The Silver Bullet

ALGEBRIS INVESTMENTS

Currency Wars: The Inflation Menace

"I find your lack of inflation disturbing"
- Darth Vader

Central bankers at Sintra agreed on a hawkish path for monetary policy. What followed shows why exiting QE Infinity will be a very difficult mission.

Policymakers shifted to a hawkish narrative before and around the meeting. The ECB, the Fed, the Bank of England, but also Bank of Canada and the Royal Bank of New Zealand signalled an imminent yet gradual end to the era of loose monetary policy. As suggested by Mr Draghi, "*the threat of deflation is gone and reflationary forces are at play."*

Why do central bankers want to exit QE? Inflation remains elusive even where unemployment is low, as we have seen from recent data in the US and UK. In part, this is the result of structural factors, including technology, demographics and polarization in wealth and incomes, as we discussed in our last Silver Bullet | Rebanalcing and Revolutions. But there are other reasons to exit. One is to build a policy buffer for the next crisis. Another is financial stability: normalising interest rates would prevent households and corporates from over-leveraging. There are also political considerations. As we discussed over the past few years, QE introduced collateral effects to society, including wealth and geographical inequality. As the Eurozone recovers, pressure to end the extraordinary stimulus is rising, as Germany's Chancellor and Finance Minister suggested over the past few weeks.

In other words, QE worked to prevent the worst of the crisis, but its utility seems to have run its course. Exiting QE, however, poses challenges. What happened over the past few weeks makes a good example of them. After Sintra, long-term interest rates initially widened, led by Bunds on Draghi's reflation rhetoric. Later on, however, the rates move faded: long-term yields tightened back, the Euro started rising against the Dollar and other currencies. After that data in the Eurozone started to undershoot expectations, while US data surprised on the upside. Currency markets appear to have redistributed some inflation from the Eurozone to the US.

Why did the Euro rise so much? And will it make it harder to withdraw stimulus?

One answer is capital flows: since 2010, Eurozone investors tied to negative interest rate have been chasing yield elsewhere, and accounted for more than half of foreign purchases of US debt securities since the start of QE (see speech by ECB's Benoît Cœuré). Now that interest rates may be normalising, these capital flows may make their way back.

A second driver for the Euro's rise is that the tail risk premium associated with holding Euro-denominated assets has fallen sharply. Following French elections, the policy scenarios which saw a potential two-speed Europe or even a breakup have proven wrong-sided, as we expected. What's ahead is more integration and potentially more fiscal spending. Clearly the

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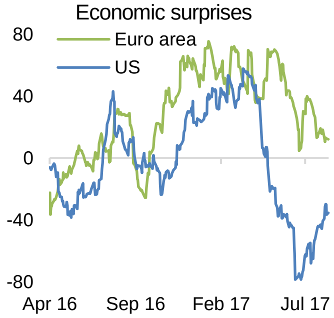
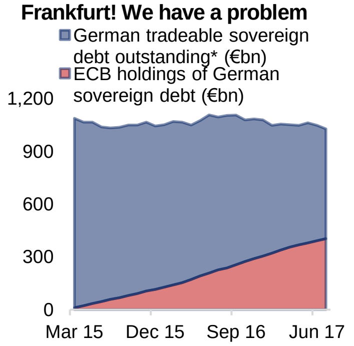
Europe-US closing the gap
Economic surprises



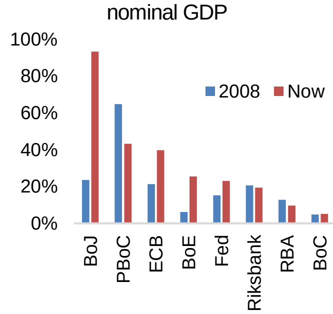
Source: Algebris (UK) Limited, Bloomberg

Frankfurt! We have a problem



Source: Algebris (UK) Limited, Bloomberg, ECB. *BofA Merrill Lynch German Government Index (Full Market Value)

CBs have grown faster than GDP
Central bank balance sheet size, % nominal GDP



Source: Algebris (UK) Limited, Bloomberg, IMF, central bank websites

road won't be free of bumps, including the upcoming Italian elections, but the balance has improved.

The third reason is investors may be anticipating the ECB will soon run into a scarcity problem: it has bought most of the outstanding German debt, within the percentage limits of its programme. The ECB has been bending the rules, buying more French and Italian debt recently, but eventually its ability to do so may end – absent a change in the rules, the ECB may have to taper anyway.

What happens if the ECB (or any other central bank) attempts to exit stimulus alone? Like at the launch of QE, when a lack of coordination created currency wars across central banks, the same can happen at the exit. Exiting QE alone can be as hard as landing a plane on a single engine.

Let's consider two central banks, both targeting inflation as their mandate. The ideal scenario is where both their economies are running at the same growth speed and have the same amount of slack in labour markets. This is unlikely to happen in reality. If Country A's economy is ahead of B in growth and/or inflation, and central bank A signals an exit, the result can be rapid currency appreciation. This in turn reduces exports and redistributes inflation to country B, forcing central bank A to moderate its tone. The endgame is no exit is achieved, and both central banks are back to square one.

The coordination exercise is even harder in a world with several central banks dealing with asynchronous economic cycles. Will central bankers agree on a coordinated exit at Jackson Hole? Or will currency wars start again?

This is when things get interesting, and the reason is some central banks are in a better position to exit than others. The Fed is ahead of the pack, though its hiking path is now at risk and depends on Trump's fiscal policy delivery. The ECB is preparing ground for its QE exit, but is at risk of delay from rapid currency appreciation. The Riksbank is catching up on its hiking curve to cool down an overheating economy and tame household leverage. The Bank of England and the Bank of Canada are talking hawkish, but face a weakening economy. The Bank of Japan is in no hurry to exit given still-elusive inflation. The People's Bank of China is walking a tightrope: it continues to tighten selectively, balancing between squeezing credit bubbles and supporting the economy. The Reserve Bank of Australia is staying dovish, but may have not enough policy ammunition if a downturn strikes earlier than expected.

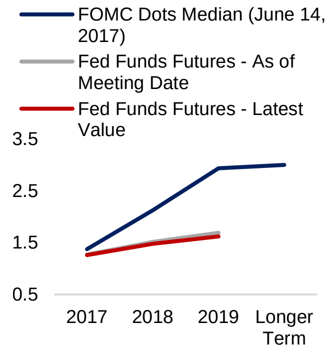
1. Fed: Rate Hike Momentum Sapped by Political Uncertainty

For all the talk of a stronger economy and the hawkish intent of some FOMC members, the Fed has guided for a shallower normalisation path compared to previous cycles, with only four hikes projected in 20 months. The main culprit has been stagnant core inflation at 1.7%, which in our view has been caused by structural wage growth issues, despite decade-low unemployment and strong economic growth.

However, after months of macro data undershooting expectations in the US, we may be about to see some positive surprises. Dollar weakness since Jan 2017 – down 11% against the Euro – may accelerate inflation towards year-end. This inflationary effect, however, is dependent on the ECB not reacting to the strengthening Euro and may be just a temporary boost without a real acceleration in wage growth. Why are wages not rising? Some of the reasons are structural: technology, demographics and rising inequality, as we discussed in our previous Silver Bullet. These are issues that monetary policy cannot fix – they need fiscal and micro intervention.

This means that to keep hiking substantially above the 2% rate over the coming quarters, the Fed will eventually rely on the Trump administration to deliver. So far the outlook for fiscal reform, tax cuts and/or increased infrastructure spending is bleak – at least in the near-term. But the situation could change next year, with the Republican Party needing to show tangible progress in their agenda, ahead of the 2018 mid-term elections. Any such stimulus that might jump start wage growth could be enough to prompt the Fed to deliver on the June dots, which are well beyond the implied path suggested by the Fed Funds Futures, at ~1.6% in 2019.

Markets anticipate slower hikes
Year-end projection, %



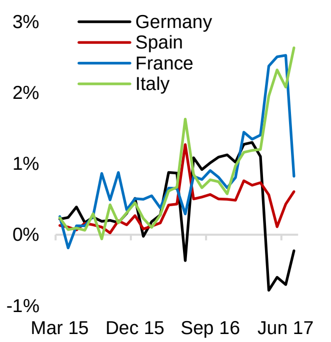
Source: Algebris (UK) Limited, Bloomberg

The key to the Fed delivering on their [hawkish promises](#) will therefore remain a political wildcard, and in our view this is more likely to disappoint in 2017 before turning around next year.

2. ECB: Getting Closer (or Being Pushed) to the Exit Door

The ECB is set to start policy normalisation soon, and the reasons are two-fold. First, growth and inflation are coming back, as suggested by President Draghi at Sintra. Economic data has consistently beaten expectations over the past quarters, albeit there has been some recent mean reversion. Moreover, not only core countries are marching ahead, Spain, Ireland, Portugal and Cyprus are all growing at close or higher than 3% YoY over the past two quarters. A more broad-based recovery means a gradual removal of policy accommodation is possible and desirable.

Capital key deviation under the hood
PSPP monthly net purchases % total vs capital key (exc. Greece)

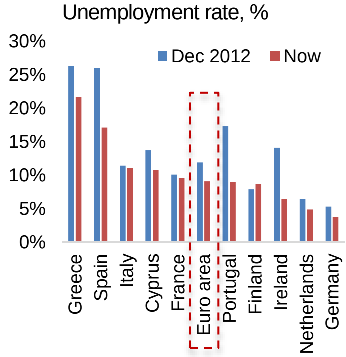


Source: Algebris (UK) Limited, ECB

Second, the clock is ticking for the ECB to wind down its sovereign bond purchase programme before running into scarcity issues. At its current pace, the ECB is likely to hit the 33% issue limit on German bond purchases in Q3 2018, according to [JPM estimates](#). One potential solution to the scarcity problem is to allow capital key deviation, which de facto has already been happening as shown by the skew towards more Italian and French bond purchases over recent months (see left). However, this remain a temporary trick and an official relaxation of the capital key constraints is unlikely given its political sensitivity. The latest [legal challenge to QE](#) referred by Germany's constitutional court to the European Court of Justice may also act as another impediment to any capital key deviation.

However, the Eurozone faces two challenges as the ECB approaches its QE exit. First, excessive currency appreciation due to a lack of coordination with other central banks can be counter-productive to inflation. According to an [ECB paper](#), a 1% depreciation of the Euro increases HICP inflation by 0.02-0.11pp after one year or 0.12-0.25pp after three years, based on different model estimates. Since French elections, the Euro has appreciated by around 8% on a trade-weighted basis and 10% against the Dollar, and may soon become a headwind to exports and inflation. In response, the ECB has tried to talk down the Euro, highlighting their concerns over "*the risk of the exchange rate overshooting in the future*" in their [July policy meeting minutes](#).

Eurozone needs more rebalancing
Unemployment rate, %

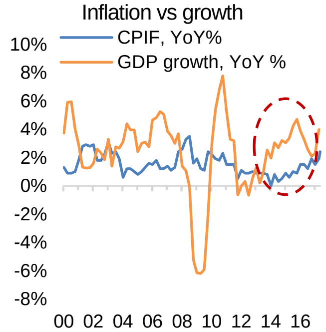


Source: Algebris (UK) Limited, Eurostat.
*Now = latest available data (Jul 2017 for Ireland, Apr 2017 for Greece and Jun 2017 for the rest)

Second, beneath the current cyclical recovery there are still structural divergences between Eurozone countries. These issues cannot be fixed by ECB easing. They require long-term solutions from governments, including fiscal stimulus, stronger European institutions and potentially a fiscal union to rebalance the economies of the periphery vs core, as we wrote in [The Silver Bullet | Europe's Opportunity](#). We believe there will be a more concerted effort by European leaders towards further integration after German elections in September. The upcoming Italian elections may be a bump in the road and create some market volatility, but are unlikely to derail the integration trend, in our view.

Sweden: inflation has lagged growth

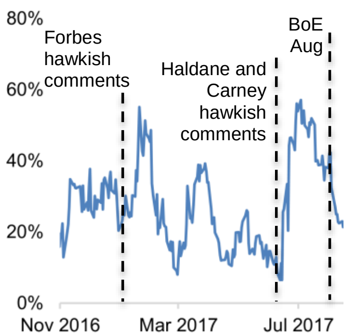
Inflation vs growth



Source: Algebris (UK) Limited, Bloomberg

Calling the BoE's bluff

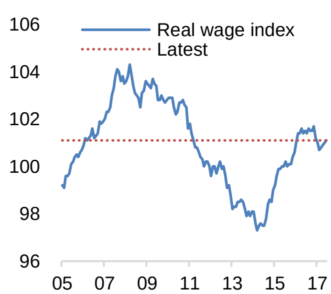
OIS implied probability of a rate hike in Dec 2018



Source: Algebris (UK) Limited, Bloomberg

Real incomes: below pre-crisis levels

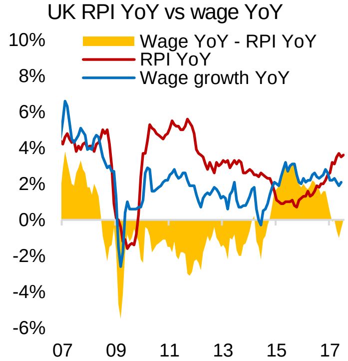
UK real average weekly earnings



Source: Algebris (UK) Limited, ONS

Inflation bites into income again

UK RPI YoY vs wage YoY



Source: Algebris (UK) Limited, Bloomberg

3. Riksbank: Behind the Hiking Curve

The Riksbank has allowed the economy to overheat, and is now behind the hiking curve. Over the last few years, the Riksbank has maintained an accommodative monetary policy stance as despite accelerating growth, inflation had lagged. In the last year, Sweden's economic growth has re-accelerated and inflation is now above the central bank's 2% target rate: Q2 GDP growth was almost 4% YoY vs 2.3% in Q1 and; in July, inflation rose to 2.4% from 1.9% vs the previous month. The Riksbank's accommodative stance in the face of a stronger economy – its real policy rate has been negative for the last three years – has encouraged households to overleverage and buy homes. Swedes are now amongst the most leveraged in the world, with a household debt to GDP ratio of 175%. Meanwhile, real house prices have risen over 40% in the last four years, up almost 80% since 2008 in Stockholm.

The Riksbank has expressed concern on the risk to financial and macroeconomic stability from the high household indebtedness and highlighted the need for *"further measures to be introduced to increase the resilience of the household sector and reduce risks".* While *"further measures"* will likely include macro prudential policies to tighten the housing market, these policies are not set by the central bank but by the government, which has been historically reluctant to take away the punch bowl. Therefore, another reason for the Riksbank to hike may be to control the housing bubble, on top of inflation.

4. BoE: All Bark and No Hike

At the Bank of England's August meeting, a journalist asked Governor Carney why he thought the market was underestimating the potential for a hike, while there were few signs of improvement in the economy and inflation. This is the question that still needs to be answered. In our view, Governor Carney's response that "*we have an expectation that domestically-generated inflation will build*", bears little credibility. For now, the BoE's hawkish-talk is all bark and no bite.

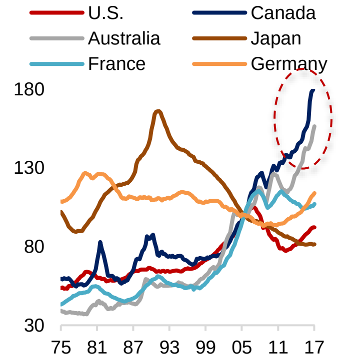
We think the BoE is unlikely to hike in the foreseeable future, i.e. not before 2019, for the following reasons. First, the UK economy is weakening, and it may be even weaker than headline data suggests. As interest rates have declined and unemployment has remained low, consumer borrowing has risen, potentially propping up spending and headline growth. However, beneath the still benign macro picture are several deteriorating trends that could soon break this credit-supported equilibrium. UK businesses, which reported their lowest confidence in six years, are looking past buoyant retail sales numbers and may have expressed concern both on the "*path of Brexit*" and "*evidence of more subdued consumer spending*", according to IHS. In response, corporates are moving out – firms that have reported relocation plans are not only big US banks but also smaller businesses like Smiffy's, a fancy dress supplier. Meanwhile UK household finances continue to worsen: debt-to-income ratio is climbing back to pre-crisis highs, but average real income is still well below pre-crisis levels and will be further eroded by rising inflation. The latest inflation numbers highlighted that while Consumer Price Inflation was broadly stable in July, Retail Price Inflation (RPI) accelerated. This divergence may indicate a further squeeze on consumer spending, as RPI may be a better representative of the average UK households' living costs. In addition, productivity, already low by historical standards, has continued to decline, as noted by the BoE's latest inflation report.

Second, the BoE is basing its forecasts on the expectation of a "*smooth adjustment to that new trading relationship*" with the EU. However, the reality is that Brexit negotiations are still in their early stages and considerable uncertainty remains ahead. A recent paper by the Chancellor and Brexit Minister Davis shows the UK still plans to exit the single market, even though with a transition period. But the EU and UK have yet to agree on the Brexit divorce-bill, which is a pre-condition to any Free Trade agreement, as both President Juncker and the

EU's Chief Negotiator for Brexit Michel Barnier, have said. The longer the bill remains unsettled, the less time the UK will have to negotiate the terms of its exit before the hard deadline of April 2019. This will likely increase the odds that the UK exits the EU without a trade deal, pushing the economy into further uncertainty and killing any chances of a rate hike.

5. BoC: Too Fast Too Soon

House prices in bubble territory?
Real house price index
(Quarterly to March 2017)



Source: Algebris (UK) Limited, Dallas Federal Reserve

The Bank of Canada (BoC) was the first central bank to hike after Sintra, two weeks after the summit in late June. It is the BoC's first rate hike since 2010, following GDP growth of 4.6% YoY in May and a solid jobs growth pace. We do not forget however, that Canada loosened rates in the first place due to oil's collapse since 2014. While oil prices have since stabilised, OPEC supply curbs' non-compliance and ex-OPEC supply growth may prompt a 2014 reprise – capital investments in the oil sector were an important factor behind the broadening of GDP growth in Canada.

More critical however, is the over-heating Canadian regional housing market and its current wobbles, with home sales falling for the fourth consecutive month in July according to the CREA. A swift hiking path by the BoC, egged on by a hawkish Fed in 2018 may pop the housing bubble instead of deflating it, or/and may push levered oil-industry players over the brink of default. Individually we think these shocks could be absorbed, but we remain concerned by the large combined exposure to oil and real estate of Canada's oligopolistic banks, though we acknowledge higher rates will help them absorb loan losses.

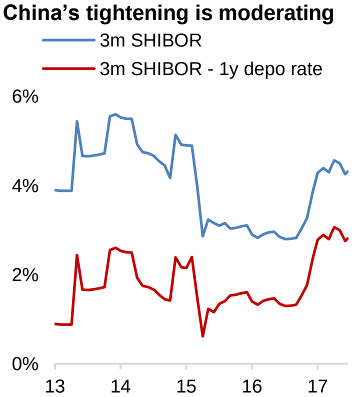
Finally, though we highlighted the need for risk-sharing frameworks in Europe with other regions in our Silver Bullet | Europe's Opportunity, we note a recent Financial Times article highlighting how Canadian banks have showered European investors in covered bonds, spreading Canadian housing market risk on yield-hungry European investors – yet another unintended consequence of QE.

6. BoJ: The Exit Is Still Far, Far Away

Inflation in Japan may be poised to rise, but the Bank of Japan (BoJ) is unlikely to signal an exit from Quantitative Easing anytime soon.

At its meeting in July, the Bank of Japan raised its real GDP growth forecasts for 2017/2018, but pushed back the time it expects to achieve its 2% inflation target from 2018 to 2019. Inflation in Japan has remained subdued partly due to weaker consumer spending, as despite a tighter labour market (unemployment is at a 23-year low of 2.8% in June), job insecurity has remained high and wage bargaining power has remained low (under 7% of those aged 25 to 34 years, changed jobs in 2016). The recent acceleration in GDP growth (4% annualised in Q1; beating survey expectations), was supported by greater consumer spending and may point to higher inflation to come. However, with inflation currently at 0.4% YoY, a pick-up in inflation will still likely be well within the BoJ's inflation target of 2%. The ample inflation head-room and the country's heightened political uncertainty, means the BoJ may be in no rush to exit its Quantitative Easing programme any time soon – or at least until BoJ Governor Kuroda's term ends in April 2018.

China's tightening is moderating



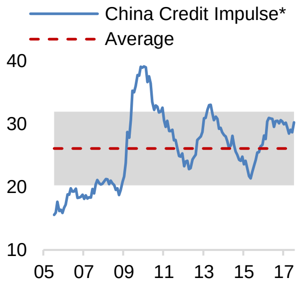
Source: Algebris (UK) Limited, Bloomberg

7. PBoC: Micro-Managing Bubbles

The Chinese central bank faces a trilemma. On the one hand, it is fully aware of the urgency to delever the economy, given total debt has more than doubled to over three times GDP since 2008 on the back of government stimulus. On the other hand, it cannot afford to tighten its policy too much, given maintaining robust growth is still a political priority under the government's 5-year plan to double the economy by 2020. On top of the two conflicting goals is the complexity over the RMB: while a lower currency could support exports and growth, the PBoC is wary of rapid depreciation on fears of triggering capital outflows.

The strategy the PBoC has thus adopted is a tightrope walk: a combination of targeted tightening, macro-prudential measures and tighter capital controls, as we discussed earlier. For example, it hiked its Medium-term Lending Facilities rate and Standing Lending Facilities rate by 20bp respectively this year, and tightened regulations on off-balance sheet lending. These measures are targeted at the most levered part of the financial system – the interbank market and the shadow banking sector, while concurrently liquidity still remains ample for policy banks to support infrastructure projects. Such a micro-managed policy framework has worked so far, with growth surprising to the upside this year, shadow bank loan growth slowing and foreign reserves stabilising/slowly edging up. However, overall deleveraging has been lacking, with credit growth rebounding in July following the PBoC's slight softening of its policy tightening. The slow pace of deleveraging means there is little margin for policy error or room to further grow credit to prop up the economy.

Credit impulse has rebounded
Grey area = +/- 1 s.d.

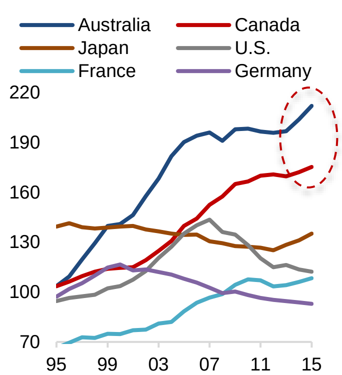


Source: Algebris (UK) Limited, Bloomberg.*Bloomberg China Credit Impulse, measured by new credit as a percentage of GDP

8. RBA: Taking It Easy Can Turn Into Complacency

The Reserve Bank of Australia (RBA) kept its cash rate target flat at 1.50% in its August meeting. While the RBA improved its macro and external outlook, it also recognised significant risks which preclude a raise. We think the RBA's cautiousness is warranted, and Mr Lowe is one of the few Central Bank heads that can convincingly remain somewhat economically hawkish and rate dovish for the time being.

Household debt rising again
(Total, % of net disposable income)



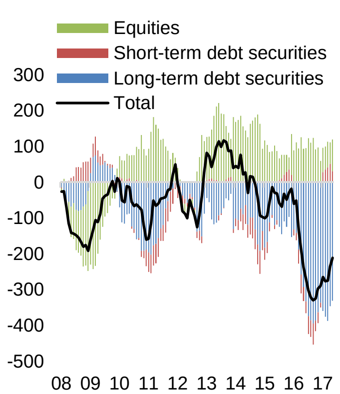
Source: Algebris (UK) Limited, OECD

Similar to Canada, Australia's economy looks vulnerable to an exuberant housing market, which has pushed household leverage to record highs. Mr Lowe's dovish strategy to hopefully weaken the AUD, solidify labour conditions and drive wage increases to support deleveraging is a temporary albeit worthwhile approach.

The risk remains that the promise of low rates adds gasoline to the housing bubble if Government macro-prudential measures do not significantly limit further price increases. This difficult environment has occurred, we think, partly due to Australia's exposure to China's capital flows. However, its reliance on China's demand for commodities is also an unknown risk, as we discuss above – China must manage a very difficult balance between growth and excess debt, and the RBA is relying on nothing going wrong in the interim.

Conclusions: Investing During Currency Wars

Euro assets are still under-owned
Foreign non-MFI portfolio investment in the Eurozone, 12m moving sums, €bn



Source: Algebris (UK) Limited, ECB. A positive (negative) number indicates net purchases (sales) of Euro area securities by non-Euro area investors

Central bankers are attempting an exit from ten years of non-standard stimulus. A successful global exit will be difficult. First because inflation remains subdued due to structural factors, including the same collateral effects caused by QE. Second, because a successful exit depends on coordinating multiple equilibria across economies.

In particular, fiscal stimulus and domestic politics will be key to allow reducing monetary stimulus. Absent coordination, attempts to exit QE may result in strong currency swings, which will over time redistribute inflation out of hawkish countries, nullifying their attempt to normalise policy. Today, the major threat from currency warfare is to the Eurozone and the Euro, which has turned into a popular long after a decade of skepticism. The risk of too-fast currency appreciation is not only a drop in risky assets, as we have seen recently for European stocks, but a slowdown in inflation, as recent data from Germany shows.

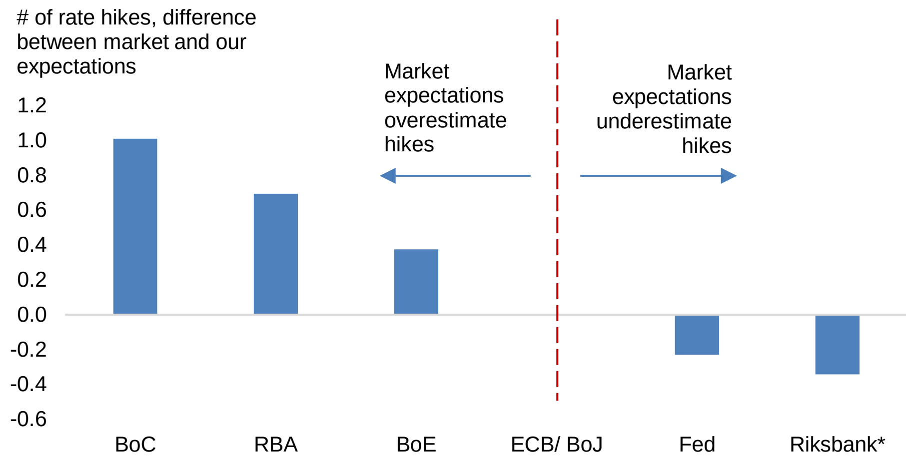
Without a coordinated normalisation, the long-term risk for developed economies will be to get to the next slowdown without policy ammunition – and with a much more divided society, due to the collateral effects which QE has caused, including rising wealth inequality.

Eventually, a coordinated exit from QE may be successful, but will likely cause several assets to re-price. The losers, as we discussed earlier would be all those assets which investors bought purely for yield or to store cash, like long dated investment grade bonds, utility stocks, but also property, art and collectibles, for example. Short-volatility and risk-parity strategies appear vulnerable also, as shown by their performance over the past few weeks.

But for now, we see currency wars as the most likely outcome – until fiscal and monetary policy can reach coordination. We think investors should structure their portfolio to include currency hedges for a re-start of currency wars, betting on the central banks which can hike and fading hawkish rhetoric from the ones that are bluffing.

We see more upside in the Euro and the Swedish Krona, as both the Eurozone and Sweden continue to outperform. The Bank of England and Bank of Canada, instead, have talked hawkish, but will soon meet the reality of weaker economic data, too-high household leverage and falling property prices.

Central Bank Hawk-O-Meter



Source: Algebris (UK) Limited, Bloomberg.

“Hard to see, the inflation is.”
- Yoda

The Silver Bullet is Algebris Investments' macro letter.

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Additional reading:

The International dimension of the ECB's asset purchase programme, Speech by Benoît Cœuré, Member of the Executive Board of the ECB, at the Foreign Exchange Contact Group meeting, 11 July 2017

Scars or scratches? Hysteresis in the euro area, Speech by Benoît Cœuré, Member of the Executive Board of the ECB at the International Center for Monetary and Banking Studies, Geneva, 19 May 2017

Exchange rate pass-through into euro area inflation, ECB Economic Bulletin Issue 7, 2 November 2016

Jarociński, M., Lenza, M., An inflation-predicting measure of the output gap in the euro area, ECB Working Paper Series No 1966, September 2016

Williamson, S., Neo-Fisherism: A Radical Idea, or the Most Obvious Solution to the Low-Inflation Problem?, Federal Reserve Bank of St. Louis, July 2016

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