	62%	1%
	USD TWI	0.16	0.11	0.44	0.08	24%	4%	54%	1%
	Explained variation	**36**	**48**	**58**	**64**				

Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 46: Correlation matrix for RAI principal components
Data since 2000 (weekly changes)

	PC1: Global growth	PC2: Monetary policy	PC3: US$	PC4: Euro area risk
PC1: Global growth	1.00	0.18	-0.54	-0.33
PC2: Monetary policy		1.00	-0.21	-0.21
PC3: US$			1.00	0.31
PC4: Euro area risk				1.00

Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

[2] Principal component analysis (PCA) is a statistical procedure that generates a group of factors (principal components or PCs) that isolate the primary sources of variation among a set of variables. The first principal component accounts for as much of the variability in the data as possible in a single factor/variable. The second principal component accounts for as much variability in the data as possible in a single factor/variable, conditional on it being uncorrelated (orthogonal) to the first principal component. And so on for subsequent principal components.

Disclosure Appendix

Reg AC

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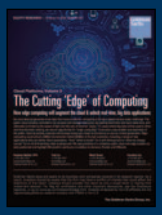

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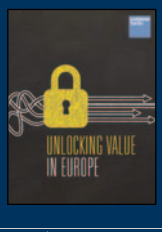

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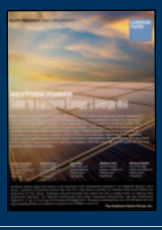

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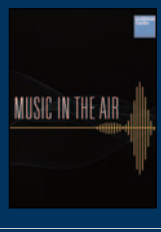

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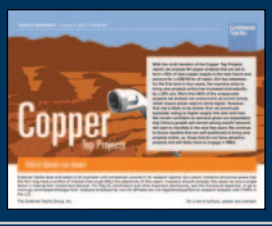

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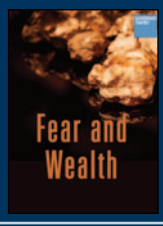

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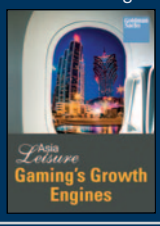

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