ETFS Outlook

ETF Securities | The intelligent alternative | December 2017

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Big picture

Thinking outside the box

Disruptors going mainstream in 2018

We now stand at a tipping point for a new generation of commodities driven by intertwining technologies among the themes of energy efficiency, automation, and climate change likely to be central for commodities demand. In our 2018 outlook we explore a range of disruptive themes, from commodities to Bitcoin and green bonds to central bank policy.

Macro-economic outlook

The world is in a synchronous growth phase at present, supported by massive central bank stimulus. However there are indications that developed markets are likely close to their cycle highs, and a period of slower growth potentially lies ahead.

While we think that the world economy will escape a significant upset in 2018, there remain formidable tail risks. Recent polling in Italy highlights a resurgence in popularity of the populist 5-Star movement and Germany is currently unable to form a stable coalition primarily due to issues associated with populism; it may have subsided in Europe but it certainly remains a thorn in its side. In emerging markets there is a risk of escalation in the Saudi/Iran proxy war, prompting a potential oil price shock, while there are presidential elections in both Mexico and Brazil where populism is prevalent. And finally, the unwinding of monetary policy brings risks to both bonds and equities, likely renewing appetite for assets classed as alternatives.

There are three big questions for investors in 2018: Can major central banks deflate the global bond balloon without derailing global expansion? Can global equity markets continue their stellar rally? And will China keep the commodity rally alive with the US Federal Reserve (Fed) tightening rates?

Deflating the global bond balloon

Major central banks learned a valuable lesson from the 2013 ‘taper tantrum’ in the US: prudent communication is crucial to forming investor expectations about the path for tighter monetary policy, maintaining market confidence and ensuring the market is aware that stimulus will not be sharply withdrawn. ECB President Draghi recently stated ‘Why discard a monetary policy instrument [forward guidance] that has proved to be effective?’ Comments such as this indicate that major central banks will remain very cautious in the removal of the vast stimulus provided by quantitative easing (QE) when the time is right.

With inflationary pressure only expected to be a burden for US policymakers, wide ranging asset purchasing programmes will continue to be a key feature of central bank policy in 2018. Although the balance sheets of most major central banks will continue to rise, a measured removal of accommodative policy in the US will allow policymakers to deflate the global bond balloon rather than see it burst.

The Fed is the only central bank that we expect to reduce its balance sheet in 2018. And although it appears that the Fed is finally becoming proactive by raising rates ahead of building inflationary pressures, 2018 will be a year of change. The top three Fed officials are relinquishing their posts and a non-economist at the helm raises the potential for policy mistakes. Indeed, Jerome Powell has never dissented in his time as a Fed Governor, a fact that doesn't instill confidence that he can continue to forge a pioneering path. What the Fed does and what it should do are different things: hiking rates and reducing the central bank's balance sheet are necessary to counter rising inflation pressure. While wage growth has been lacklustre in recent years, real wage growth has remained positive. In a strengthening jobs market, workers feel more secure, and as inflation begins to rise next year, there is likely to be a greater tendency for workers to request pay rises. If the Fed fails to raise rates three times next year, a scenario that is expected by the market, an adverse inflationary feedback loop, via wages, could become entrenched.

If the Fed does adjust policy to contain building inflationary pressures as we expect, the US Dollar (USD) is likely to grind higher in H1 2018. Divergent monetary policy is another supportive factor for the USD: as the Fed unwinds its QE, in stark contrast to other major central banks, it will engineer a modest steepening of the US yield curve.

Higher nominal interest rates, a steeper yield curve and the resultant stronger USD are likely to be impediments for significant upside in the price of gold. However, there are other factors in play: uncertainty over the ability for equity markets to continue their stellar rally has led investors to look for ways to hedge a potential correction. Although we expect the Fed to continue to tighten policy, we think the downside risks to gold prices are limited because real interest rates will remain depressed as inflation gains pace in the US. However, a shock event, such as an equity market correction, could force gold prices higher. On balance we see little change in gold prices in the coming year. Investors continue to be optimistic about gold despite the rising interest rate environment, we believe this is due to investors now seeing gold as an insurance policy from geopolitical concerns rather than investment.

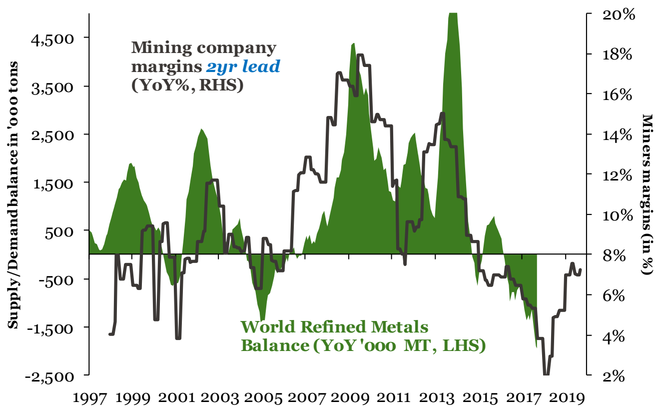
Stretched equity valuations

Navigating the stretched valuations in both equity and bond markets and the potential pitfalls of low volatility will be a critical objective for investors in 2018. US Corporate margins will face headwinds from tighter US monetary policy and wages growth. As the US jobs market continues to tighten in 2018, wage pressures are likely to rise significantly and reinforce inflation momentum due to the need for businesses to increase prices in an attempt to preserve margins. Typically, at this point in the economic cycle, price earnings expansions leave markets much more vulnerable to corrections. This is most prevalent in the US where valuations are extreme on both an absolute and relative basis. We continue to see value in European and emerging market equities where economic growth seems more sustainable in the coming year.

The emerging market puzzle

Another potential consequence of tighter US policy is the negative impact on emerging market economic growth, and in particular China. Higher borrowing costs, input costs and currency volatility could be a threat to EM growth, as is potentially weaker revenue streams for commodity producers, vulnerable to a rising USD at a time of ongoing commodity supply-side destruction.

Miners Margins vs Supply/Demand



Source: Bloomberg, WBMS, ETF Securities as of close 22 November 2017

EM demand is also crucial for commodity markets as they represent 70% of industrial metals demand. In this respect, we expect any weakness in commodity prices to be largely offset by solid demand growth, again led by China. Although concerns remain over the build-up of debt, Chinese policymakers have continued to show a willingness to support the financial system with stimulus to ease financial conditions. We expect commodities to outperform, as investors look outside traditional asset classes to alternatives for better value; the global increase in infrastructure spending being a significant driver. Although commodities are a heterogeneous group, we expect the star performer for 2018 to be industrial metals (see Industrial metals likely to open to new entry points). This sector is likely to benefit the most from improving EM growth, at the same time we expect supply to remain in supply deficit in 2018 as the lack of investment in mining infrastructure continues to bite.

Gold outlook: flat for the year

By Nitesh Shah – *Director – Commodities Strategist* | nitesh.shah@etfsecurities.com

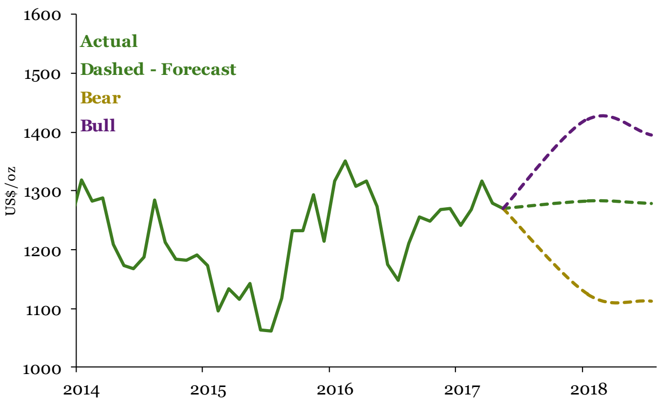
Summary

Our base-case fair-value for gold is broadly flat over the coming year, as support from rising inflation will counter the downward pressure from rising interest rates.

Despite policy interest rates rising in 2017, the US Dollar has depreciated and US Treasury yields have declined. We expect these paradoxical trends to abate in 2018.

Most of the variation in gold price in our bull and bear cases (compared to our base case) comes from assumptions around investor positioning. Many measures of market volatility are currently subdued. However, several risks - both political and financial - exist. Sentiment towards gold could shift significantly depending on which of these views dominate market psyche.

Gold Price Forecast



Source: Bloomberg, ETF Securities, data available as of close 7 November 2017

US Federal Reserve to continue tightening

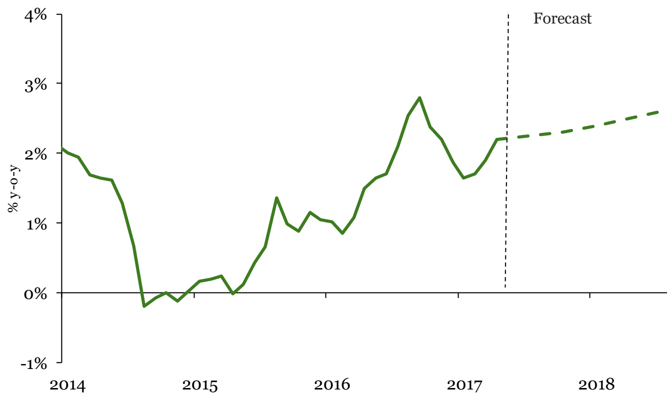
We believe that in addition to the fully-priced-in December 2017 hike, the US central bank will follow through with three further rate hikes in 2018. That comes on top of the balance-sheet run-off that the Fed has already announced[1]. Although some market participants think that under a new Chair, the Fed will become more dovish, we believe the central bank will remain data-dependent and trained staff economists' analysis will become more influential in the Board's decision making. In light of strengthening domestic demand and a tight labour market, the inflationary potential will be hard to ignore.

Inflation to gain momentum

Inflation has been subdued in 2017, despite so many signs of cyclical strength, but a large number of idiosyncratic factors account for this apparent weakness in price movements. Dominant wireless phone service providers changing pricing; solar eclipse changing the timing of hotel stays; severe hurricane disruptions; budget airlines opening new routes are some of the idiosyncratic factors that are unlikely to be repeated. Also the calculation of owner occupied equivalent rent has caused some distortions in the inflation numbers as it is sensitive to energy prices. With volatility in energy prices having fallen, we expect these distortions to subside. The unemployment rate is at its lowest in 16 years and a healthy number of jobs are being added every month (notwithstanding hurricane disruptions). The strength in the labour market is now likely to show up in inflation as per its traditional relationship[2].

We expect US inflation to rise to 2.4% in June 2018 and 2.6% by December 2018 (from 2.2% in September 2017). These levels will likely be uncomfortably high for the Fed, but given the lags in policy and price response, there is little the Fed can do next year to stop it (the inflationary pressure has been built up this year). However, we believe three rate hikes in 2018 will be required to keep inflation expectations sufficiently anchored.

CPI Inflation



Source: Bloomberg, ETF Securities, data available as of close 20 November 2017

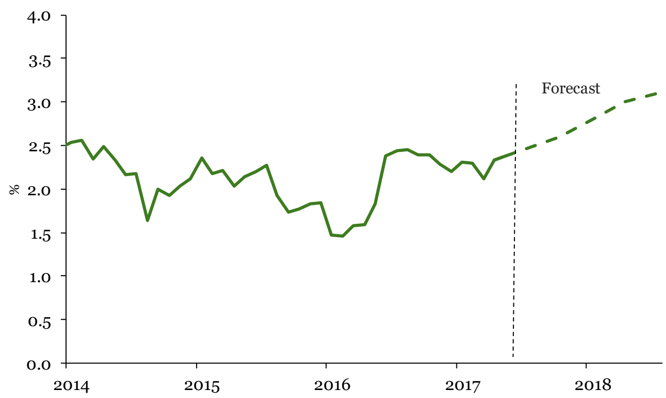
[1] See "Unwinding Fed's balance sheet to have limited impact on US yields", September 2017

[2] Stylised in the Phillips Curve and it numerous variants http://www.economicsonline.co.uk/Global_economics/Phillips_curve.html

US Treasury yields

During the rate tightening that has taken place in 2017, the US Treasury yield curve has flattened. While there have been 75bps of policy rate increases since December 2016, nominal 10-year Treasury yields have fallen from 2.60% to 2.34%. We don't think that 10-year yields can continue to decline. We expect 10-year Treasury yields to rise to 3.1% by the end of 2018.

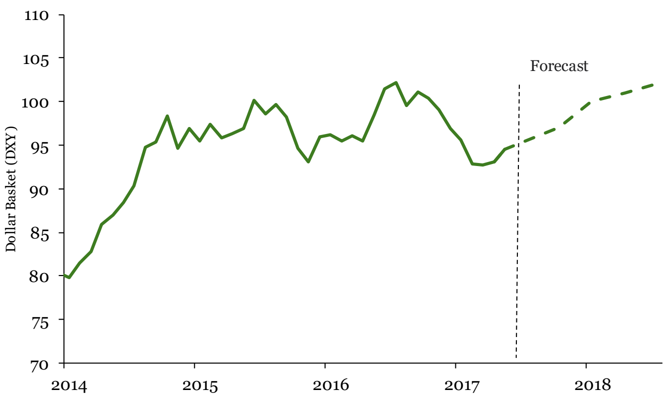
Nominal US 10yr Bond Yields



Source: Bloomberg, ETF Securities, data available as of close 20 November 2017

We expect the US Dollar to appreciate modestly (see FX Outlook 2018), reversing some of the weakness that we have seen in 2017. We expect the DXY (the trade weighted US dollar index) to appreciate to 102 by the end of 2018 from 94 currently. A lack of progress in implementing pro-growth policies that the Trump Administration had promised, a lack of tax and budget reform and a generally stronger Euro and Yen have weighed on the US Dollar in 2017. Some of these trends will continue to drag on dollar performance in 2018, but rising interest rates will lend some support. We believe that the policy divergence between the Federal Reserve, European Central Bank and Bank of Japan will become more pronounced as the market becomes increasingly disappointed by the pace of tapering by the latter two central banks. That will reverse some of the strength in the Euro and Yen.

US Dollar Exchange Rate



Source: Bloomberg, ETF Securities, data available as of close 20 November 2017

Market sentiment

We expect CFTC futures market positioning in gold to hover around 120k contracts net long, lower than current positioning (190k), but marginally higher than the long-term average positioning of around 90k contracts net long. Currently positioning is elevated due to investor fears around continued sabre-rattling between US/Japan and North Korea and some of the tensions in the Middle East. These concerns could fall away if new developments on these geopolitical issues do not resurface. We have observed that when such geopolitical issues simmer in the background, political risk-premia tends to dissipate from the price of gold. It requires keeping the issues at the forefront of market psyche for the premia to endure.

Bull case

Our bull case for gold assumes only two rate hikes in 2018. As a result the DXY only rises to 99 and treasury yields only rise to 2.8%. We assume that inflation rises to 3%.

We raise the investor positioning in gold to 200k contracts net long for the whole forecast horizon. This is one of the main drivers of higher gold prices in this scenario compared to the base case. There are numerous risks which can push demand for gold futures higher:

- Continued sabre-rattling between US/Japan/South Korea and North Korea;
- The proxy war between Saudi Arabia and Iran escalates;
- A disorderly unwind of credit in China;
- Italian policy paralysed by the inability to form a government after the election;
- Catalonian independence pushing Spain close to civil war
- A potential second general election in Germany; and
- Market volatility measures such as the VIX (equity), MOVE (bond) spike as yield-trades unwind

In the bull case scenario, gold will rise to US$1420/oz by the middle of the year, and ease to just below US$1400/oz by the end of 2018.

Bear case

In our bear case, we assume the Fed delivers four rates hikes in 2018 as it tries to anchor inflation expectations. 10-year nominal Treasury yields rise to 3.3% by the end of the year, while the DXY appreciates to 105. By year-end inflation falls back to 1.6%. In this scenario we assume that the absence of any geopolitical risk premia or adverse financial market shock and so speculative positioning falls to 40k contracts net long. In the bear case scenario gold falls to US$1110/oz by end of 2018.

Oil: Back to surplus

By Nitesh Shah – *Director – Commodities Strategist* | nitesh.shah@etfsecurities.com

Summary

OECD crude inventories have fallen and oil futures curves are in backwardation. Does that mean OPEC has achieved its mission?

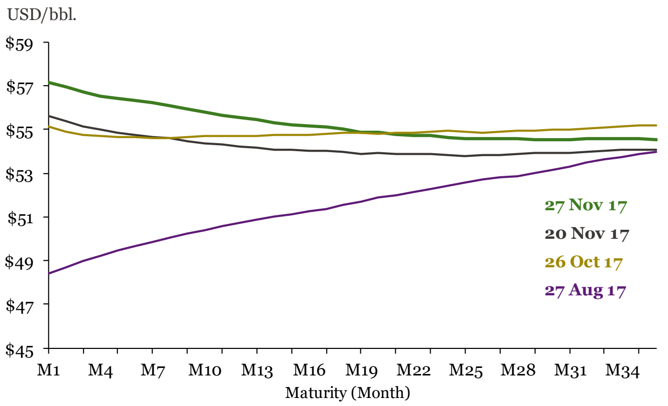
No. US production is to rise and demand is to weaken amid higher prices. Market likely to move back into surplus and so inventories unlikely to continue to decline.

Political risk premia in oil prices will likely be fleeting.

Backwardation

Many market commentators argued a year ago that OPEC's strategy was to flip the oil futures curve from contango to backwardation. Contango, they argued, provided the incentive for US shale producers to keep pumping out oil despite depressed spot prices because prices for future delivery were higher and so they could store oil today and lock into higher prices at a future date. Contango therefore would see continuous increases in inventory. The futures curve is now in backwardation.

Brent Oil Futures

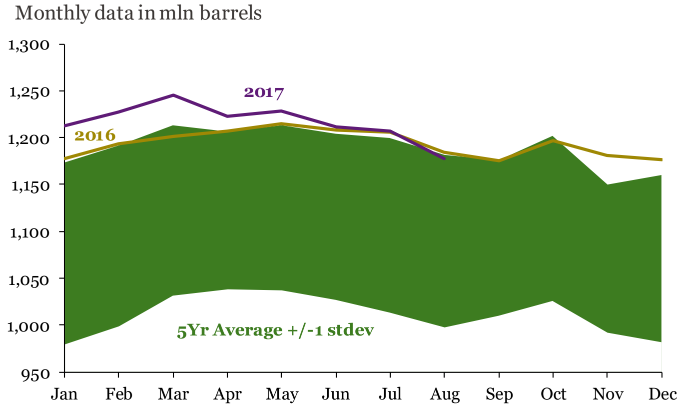


Source: Bloomberg, ETF Securities, data available as of close 28 November 2017

Inventories decline…

Inventories have been declining across the OECD (global inventory data does not exist). Most of the declines have come from floating storage (which is the most expensive form of storage).

OECD Oil Industry Inventory

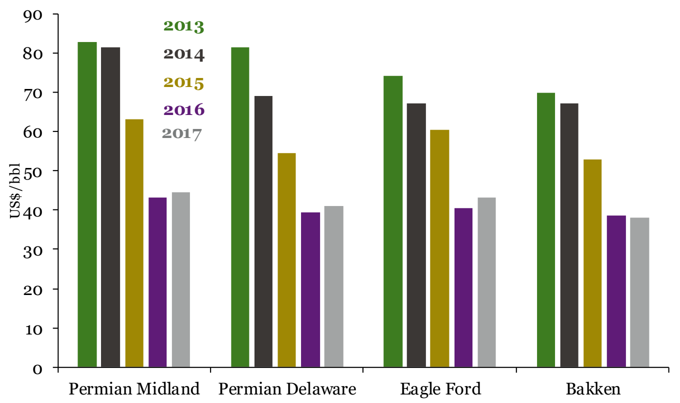


Source: Bloomberg, ETF Securities, data available as of close 28 November 2017

…but likely to be temporary as US production expands…

We are unlikely to see the decline in inventories continue however. At current prices US production will likely expand substantially. US shale oil production can break-even at close to US$40/bbl. With WTI oil currently trading at US$55/bbl, there is plenty of headroom for profitability and we expect a strong expansion in supply.

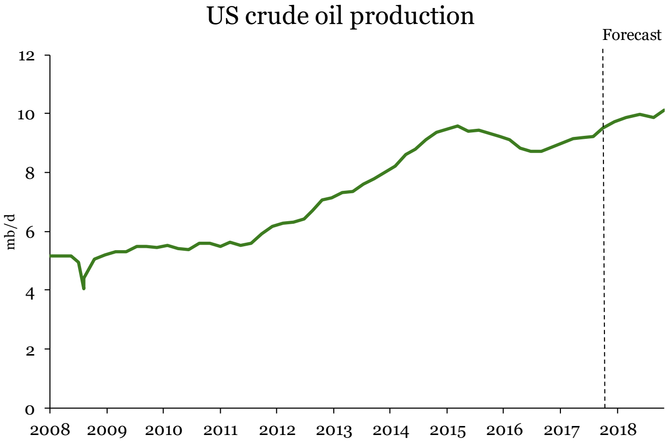
Breakeven by play



Source: Rystad Energy, ETF Securities, data available as of close 28 November 2017

In 2018, US production will likely hit an all-time high, surpassing the cycle peak reached before the price war in 2014 and above the 10 million barrel mark last hit in 1970. There is little indication that the backwardation in futures curves is going to stop US production from expanding.

US crude oil production



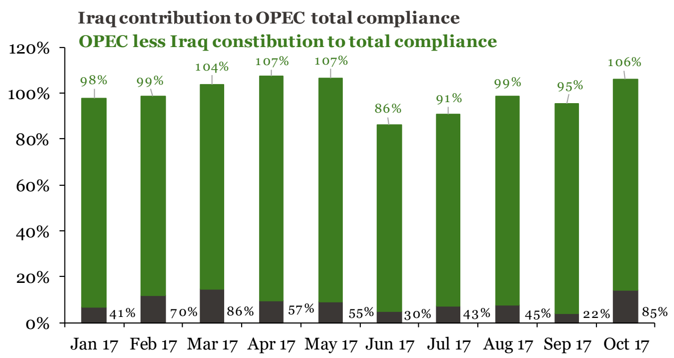
Source: EIA, ETF Securities, data available as of close 28 November 2017

... and OPEC compliance wanes

In October 2017, OPEC and its 10 non-OPEC partners posted their best level of compliance with the production curb deal to date. However, looking at the detail, it is countries like Iraq who managed to step-up the most to improve compliance. Iraq's compliance levels jumped from 22% in September to 85% in October, making a strong contribution to the rise in OPEC's overall compliance (95% in September to 106% in October). That is unlikely to be repeated given that the supply disruptions stemming from the Kurdish region's vote for independence was the driver. We doubt the threat to cut off oil production from the Kurdish region is credible. Turkey, the main buyer of the oil has not followed through with threats to shut-down pipelines that take oil out of the region.

OPEC and it non-OPEC partners last week announced they will extend the deal to cut supply from October 2016 by 1.8mn barrels to the end of 2018. We think that compliance in this extended deal will fall short of expectations. Russia's insistence on discussing an exit strategy and having a review in June 2018 indicates that the patience of non-OPEC partners in the deal is wearing thin.

OPEC Compliance Levels



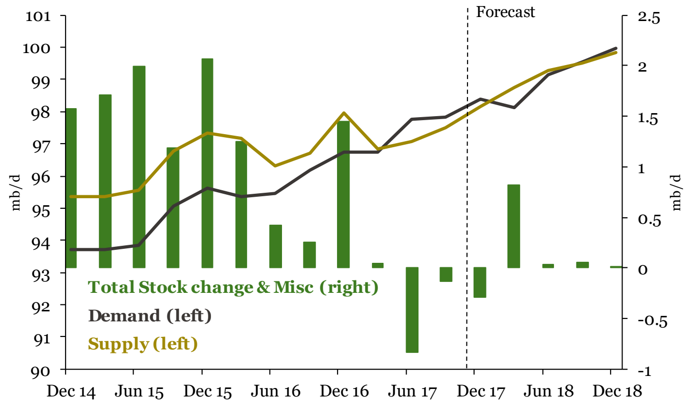
Green labels are total OPEC compliance levels
Black labels are Iraq compliance levels

Source: OPEC, ETF Securities, data available as of close 28 November 2017

Back to market surplus

With the US expanding supply and OPEC likely to under deliver on its promise to consistently curb production, we expect the supply to grow. At the same time demand is unlikely to continue to grow at the current pace, with prices having gained 33% over the past year. Q4 2017 is likely to be the last quarter of deficit for a while. Surpluses are going to contribute to higher OECD inventories. So much for backwardation being the panacea!

Deamand/Supply Balance



Source: IEA, ETF Securities, data available as of close 28 November 2017

Political risk premia to fizzle out

Oil prices jumped 5% in the first week of November as a result of developments in Saudi Arabia. Unless geopolitical risks remain in the limelight, we expect the prices of oil to ease.

The Crown Prince of Saudi Arabia, Mohammed bin Salman, in his drive to modernise the Saudi economy, has taken aim at corruption in the country. With many of the economic and political elite having been caught up in the investigation, there is a risk that the fragile consensus that held the Saudi state together for many decades could unravel.

Saudi Arabia has accused Iran and Lebanon of committing acts of war. Iran, for supplying a missile that Yemen used in an attempted attack on Saudi Arabia's airport. Lebanon, for the acts of aggression by the Iran-backed Lebanese Shi'ite group, Hezbollah. Saudi Arabia initiated a military intervention in Yemen in 2015 that has been seen as a 'proxy war' with Iran given Iran's support for rebel Houthis that had toppled Yemen's former government. Recent developments show that this proxy war is escalating.

The market perceives both the internal and external conflicts in Saudi Arabia as a source of disruption in oil production in the region.

We believe that the geopolitical premium priced into oil is likely to be transient unless a war actually breaks out. The Saudi proxy war with Iran has been raging for over two years, with little reflection in the price of oil until recently. Unless investors are constantly reminded of the risks, the premia tends to evaporate within a matter of weeks.

FX Outlook 2018

By Martin Arnold – *Director –FX & Macro Strategist* | martin.arnold@etfsecurities.com

Summary

Flat global yield curves pave the way for broad US Dollar (USD) strength as the US Federal Reserve (Fed) begins to taper monetary policy.

The European Central Bank (ECB) is not tightening policy and its cautious outlook for inflation will continue to apply downward pressure to the Euro.

We expect that Sterling (GBP) will remain range bound in the near term, but has potential to break to the upside if uncertainty surrounding Brexit negotiations is positively resolved in H1 2018.

FX heatmap

	MvC	Carry	Valuation	Positioning	Total
EUR/USD	0	-1	-1	1	-1
USD/JPY	1	-1	1	-1	0
GBP/USD	0	-1	1	1	1
USD/CHF	0	-1	-1	-1	-3
AUD/USD	0	1	-1	1	1
EUR/GBP	0	-1	-1	1	-1
USD Index	0	1	n/a	-1	0

(please refer ETFS Outlook January 2017 for definitions of the various heatmap indicators.)

One clear signal is that safety is off the table when looking at the currency fundamentals heatmap. Weakness in both CHF and JPY is expected in coming months against the USD.

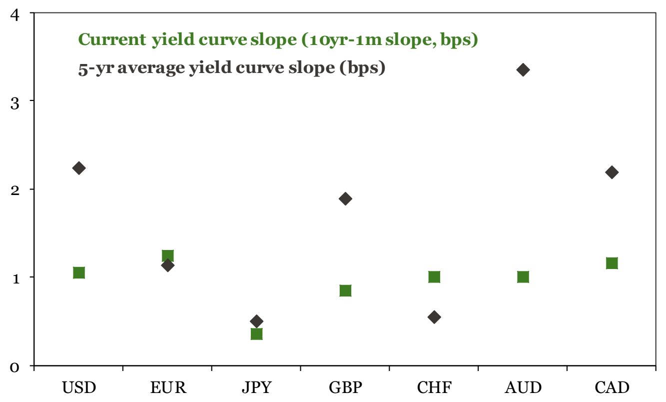
A more benign FX environment should see fundamentals, in particular a focus on central bank policy, drive strategic trends in FX markets in 2018. Divergent monetary policy will drive yield curve steepness and cross country curve differentials, and accordingly we remain constructive on the USD, and GBP to a lesser extent.

Flatter global yield curves

A flat bond yield curve signals a relatively weak economic environment in the future. Global yield curves are, for the most part flatter than historical averages, signalling that the global recovery has been more gradual than in previous cycles. However, central bank policy has played its part too. Central bank asset purchase programs have been successful in keeping longer-end yields depressed in order to stimulate economic activity.

The EUR and the Swiss Franc stand out in contrast to other G10 currencies as the ones that have a corresponding yield curve that is steeper than the longer-term average. With both the Fed and the Bank of England (BOE) having begun to tighten policy, steeper curves could see these currencies begin to outperform those currencies where the curve is more or less 'normally shaped'. The Japanese curve is virtually right on the average, similar to the Euro curve, a reason that could limit any gains for the JPY.

Flatter curves

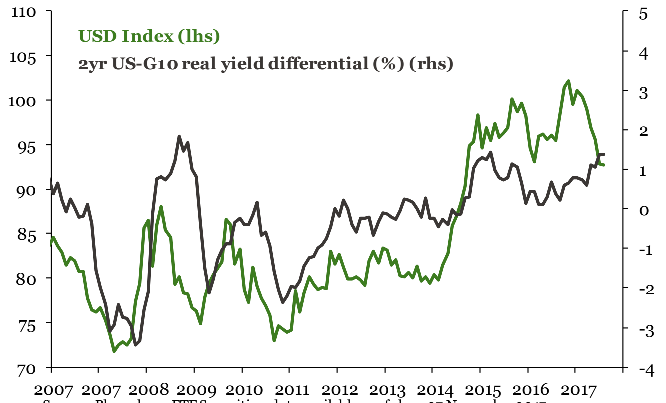


Source: Bloomberg, ETF Securities, data available as of close 22 November 2017

Dollar on the ascent

We expect the USD to benefit from improving US economy and the tighter path for US Federal Reserve (Fed) policy. It's not just rising front-end rates that will be USD supportive. The potential for a steepening of the yield curve as the Fed reduces its balance sheet will also help lift the USD, as the artificial suppression of the long-end is alleviated. With the exception of the JPY, the USD remains the least favoured major currency compared to the longer-term average, with net investor positioning hovering just shy of record low levels.

USD supported by rising rates



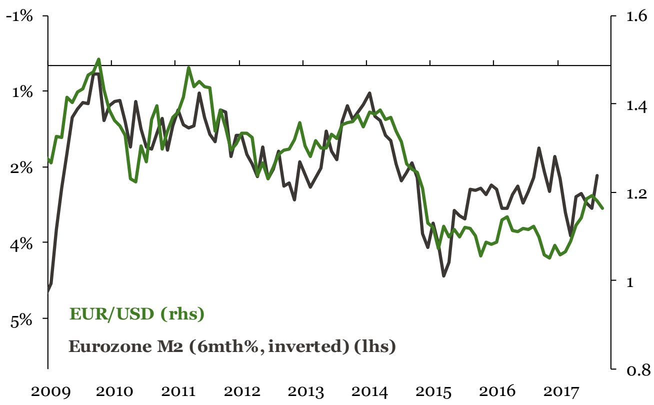
Source: Bloomberg, ETF Securities, data available as of close 07 November 2017

The ECB isn't tightening policy...

Although it appears that the BOE and the ECB are taking different approaches to tightening monetary policy, we believe it is too early to judge: the ECB is still expanding its balance sheet, not tightening policy. However, it seems the market has already priced in the beginning of a new tightening cycle. The ECB hasn't started tapering its stimulus program, it has simply 'downsized' it, according to President Draghi. The ECB has extended its asset purchase program by nine months, and will add at least €270mn to its balance sheet in 2018.

Although it expects 'key ECB interest rates to remain at their present levels...well past the horizon of the net asset purchases' we feel it is unlikely that the ECB will unwind its stimulus prior to raising rates. Accordingly, with the money supply continuing to rise, the Euro will remain under pressure, especially with the so called 'tapering' already priced in. The Euro strength in H2 2017 has been driven by the Eurozone's relatively steeper yield curve and we believe there is near-term downside risk for the Euro as the ECB remains in a stimulative policy stance.

Measured ECB will pressure Euro



Source: Bloomberg, ETF Securities, data available as of close 07 November 2017

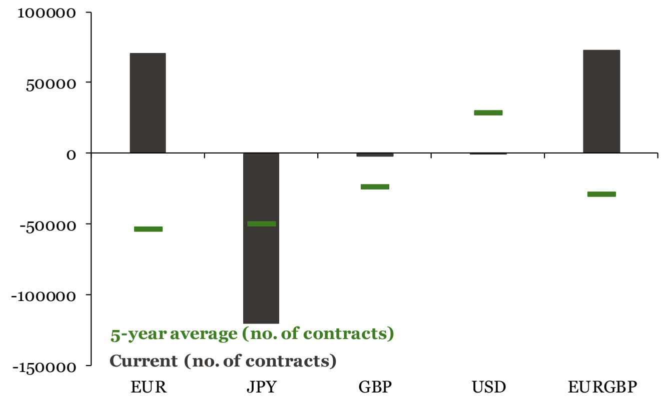
Brexit uncertainty reigns

In contrast, the BOE has begun its tightening cycle. The BOE matched market expectations in October, raising its benchmark interest rate for the first time in a decade to 0.5%. The central bank highlighted that although inflation will peak above 3.0% in October, but the path for rates will be 'gently rising', something that has weighed on GBP recently.

The more hawkish tone from BOE Governor Carney in commentary leading up to the October meeting, accompanied by ongoing inflation pressure and a resilient economic environment were the reasons for our long held view that the BOE would hike rates in 2017. Although these elements also provided the basis for the BOE decision, the central bank was somewhat cautious in its comments regarding the uncertain impact of Brexit on the outlook for growth and the future path for rates.

Although 'company balance sheets are in good shape and financial conditions remain supportive' according to the BOE, Brexit confusion and uncertainty reigns. GBP remains subject to the whims of the Brexit negotiation process and such concerns are likely to keep gains capped in the near-term. However, tighter monetary policy in coming years will enhance short-term yields and a broadening economic recovery should see the yield curve steepen, reverting closer to historic norms. While we expect GBP to range trade against the USD, we feel that a strong move could be made against the Euro, as the market begins to price in both the resilience of the UK economy, the subsequent inflationary pressure and the measured nature of ECB policy. Both of these factors should see the stretched futures market positioning of the EUR against GBP unwind in H1 2018.

CFTC Net non-commercial futures positioning

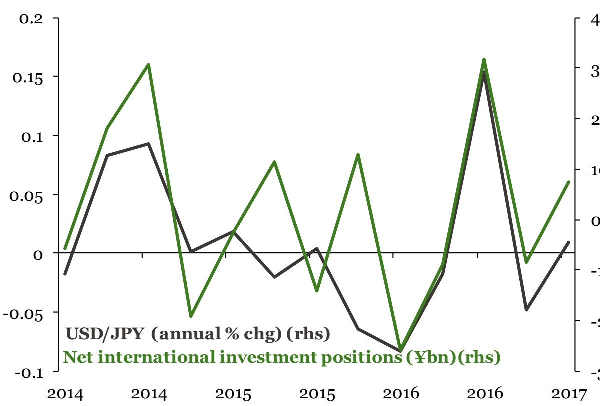


Source: Bloomberg, ETF Securities, data available as of close 06 November 2017

Maintaining the status quo

With Prime Minister Abe winning the election, Bank of Japan (BOJ) Governor Kuroda is likely to retain his place at the head of the Japanese central bank. As a result, we expect that JPY will stay mired in the swamp of the BOJ's aggressive quantitative and qualitative easing policy. Unless, there is a reduction in risk appetite globally, potentially catalysed by a sharp equity market correction, we expect that the balance of risks is firmly tilted to the downside for JPY. As investors continue to pursue yield offshore in a risk-on environment, the JPY will remain under pressure.

Japanese capital flows



Source: Bloomberg, ETF Securities, data available as of close 09 November 2017

Platinum – More uncertainty than opportunity

By Aneeka Gupta – *Associate Director – Equity & Commodities Strategist* | aneeka.gupta@etfsecurities.com

Summary

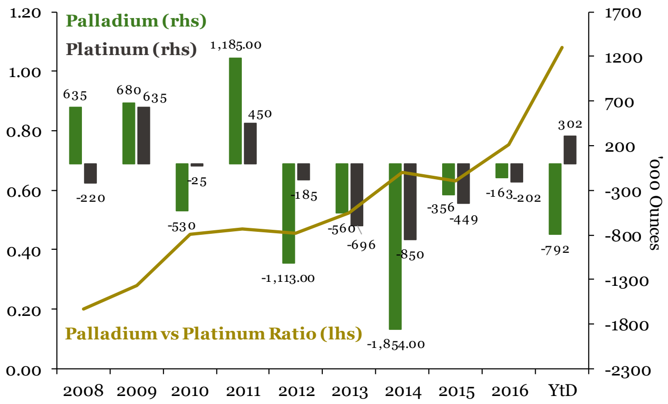
Palladium's outperformance is tied to a confluence of reasons - the 'Dieselgate' scandal, strong auto demand and speculative buying interest. However this is unsustainable.

Accelerating growth in the European auto sector should offset the gradual decline in diesel cars market share, supporting platinum's demand.

Platinum's sustainable long term price recovery is rooted in meaningful production cuts.

Palladium has rallied 43% in 2017, marking the strongest performance within the commodity complex. It has surpassed its counterpart platinum for the first time in 16 years. The price movement of platinum and palladium has historically been in sync since the majority of their use is derived by catalytic converters used in gasoline and diesel vehicles respectively.

Net Balance vs Ratio



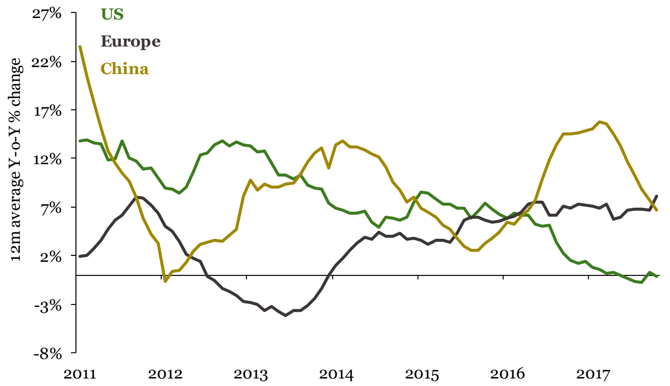
Source: Bloomberg, Johnson Matthey, ETF Securities as of close 07 November 2017

The last time we witnessed a similar price outperformance by palladium was in 2000, triggered by supply disruptions in Russia. While the Russian government's threat to stop selling palladium never materialised, it certainly prompted a fear of a supply deficit amplifying palladium's price surge. It's worth noting that consequently palladium underperformed platinum for more than eight consecutive years.

'Dieselgate' lifted palladium higher

Demand for platinum suffered a setback after the emissions scandal sparked by Volkswagen two years ago dented investor sentiment towards the precious metal. Data from the European Automobile Manufacturers Association (ACEA) has revealed in H1 2017 that sales of gasoline powered cars in Europe surpassed diesel powered cars for the first time since 2009. The share of diesel cars declined by 3.8% YTD (year-to-date) while gasoline cars rose by 10% YTD. In France, gasoline cars are currently dominating market share contrary to its historical 70% ownership of diesel cars. In addition the rising demand for relatively larger gasoline cars, which contain larger motors, combined with stricter emission standards has increased the loading requirements of palladium. This shift in consumer preferences in size and category of cars had a strong role to play in the recent divergence of performance between the two precious metals. That being said, auto sales in US and China, known for driving gasoline cars are softening and its effect could limit palladium's upside in the near term.

Global auto sales growth



Source: Bloomberg, ETF Securities as of close 30 October 2017

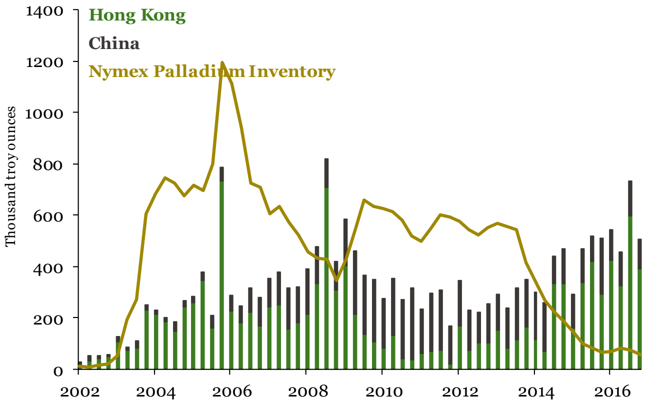
European auto demand bullish for platinum

Auto sales in Europe (dominated by diesel cars) are gaining momentum. Since the decline in diesel market share will be a gradual ongoing process, platinum demand will remain well supported. In addition as new emission standards in Europe intensify, platinum's price recovery over the medium term remains well supported.

Platinum is known to be about twice as effective as palladium in catalytic convertors. The potential for substitution between the two precious metals is reliant on whether fabricators perceive platinum's current price discount to palladium to persist for a substantial period. Furthermore supply shortage concerns of palladium (deficit predicted in 2018) in the long term could also be a cause for substitution away from palladium. Speculative interest unlikely to last

Palladium's outperformance to a large extent can be attributed to speculative buying interest encouraged by the bullish backdrop for palladium. The first week of June witnessed a surge in the lease rate to borrow palladium from 3.5% to 16%, underscoring the shortage of palladium in the market. There is evidence that the strong buying interest from Asia overwhelmed the relatively small market. The palladium market is the smallest and least liquid market among the four tradable precious metals and remains vulnerable to sharp price swings caused by sudden speculative flow of money.

Palladium Imports vs Inventory



Source: Bloomberg, ETF Securities, data available as of close 30 October 2017

The forward curve of precious metals generally tends to be in contango (future price higher than current price). However palladium's forward curve has been in backwardation for almost nine months, illustrating the tightness in the market. While contango is the cost of holding a commodity, backwardation is a benefit. That being said, the slope of the backwardated palladium curve is allowing speculators to buy the lower priced forward contracts and roll up the price curve into the higher spot prices. This has allowed them to lock in a positive roll, which has been extremely attractive in the current low yielding environment. Owing to this, the bulk of demand for palladium is in the present, and that optimism is waning looking forward.

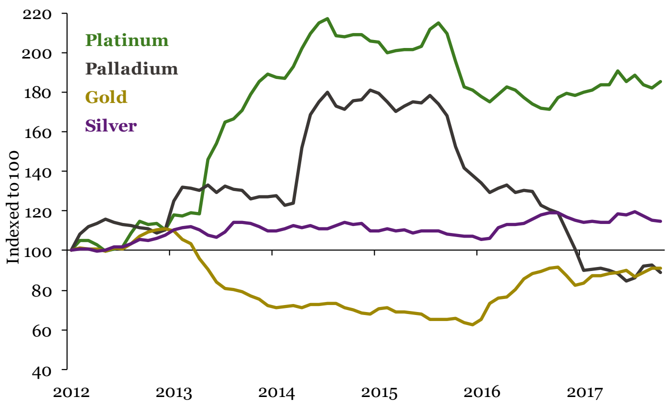
Platinum's deep discounts support demand

While platinum has historically traded at a significant premium over gold, it's currently trading at a -28% discount to gold. Platinum is highly correlated to gold, however in this cycle it has only tracked gold's downward movements and captured very little of the upside. We believe this recent trend could be broken and traditional correlations restored if consumers recognise just how cheap platinum is right now. We expect price sensitive jewellery consumers to switch to the relatively cheap platinum especially as it is gaining further acceptance in key markets like China and India. Given a supportive backdrop of improving economic conditions globally combined with platinum's relative price attractiveness, we expect demand for platinum to rise. We expect most of the growth to be concentrated in industrial applications – chemicals, glass and electrical (the second largest component at 20% of platinum consumption).

Platinum investment demand is strong

Out of the precious metals, physically-backed platinum ETPs have acquired the highest assets under management since 2012. While palladium has accumulated the least. Platinum's relative price advantage and lower volatility will be the primary stimulus for the investment sector. Platinum holdings stands to benefit a portfolio by providing protection against inflation and financial asset deflation, while allowing positive upside as industrial demand recovers globally.

Physically backed ETPs



Source: Bloomberg, ETF Securities as of close 31 October 2017

Platinum's upside tied to supply cuts

Platinum producers in South Africa (known to account for 80% of global output) are struggling, as lower platinum prices and higher fixed costs coupled with weak demand from key segments are straining margins. So far, the miners have not meaningfully reduced production. Efforts to spread fixed costs over a wider output base have resulted in an oversupply. However this is unsustainable. Platinum miner Sibanye recently backed out from its announcement to shutter shafts worth 300koz at its Rustenburg site. Sibanye's reluctance to shutter mines is illustrative of the unwillingness of producers to make meaningful supply cuts to stimulate prices.

Electric vehicle growth in nascent stage

Demand for electric vehicles (EVs) have been the focal point of future risks facing the platinum and palladium industry. While the auto industry is undergoing a structural shift, away from the internal combustion engine towards battery electric vehicles (BEVs). The reality is the uptake of sales of EVs is likely to be gradual. The reason behind this is the necessary infrastructure – development of batteries and charging stations to facilitate this shift will require a longer time frame than anticipated. China recently announced its intention to delay the enactment of the quota requiring automakers to produce a minimum number of EVs. Consumer acceptance of EVs hinge on extensive public subsidies.

Momentum drove the broad based exuberance in 2017

By Aneeka Gupta – *Associate Director – Equity & Commodities Strategist* | aneeka.gupta@etfsecurities.com

Summary

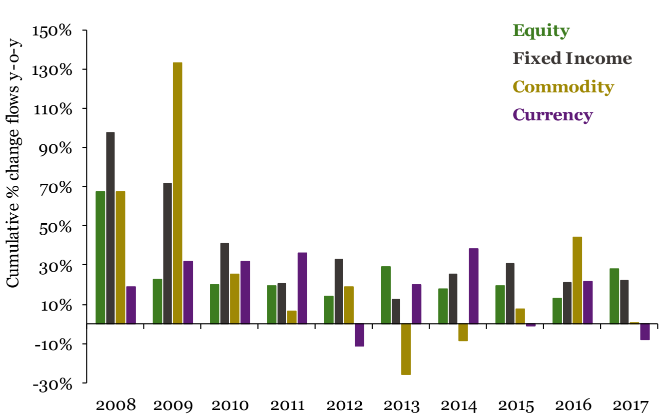
Energy ETP flows trade inversely with energy prices, cushioning the price declines.

Momentum style Equity ETPs drove global equity markets higher but a near term correction is likely.

The strong positive correlation of emerging market ETP flows with underlying prices is signalling further upside in prices.

Another record year for the ETP landscape

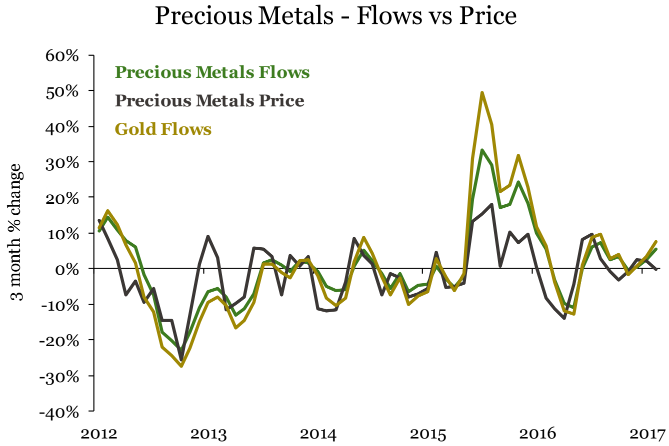
2017 was another positive year for ETP landscape, surpassing the US$4.5trn mark in global assets under management. Investors flocked to ETFs and shunned mutual funds, paving the way for potentially another record year of flows in 2018. Investor risk appetite in equity and bond ETPs remained strong, as cumulative flows were materially higher by 28% and 22% over the prior year respectively. Meanwhile a mixed performance within the commodity complex rendered flat commodity ETP flows this year.



Source: Bloomberg, ETF Securities as of close 30 October 2017

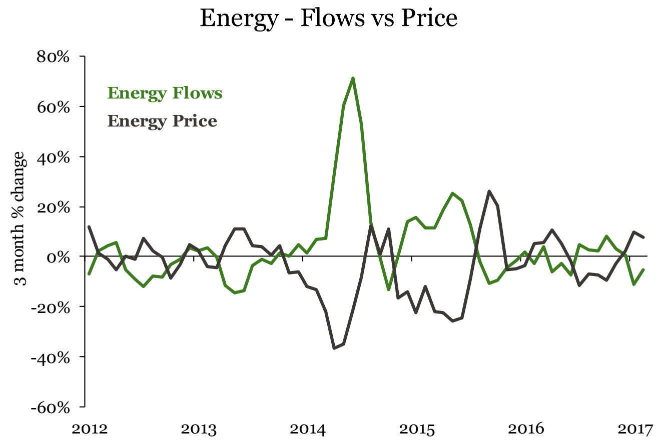
Broad commodity flows remain steady

Cumulative inflows into commodity ETPs, have so far reached USD$115bn in 2017. Of which, precious metal ETP flows account for the largest share worth US$75bn followed by energy ETP flows at US$20bn. Performance within the commodity complex was bifurcated. Energy and industrial metals posted strong price gains of 15% and 17% y-o-y respectively. While performance of precious metals and agriculture lagged behind with y-o-y returns of 3% and -13% respectively. Judging by the bifurcated performance within commodities, inflows into broad commodity basket ETPs remained steady throughout the course of 2017. Meanwhile precious metal ETP flows traded directionally in line with underlying prices, with a strong correlation of 0.7. Gold amassed the largest share of precious metal ETP flows worth 80%. Flows continue to trade in line (at 0.7 correlation) with gold prices. At present the trend depicts the pace of flows, and are pointing to higher upside for gold prices in the near term.



Source: Bloomberg, ETF Securities, data available as of close 30 October 2017

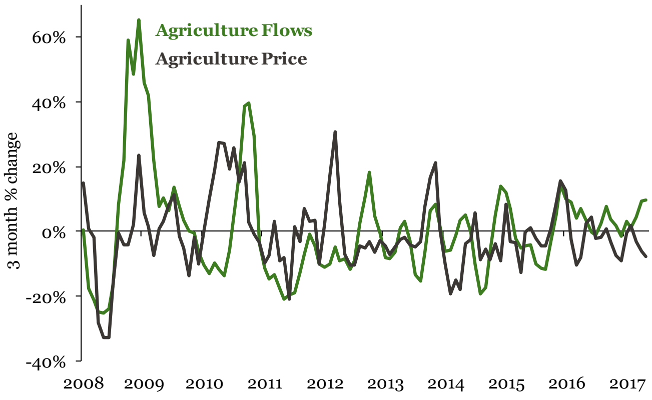
In stark contrast to the positive relationship between most commodity ETP flows and their prices, energy ETP flows depict a negative relationship with their prices, at -0.7 correlation.



Source: Bloomberg, ETF Securities, data available as of close 30 October 2017

This counter cyclical relationship has allowed energy ETPs to cushion the price decline and provide resistance when prices move higher. As bargain hunters have relentlessly chased falling energy prices evident from simultaneously rising flows. Furthermore, the price direction and net flows within the agricultural sector have maintained a correlation of 0.3. However recently flows have overshot price movement suggesting bargain hunters are buying on dips and we could see price upside within the agriculture sector as we approach 2018.

Agriculture - Flows vs Price



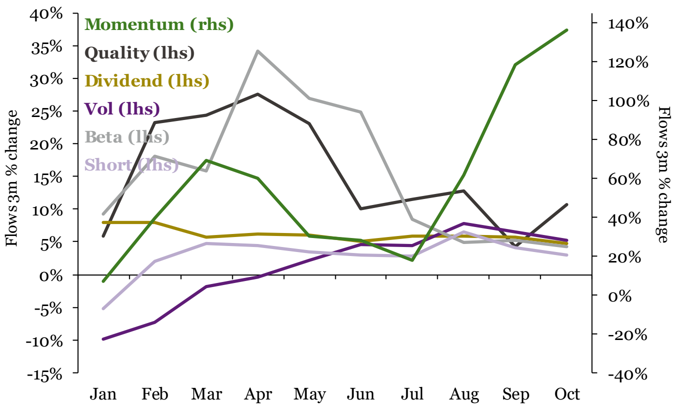
Source: Bloomberg, ETF Securities, data available as of close 30 October2017

The positive flows versus price movement (at 0.6) within the industrial metals sector is signalling a correction for prices, evident from the declining pace of flows.

Equity flows driven by momentum

Investor appetite for equity ETPs proliferated in 2017. The wider spectrum of product availability across style, sector and geography gave rise to distinct trends amongst equity investor. Momentum investing was the most favoured style factor in 2017. The momentum phenomenon can be justified by common behavioural biases among investors, as global stock markets continued to break new highs. The bull herd mentality led investors to pile into winning stocks that are rising and sell out of declining stocks regardless of underlying fundamentals.

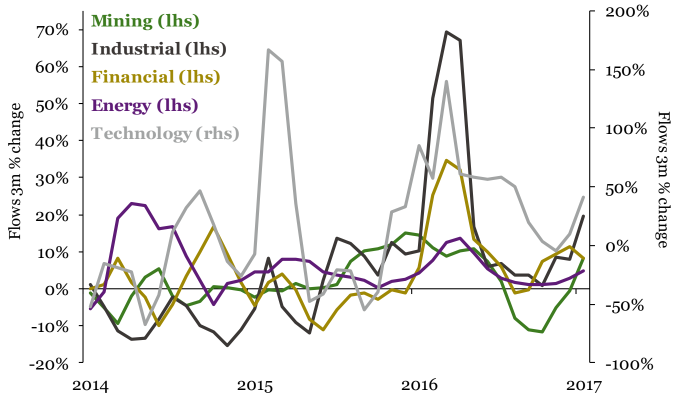
Style Factors in 2017



Source: Bloomberg, ETF Securities, data available as of close 30 October2017

Technology focussed ETPs had the lion's share amongst global equity flows across all sectors. Interestingly within the technology sector, robotics and automation ETP flows outpaced those of cybersecurity ETP flows. The global industrial and financial sectors, pinned as the strongest beneficiaries of President Trump's policies, continued to receive the highest inflows in 2017. Meanwhile ETF flows into consumer discretionary, consumer staples, real estate and healthcare sectors fell out of favour with investors in 2017.

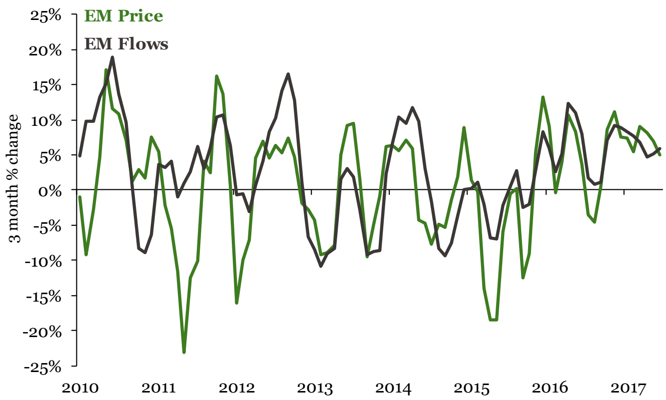
Equity Sector Rotation



Source: Bloomberg, ETF Securities, data available as of close 17 November 2017

Across geographies, ETPs tracking US and European equities garnered strong inflows. However, the decelerating trend indicates these markets are due for a correction. Strong inflows into geopolitical hotspots such as Italy, North Korea and Greece highlight that investors ignored risks of political events escalating despite high odds. Flows into broad emerging market equity ETPs accelerated up 124% y-o-y to US$213bn. India received the largest inflows among emerging markets while China suffered the largest outflows. The strong positive directionality (correlation of 0.6) of emerging market ETP flows and price, have made ETP flows a strong sentiment indicator of future prices.

Emerging Markets - Flows vs Price



Source: Bloomberg, ETF Securities as of close 30 October 2017

Bond Flows shrug off rate hikes

Inflows into fixed income ETPs vaulted to US$832bn. The pace of inflows into corporate and inflation linked bond ETP flows surged the highest by 28% and 26% over the prior year respectively. Despite the ongoing rate rising environment in 2017, this sector has received an average US$10bn of fixed income ETP inflows for each consecutive month.

Disruptive themes behind future commodity demand

By James Butterfill and team contributions – *Head of Research & Investment Strategy* | research@etfsecurities.com

Summary

As energy efficiency drives renewable energy and battery technology demand, silver and nickel usage may see a boost.

Automation and technology integration may benefit copper.

Climate change may continue to impact global agriculture.

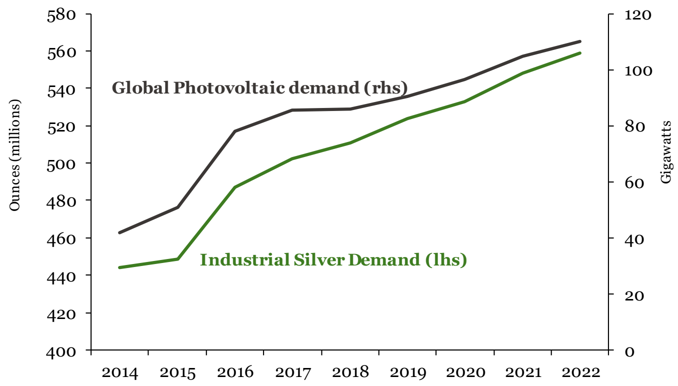
If the evolution of commodities is traced over time, the economically dominant commodity sector tends to follow structural shifts in technology and growth. Until the 18th century, agriculture made up the bulk of the commodity market, moving in sync with trade and population. The industrial revolution of the 19th century brought the rise in mass production of steel and coal into the limelight. This momentum then cascaded into the 20th century where oil and petroleum reigned supreme. We now stand at a tipping point for a new generation of commodities driven by intertwining technologies among the themes of energy efficiency, automation, and climate change likely to be central for demand.

Energy efficiency

The rise of renewable energy has caught much attention in recent years as a way to meet growing energy demand– one the most commercially and economically viable of which being solar. Global photovoltaic (PV) panel installations continue to beat expectations with global PV demand expected to exceed 100 gigawatts (GW) for 2017 according to an EnergyTrend[1] report. China, the global leader in solar energy, installed 34 gigawatts of solar panel installations in 2016 and over 17 gigawatts in the first half of 2017. This increasing demand for PV panels may provide a boon for key materials most notably silver. Industrial demand for silver may further increase through 2022 in line with global PV demand.

Technology advancements in energy storage have helped improve renewables' economic viability, particularly with battery technology. Lithium-ion battery growth is expected to see rapid demand increase through electronics, power cells, and most notably further adoption of battery electric vehicles globally.

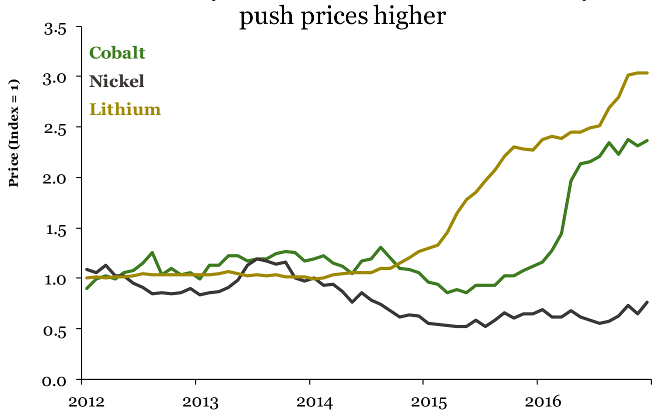
Solar's rise may push silver higher



Source:GTM Research, Metals Focus, ETF Securities, data available as of close 23 November 2017

Looking beyond lithium however, current battery technology is also reliant on other commonly traded metals – particularly cobalt and nickel. Cobalt, whose supply primarily comes from the Democratic Republic of Congo, has experienced a commensurate rise in price along with lithium, due to supply disruptions and anticipated battery demand. Nickel, on the other hand, has global production that is more geographically diverse and has yet to see a rapid spike in prices.

Nickel's key role in lithium-ion batteries may push prices higher



Source: Bloomberg, ETF Securities, data available as of close 23 November 2017

A more likely scenario will be nickel prices gradually benefiting from new battery demand in coming years. Currently nickel has seen supply deficits widen, a trend expected to persist into 2018. Higher anticipated demand has pushed nickel prices upward in recent months, not supply side factors such as production costs.

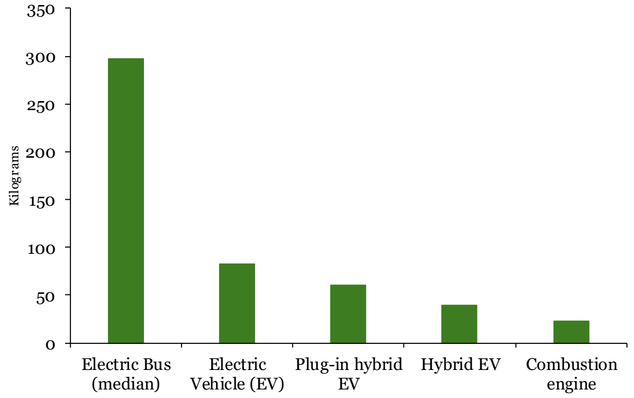
Automation & technology integration

Another persistent theme that may benefit commodities is that of rising automation and technology integration. The increasing

1. *http://pv.energytrend.com/*

focus of autonomous or self-driving vehicles is an exciting example. An overlooked impact from a rise in utility of these types of vehicles is actually increased metal demand. Copper, silver, and gold are great conductors of electricity and used in countless electronics and electrical components for these vehicles. As future vehicle fleets become more technologically dependent and autonomous, a commensurate increase of conductors across aggregate systems may follow. Usage of copper in electric vehicles (EVs) is also larger than those of gasoline engines; particularly for mass transit vehicles such as buses. Electric buses may also benefit from a quicker implementation than individual EVs driven by local legislation rather than consumer preferences.

Copper usage by vehicle type

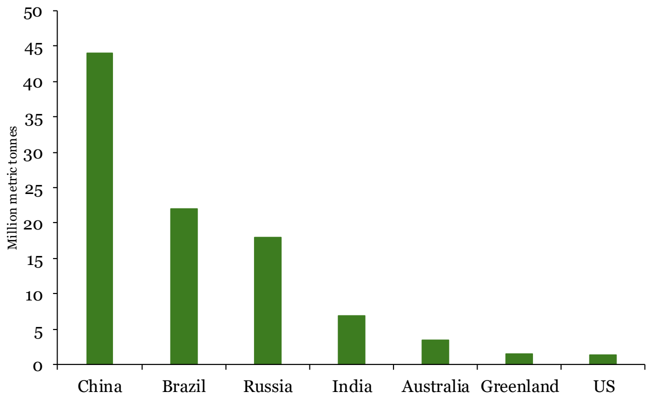


Source: International Copper Association , ETF Securities, data available as of close 23 November 2017

Perhaps the most interesting of this new generation of commodities is the least familiar, the rare earth elements. Despite their unfamiliarity to most, this group has become integral to produce modern technologies across many industries including medicine, defence, transportation, and energy generation as well as linchpins of our daily lives such as electronics and mobile devices. With a growing global middle class coupled with the rise of automation, a litany of materials you'd be hard pressed to pronounce (like yttrium and praseodymium) will continue to cement their central role in our modern standards of living.

As with any natural resource, supply and reserve concentrations are an important factor.

Rare Earth Element Reserves



Source: US Geological Survey, ETF Securities, data available as of close 23 November

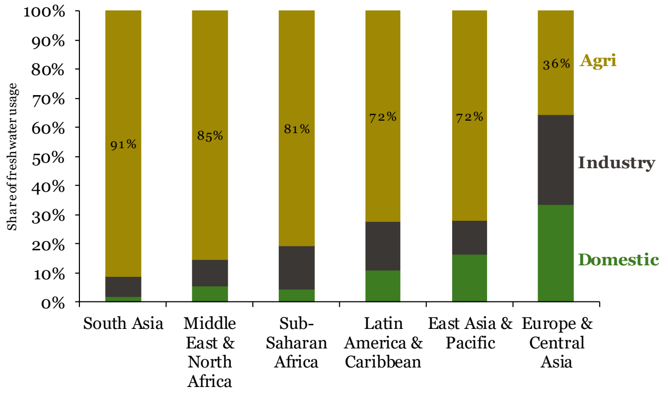
Given a high degree of geographic concentration for many rare earth elements in emerging markets, geopolitics and supply chain stability may play an increasing role. Additionally, challenges in mining and refining of these materials remain. This could leave rare earths subject to similar historical supply disruptions as their usage increases over time along with technological advancements.

Climate change

The continued disruptive theme of global climate change may be another catalyst for shifting dominance among individual commodities. This has already spurred tighter emission standards for vehicles globally, a boost for platinum and palladium demand for catalytic converters, which help reduce pollution.

Water is an often-discounted natural resource compared to commonly tradable commodities, but its role for global agriculture will likely only grow amid rising populations and demand. Among most geographic regions, the biggest use of water by a wide margin is agriculture. Sourcing fresh and usable water to combat the effects of ongoing droughts and record setting storms may spur more agricultural efficiencies and technologies related to water.

Water demand by industry



Source: World Bank, ETF Securities, data available as of close 23 November 2017

By 2025, consumption of agricultural commodities such as soy, corn, and wheat are expected to grow 29%, 14%, and 12% respectively in emerging markets, according to the Organisation for Economic Co-operation and Development (OECD), far outpacing demand growth in developed markets. As gross domestic product per capita increases, consumer preferences move further up the consumption ladder. The most common good immediately substituted is grains for meat. This not only increases demand for livestock but also grains to feed a higher number of animals.

Outlook

As these themes and technologies continue to become central to future economic growth, demand for the next generation of commodities is at the heart of these advancements and will likely move in tandem.

Invest in alternatives with the commodity contrarian

By Edith Southammakosane – *Director – Multi-Asset Strategist* | edith.southammakosane@etfsecurities.com

Summary

Investors are looking for alternatives to equities and bonds as these traditional assets are trading at their historical highs, concerned about a potential correction.

Commodities tend have low correlation to equities and bonds and play a key role in diversifying the risks embedded in a multi-asset portfolio.

While exposed to commodities, our contrarian strategy provides higher return and less volatility, enhancing the Sharpe ratio from -0.03 to 0.23.

Commonly used equity benchmarks have been rallying over the past two years, reaching new record highs every month. Sceptical participants questioned the fundamentals behind the rally, more and more convinced that the bubble is about to burst. Analysts and portfolio managers are returning to the fundamentals of stock valuation in order to pick those that present the best potential. The same applies to bonds as central banks are either tightening their monetary policy or about to follow suit, forcing investors to seek alternative solutions to boost portfolios' performance.

The old and new contrarian model

Earlier last year, we published two papers[3] discussing the concept of a commodity strategy based on fundamental and technical indicators that we view as having the largest impact on prices: inventories, positioning, roll yield and momentum.

Traditionally, if the price is above its 200-day moving average, inventories are declining, net non-commercial positioning is increasing or the futures curve (at the short end) is in backwardation, it tends to suggest further upside potential for commodity prices.

In contrast, our commodity strategy is based on the opposite reading of these indicators. We believe that when all four indicators are highlighting strong bearishness or bullishness for a commodity, the aligned indicators are signalling a turning point with prices likely to revert in the short term. We called this strategy the contrarian model.

This year, we have made amendments to the model in order to make it investable. In the previous publications, the constituents of the portfolios used were equally weighted while here we have applied the model to a portfolio based on the weights of the Bloomberg Commodity Index, our benchmark, adjusted for any new signals from the model. In addition, three out of the four measures used in our original version of the contrarian model have been improved in order to better predict turning points.

- The change in net positioning is now measured against its 3 month moving average.
- The roll yield is also measured against its 3 month moving average.
- The momentum indicator is the combination of the average price over two weeks compared to its 200-day moving average and the commodity return over the past 6 months.
- The change in inventories remains unchanged.

We have also included a lag in the positioning and inventories data to take into account the publish date the data is available at the time the model is being updated.

The below table shows that the contrarian model outperformed the Bloomberg Commodity Index by 2.4% per year. The volatility is reduced by nearly half, enhancing the Sharpe ratio from -0.03 to 0.23.

	Bloomberg Commodity Index	**ETFS Commodity Long/Short Contrarian**
Volatility	**16.5%**	**8.4%**
Annual returns	**1.5%**	**3.9%**
Max drawdown (peak-trough)	**-69.0%**	**-20.4%**
Max recovery (to previous peak)	**9.40**	**2.08**
Beta	**1.00**	**0.09**
Correlation to benchmark	**1.00**	**0.18**
Tracking error	**0.0%**	**17.1%**
Sharpe	**-0.03**	**0.23**
Information ratio		**0.07**

**Based on daily data in USD from November 1999 to November 2017. Volatility and returns are annualised. Max drawdown is defined as the maximum loss from a peak to a trough based on a portfolio past performance. Max recovery is the length of time in number of years to recover from the trough to previous peak. Beta and correlation are against the Bloomberg Commodity Index TR. Risk free rate equals to 2% (a simulated combination of the IMF UK Deposit Rate and the Libor 1Yr cash yield). Source: ETF Securities, Bloomberg*

The portfolio, called the ETFS commodity long/short contrarian portfolio, takes a long or short exposure to the 25 Bloomberg Commodity Subindices, depending on the signals provided by the model. If all four signals mentioned above are bearish, the portfolio will be long that commodity or vice versa if the signals

[3] How to make the best of commodities: the contrarian model, 02 February 2016 & Have your cake and eat it with the contrarian model, 24 May 2016

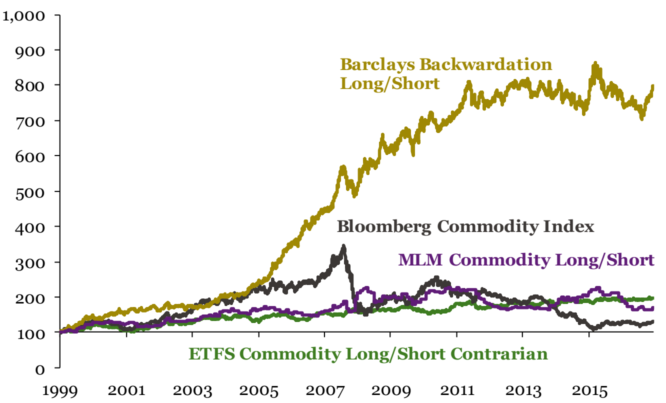
are bullish. The constituents are reassessed at the end of each quarter for the next quarter.

Other long/short commodity strategies

Adding a short exposure to a portfolio usually tends to reduce its return potential but also its volatility to a greater extent, enhancing its Sharpe ratio.

We compare the performance of the ETFS commodity long/short contrarian portfolio to two other long/short commodity indices: the Barclays Backwardation Long/Short Index and the MLM Commodity Long/Short Index. Investable but proprietary, none of them disclose publicly the methodology of their indices.

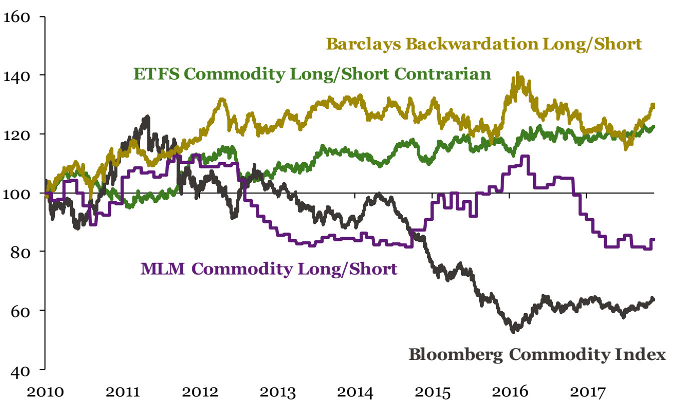
Performance of long/short commodity indices



Source: Bloomberg, ETF Securities, data available as of close 16 November 2017

With the exception of the Barclays Backwardation Long/Short index, the average return of long/short commodity indices since 1999 has been closer to 3.4% per year. The impressive performance of the Barclays index was due to the rally ahead of the great financial crisis where it capitalised on many commodities being in backwardation. By being long these commodities in backwardation and short a commodity benchmark as a beta hedge, the Barclays index is exposed to the alpha return of commodities in backwardation.

Performance since January 2010



Source: Bloomberg, ETF Securities, data available as of close 16 November 2017

However, if we rebase the chart to January 2010 at the start of the bear period for commodities, we can see that the Barclays index has been performing similarly to the ETFS commodity long/short contrarian portfolio as most commodities were in contango during the downturn post 2010.

	Barclays Backwardation Long/Short	MLM Commodity Long/Short	**ETFS Commodity Long/Short Contrarian**	**Bloomberg Commodity Index**
Volatility	9.0%	11.4%	**7.1%**	**14.0%**
Annual returns	3.3%	-2.2%	**2.6%**	**-5.6%**
Max drawdown	-18.7%	-28.4%	**-12.7%**	**-58.3%**
Max recovery	1.96	5.90	**1.36**	**6.57**
Beta	-0.14	-0.02	**-0.13**	**1.00**
Correlation	-0.23	-0.02	**-0.25**	**1.00**
Sharpe	0.33	-0.22	**0.32**	**-0.42**

**Based on daily data in USD from January 2010 to November 2017. Beta and correlation are against the Bloomberg Commodity Index TR. Risk free rate equals to 0.4% (a simulated combination of the IMF UK Deposit Rate and the Libor 1Yr cash yield). Source: ETF Securities, Bloomberg*

The above table shows the performance of the commodity indices since January 2010 and through the period of downturn for the asset class. The ETFS commodity long/short contrarian portfolio remains the least volatile of all. It provides better protection from the downside risk and also recovers faster to its previous peak.

An alternative to equities and bonds?

In this last section, we wanted to see whether the commodity long/short contrarian portfolio could be considered as an alternative investment to traditional equity and bond indices, two asset classes that are believed to be at their peak.

	MSCI AC World Daily TR Net	Bloomberg Barclays Global Aggregate Index	**ETFS Commodity Long/Short Contrarian**
Volatility	16.0%	5.5%	**8.4%**
Annual returns	4.5%	4.5%	**3.9%**
Max drawdown (peak-trough)	-58.4%	-10.8%	**-20.4%**
Max recovery (to previous peak)	5.80	1.85	**2.08**
Beta	0.37	0.05	**0.09**
Correlation to benchmark	0.38	0.14	**0.18**
Sharpe	0.16	0.47	**0.23**

**Based on daily data in USD from November 1999 to November 2017. Beta and correlation are against the Bloomberg Commodity Index TR. Risk free rate equals to 2% (a simulated combination of the IMF UK Deposit Rate and the Libor 1Yr cash yield). Source: ETF Securities, Bloomberg*

As the table above illustrates, the volatility of the commodity long/short contrarian is higher than the volatility of the bond benchmark but is almost half the volatility of the equity benchmark. The portfolio annualised return, on the other hand, has been lagging but steady since 1999. As a result, the Sharpe ratio sits right in between both indices at 0.23 compared to 0.47 for the bond index and 0.16 for the equity index.

If equities were to crash as they did during the 2009 great financial crisis and if bonds were to fall due to rising interest rates, we believe investors would be better off exposed to alternative assets such as commodities. A long/short commodity strategy provides the alpha that investors are looking for without having to cope with the higher level of volatility of investing in a broad commodity index. The ETFS commodity long/short contrarian portfolio is the only strategy showing stable growth since 1999.

A small but growing green bond market

By Edith Southammakosane – *Director – Multi-Asset Strategist* | edith.southammakosane@etfsecurities.com

Summary

According to the Paris agreement, all countries should do their best to reduce carbon emissions to cap global temperature growth to 1.5˚C.

The green bond market is, among other things, one of the tools available to help investors meet environmental targets. Access, however, remains limited to institutional investors.

The green bond market is set to grow at a rapid pace as further regulation and standardisation come into place to facilitate issuance and subscription.

History has shown that international organisations have always fallen short of climate targets. Global average temperatures continue to rise. Natural disasters are more frequent than ever while international and local measures to mitigate the negative effect of greenhouse gas emissions remain not ambitious enough to rein in global warming. The Paris agreement, drafted in December 2015 and enforced in November 2016, is said to set a turning point in the world effort to save the planet, encouraging members to define more ambitious targets based on best effort. However, actions still have to follow.

In our previous report, *Sustainable investing: the performance myth*, we highlighted the emergence of millennials as key source of demand for green investment and the role they are playing in reshaping the investment industry. Sustainable investing and ESG criteria have become mainstream, driven by new money from millennials who want to combine their investment objective with their moral duty towards the planet and future generations. While carbon allowances have not been as efficient as expected in reducing carbon emissions (see *How to Invest in Low Carbon Economy*), environmental policies and global awareness have helped increase investment into renewable energy. In this note, we are analysing the green bond market, a source of investment in green projects, which is set to grow at a rapid pace in the near future.

What is a green bond?

A green bond is a bond under which the proceeds are used for environmental purposes such as the development of renewable energy, clean transportation, pollution prevention or energy efficiency among others. A green bond has the same characteristics as a normal bond with coupons, duration and maturity, and with prices driven by supply and demand.

In the same way as for Sustainable and Responsible Investing (SRI), international organisations stepped in to define general guidelines, listing criteria that a bond has to meet to be qualified green. Two main standards are currently being used:

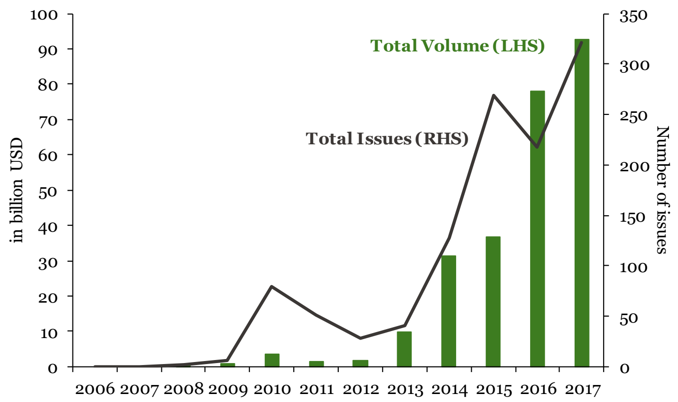
- The Green Bond Principles (GBP), developed by the International Capital Markets Association, promote transparency, focussing on the use of proceeds; and
- The Climate Bonds Standard, published by the Climate Bonds Initiative, sets more sector-specific criteria for assets and projects to be eligible for the 'green' label.

While many other volunteer guidelines have been published in local jurisdictions, a globally accepted standard is increasingly needed for the green bond market to grow at its full potential.

State of the green bond market

The first green bond was issued in 2007 by the European Investment Bank, a €600 million Climate Awareness Bond focussed on renewable energy and energy efficiency. While interest from investors and issuers was high, it took time for the market to take off due to the lack of clear guidance and transparency. The market had to wait until the publication of the GBP in 2014 to see significant increase in volumes, as illustrated by the chart below. Issuance of green bonds grew from less than a billion in 2008 to nearly US$80bn in 2016, according to Bloomberg data. Issuance in 2017 has grown further, reaching US$92bn as of end of October.

Green bond market value per year

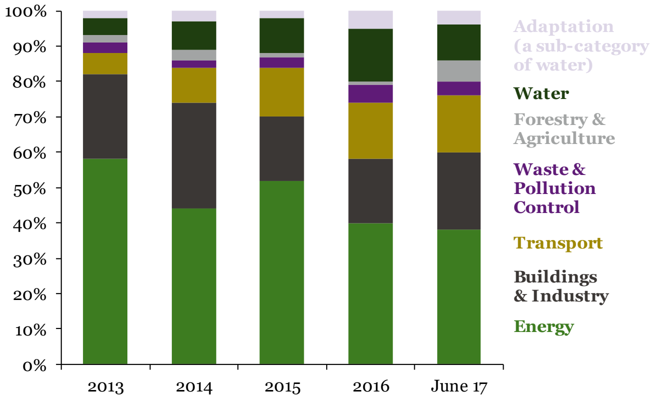


Source: Bloomberg, ETF Securities as of close 07 November 2017

**Data consists of debt securities issued globally by corporate and government issuers whose use of proceeds are for eligible green projects. Data excludes bonds with warrants, convertible securities, and credit-linked securities as well as municipal bonds, ABS and project finance bonds.*

According to the green bond database, the total market value of outstanding green bonds currently stands at US$260bn, less than 0.5% of the global bond market. The type of issuers range from multinational and governments to municipalities and corporates, with the banks representing nearly 50% of the issuers in 2016, according to Bloomberg. The proceeds have also been used for a wide range of projects as illustrated by the following chart. Renewable energy, energy efficiency and transportation made up for 80% of the usage.

Green Bonds Use of Proceeds



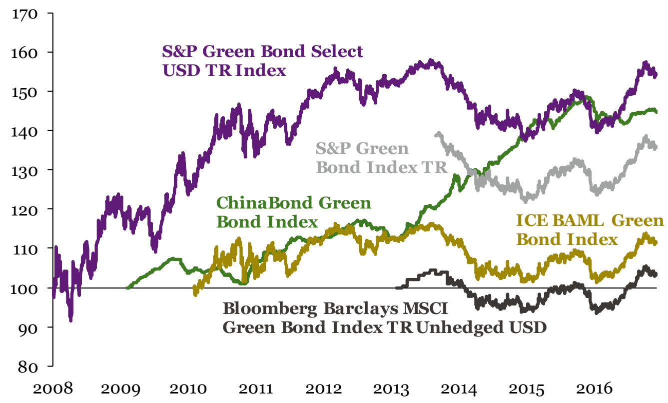
Source: Climate Bonds Initiative - The State of the Market 2017, ETF Securities as of June 2017

How to invest in green bonds?

Due to the small size of the market, green bonds tend to be oversubscribed as demand for investment in green projects is high. Investors that have accessed to these bonds are mainly institutional investors with the liquidity squeeze creating a premium on green bond prices over normal bonds.

Five indices have been launched since 2008 and have been mainly used to track the performance of the green bond market versus the bond market. While all of them include bonds with projects labelled as green, additional criteria specific to each index makes them slightly different from each other.

Green bond indices performance



Source: Bloomberg, ETF Securities as of close 07 November 2017

The above chart shows, however, that the specific selection criteria make barely little difference from a performance perspective. With the exception of the ChinaBond Green Bond Index based in Chinese Yuan, green bond indices are highly correlated to each other regardless of the time they were launched. Since the latest trough in mid-December 2016, green bond indices gained 10% as the Paris agreement, drafted in December 2015, came into force on the 4th of November 2016. As a nascent market, very few Exchange Traded Products (ETPs) are available for retail investors but ETP offerings are likely to increase as the green bond market grows.

	S&P Green Bond Select TR Index	**Bloomberg Barclays Global Agg Index TR**	Bloomberg Barclays Global Agg Corporate Index TR	Bloomberg Barclays Global High-Yield Index TR
Volatility	10.9%	**2.4%**	3.5%	4.1%
Annual returns	4.9%	**4.3%**	6.8%	14.0%
Max drawdown	-17.2%	**-3.8%**	-5.0%	-9.7%
Max recovery	2.33	**0.97**	0.63	0.90
Beta	0.21	**1.00**	1.33	0.01
Correlation to benchmark	0.05	**1.00**	0.91	0.00
Tracking error	2.4%	**0.0%**	0.4%	1.0%
Sharpe	0.42	**1.64**	1.85	3.31
Information ratio	0.27		7.15	9.52

**Based on monthly data in USD from November 2008 to November 2017. Volatility and returns are annualised. Max drawdown is defined as the maximum loss from a peak to a trough based on a portfolio past performance. Max recovery is the length of time in number of years to recover from the trough to previous peak. Risk free rate equals to 0.4% (a simulated combination of the IMF UK Deposit Rate and the Libor 1Yr cash yield).*
Source: ETF Securities, Bloomberg

The above table shows that the performance of green bonds have been substantially lagging standard bond benchmarks. Similar to SRI or carbon allowances, these markets are aimed at a new type of investors that put more emphasis on safeguarding the planet rather than the performance of their portfolio.

Set to grow but challenges remain

According to the World Bank, US$23tn of green bonds need to be issued between 2016 and 2030 in order to have a chance to meet the Paris agreement target. This is around US$1.6tn per year. The People's Bank of China, on the other hand, estimates that between US$290bn and US$580bn per year should be enough to mitigate climate change. In both cases, this means a green bond market that will see issuance multiplied by more than three times its current annual volume.

While strong issuance growth will reduce liquidity issue, challenges to reach that size remain substantial and include:

- The need for one worldwide industry standard to replace the many volunteer ones;
- The creation of a system to monitor the usage of the proceeds independently from the issuer reporting;
- Access to the green bond market to smaller investors;
- Measurable environmental impact of the project (for example, an estimated carbon emission reduction per USD invested);
- Risk of greenwashing where a company is allowed to issue green bonds and is also heavily exposed to fossil fuels; and
- Developing countries are small issuers while green projects in these regions are more pressing.

Bitcoin valuation: Marginal cost

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Summary

The electricity consumption to mine Bitcoin is currently equivalent to roughly 600,000 households' usage or US$3.4m spent every day, this will double by end-2018.

Current mining costs for Bitcoin imply a marginal cost of production of US$2,250. Including rig purchase costs, marginal costs are US$4,300.

Current Bitcoin prices appear to be justified only on the basis of mass adoption, which at this stage remains low.

Is Bitcoin useful and how can it be valued?

These are probably the two most important questions when trying to ascertain if Bitcoin is a viable investment. The first question at this point is very difficult to answer, it is similar to a start-up company in that it is potentially a great idea but there is not yet a big enough market to prove its viability. There are early signs of its potential, it has a following and is well known now, retailers are beginning to offer it as a form of payment and some cantons in Switzerland are now accepting it as payment for taxes. We believe cryptocurrencies are an emerging digital asset that has potential given its compelling concept, but is not proven yet, and there remain some very valid concerns over its volatility and its current valuations. Accordingly, like investing in a start-up company, investors should remain cautious.

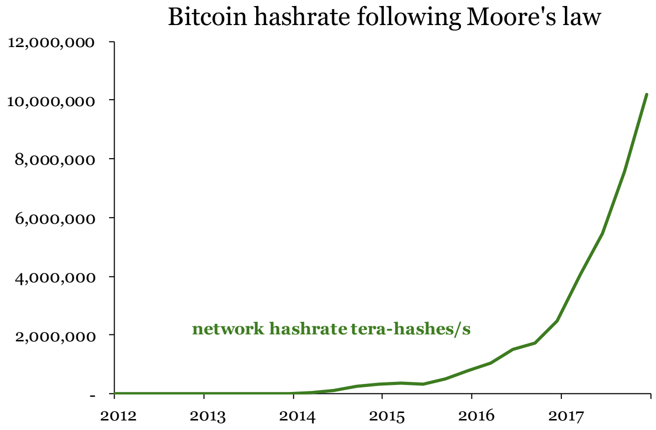
What type of asset is it?

Bitcoin is a very hard asset to categorise. It has some features of a currency, it is intrinsically a medium of exchange, but it is not currently as stable as the US dollar and has similar volatility to some frontier market currencies. We see it as also having some similar features to a commodity; it is mined using valuable resources to extract (energy and computer hardware), and it is a finite resource. It is debatable whether there is any point to mining it, but a very similar rationale could be applied to gold, given that very little is used for industrial usage (gold does have good industrial properties as highlighted *in Disruptive themes behind future commodity demand*, but at current prices application in industry are low). Ultimately miners and investors of gold see it as being a store of value and therefore worthwhile, as is emerging for Bitcoin. Bitcoin is essentially mined and minted with megawatts rather than with shovels and minting dies.

How to value Bitcoin

There are varied ways to value Bitcoin, but given it has some similarities to commodities we felt it would be worthwhile calculating the marginal cost of production. While this varies for commodities as supply and demand changes, it is an effective way in understanding the long-term equilibrium price. Bitcoin is exceptional in that the supply is predictable, being determined by the structure of its underlying algorithm. Bitcoin's algorithm dictates that after a specified number of blocks are mined the reward for mining halves. A linear path for the Bitcoin reward schedule has been established, and this is likely to continue as long as Moore's law[4] for exponential growth in processing power continues. The last coin is likely to be mined by 2130, but 99% will be mined by 2027.

The speed of mining could be accelerated but depends on the success of quantum computing, which could theoretically solve the Bitcoin algorithm far quicker, however this may come at the cost of considerably higher electricity consumption.



Source: Blockchain.info, ETF Securities, data available as of close 20 November 2017

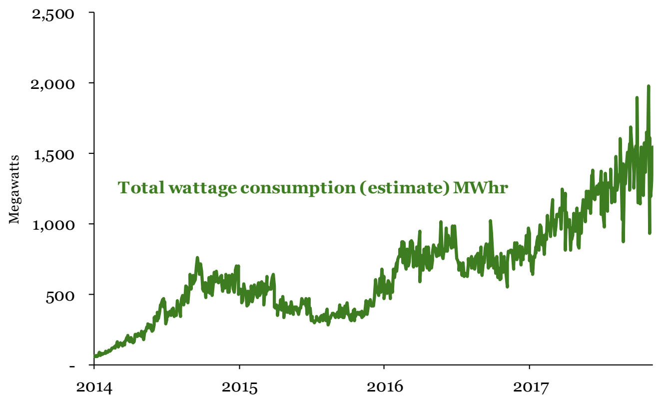
The hash rate growth of the Bitcoin network, a measure of the speed at which Bitcoin blocks are mined, coupled with the known power consumption can be used to estimate the electricity consumption costs, the equivalent of the marginal cost of production that is often used to value commodities.

[4] The observation that the number of transistors in a dense integrated circuit doubles approximately every two years

Estimating historical power costs

Bitcoin emerged in late 2009 with enthusiasts mining on their personal computers, which at the time became profitable but was a very inefficient approach. Consequently manufacturers began selling dedicated ASIC[5] miners which drastically improved efficiency. These ASIC miners began emerging in 2013, with each new model having a much more powerful hash rate, leading to an explosion in overall network hash rate as more miners joined the network. The power consumption of these commercial Bitcoin miners is well known, as is the overall hash rate. Using historical global power costs we estimate the electricity consumption to currently be 1.5GW/hr, which equates to roughly 600,000 households usage, or US$3.4m spent every day. At the current rate of growth in the Bitcoin network, power consumption costs will be double that of today by end-2018.

Bitcoin network electricity consumption



Source: Blockchain.info, ETF Securities, data available as of close 20 November 2017

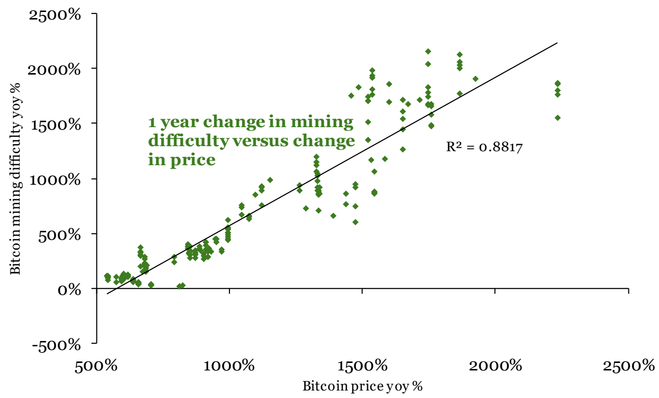
Marginal cost of production

To estimate marginal cost of production the total number of coins produced per day is divided by the mining cost: at current consumption and production levels this is approximately US$2,250, well below the current price. However, if the cost of purchasing the Bitcoin mining hardware is factored-in, and assuming a two year replacement cycle, the current marginal cost of production would be US$4,300.

Predicting future marginal cost

As the future network hash rate is likely to follow Moore's law and the mining difficulty follows a linear path future, electricity costs can be estimated. The scatter chart highlights this close relationship between price and mining difficulty.

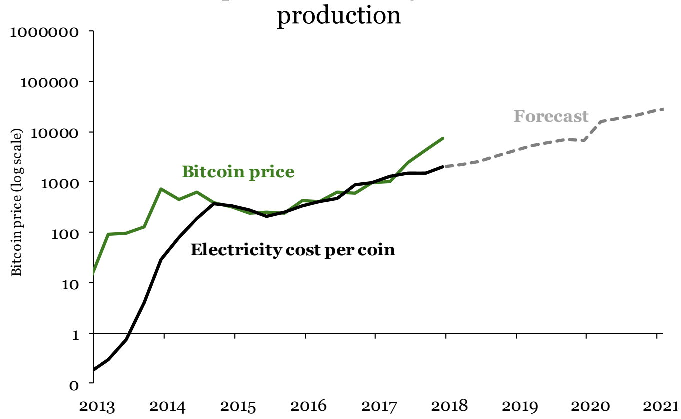
Price versus mining difficulty



Source: Blockchain.info, ETF Securities, data available as of close 20 November 2017

Assuming the historical relationship between mining difficulty and costs hold, we believe by the end of 2018 power consumption will be double that of today. We anticipate the marginal cost of Bitcoin will have risen to US$4,230 or US$6,500, including hardware purchase costs by the end of next year. It isn't until end-2019 that marginal costs would align to today's price. However, by early 2020 the reward for mining Bitcoins (as dictated by the Bitcoin algorithm) will halve, pushing marginal costs to roughly US$16,000.

Bitcoin price versus marginal cost of production



Source: Blockchain.info, ETF Securities, data available as of close 20 November 2017

Using marginal cost of production is just one approach at valuation, it could be argued that the current high valuations are justified because even if the probability of mass adoption is small, the impact on price would be very large, this is perhaps why we are seeing so much speculation. Another approach would be to use Metcalfe's law, which states that the value of a network is square the number of users, but the number of users is difficult to determine. At least now, we know what the costs are.

[5] ASIC – Application-specific integrated circuit

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