RED PAPER

Navigating negative interest rates and liquidity challenges: welcome to the new world of fixed income investing

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QIC

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There has been an upturning of two fundamentals investors have taken for granted over a lifetime – positive interest rates and deeply liquid bond markets.

Negative official interest rates have become part of the landscape as central banks resort to unprecedented measures to fight deflation. At the same time, structural changes brought about, in part, by regulations that have caused big banks to pull back from their market making roles have made trading more fragile.

With a large part of the global bond market now exhibiting negative yields, investors need to respond by relaxing benchmarks, otherwise they stand the risk of having portfolios weighed down by loss-making assets. Japan has been grappling with persistent deflation and investors there have been extending duration to try and gain a few extra basis points of yield.

For Australian investors, we think the local bond market is the most appropriate performance gauge, even for globally diversified portfolios. The Australian bond market offers a positive yield versus the growing negative yielding club and clients want positive returns, and consequently a positive benchmark is the logical performance measure. Finally, thanks to unprecedented central bank actions, there is now higher correlation between many major fixed income markets.

Given many of the changes that have led to the current liquidity environment are structural in nature, things look unlikely to improve materially in the near future. However, not all investors have equal liquidity pressures. Some may even benefit. Investors not needing instant liquidity or unencumbered by mark-to-market pressures could benefit from the current higher premium for "illiquidity risk."

Many asset managers traditionally ran their portfolios assuming vast and deep liquidity as a given. They now have to optimise portfolios for a much more stressed liquidity environment and need market intelligence from traders on what is readily available to sell.

Traders have also begun to influence investment decisions more. These changes are a big departure from the days when traders simply executed the buy and sell orders placed by fund managers, with little interaction between the two teams.

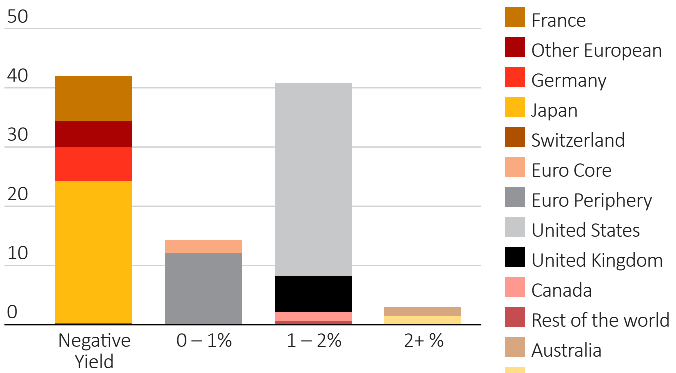
Highly skilled traders are now recognised as a vital source of information for portfolio managers, in an environment where it has become increasingly difficult to find suitable buyers or sellers at the opposite end of complex fixed income trades.

Pondering on how different markets and economies are these days from the pre-Global Financial Crisis (GFC) era brings to mind a line from the 1939 film *The Wizard of Oz* in which Dorothy states: "Toto, I've a feeling we're not in Kansas anymore." The saying has become a cultural metaphor about no longer being in a familiar place and the combination of wonder, anticipation, confusion and anxiety created by the unfamiliar.

Disbelief would once have been market participants' reaction if asked to imagine a world where negative yielding securities were a large slice of the global bond market. But that's today's reality.

At the end of June, around 42 per cent of government bonds by market value in the Citi World Government Bond Index were trading with a negative yield (**Figure 1**).

Figure 1: Negative yielding bonds figure significantly
% average yield weight in Citi World Government Bond Index



As of 30 June 2016
Source: Citigroup, QIC

Large as the figure within the Citi benchmark is, it understates the size of the negative yielding bond pool. According to rating agency Fitch, the amount of sovereign debt trading with a sub-zero yield broke through the US$10 trillion ceiling for the first time in May this year fuelled by central bank stimulus and investor appetite for sovereign paper.[1]

Negativity from the sovereign arena is spilling over into corporate bonds with Tradeweb data putting the value of negative yielding corporate bonds at US$380 billion — a figure that includes Euro denominated bonds maturing in the next year that are not captured by some of the main index providers. The yield on a host of short-term paper sold by storied companies including Johnson & Johnson, General Electric, LVMH Moët Hennessy Louis Vuitton and Philip Morris now trade below zero in the secondary market.[2]

None of this should surprise given that sovereign bonds yields are a reference for their corporate counterparts. It was only a matter of time before the gravitational pull of sovereign bonds exercised its power over corporate bonds.

Five developed market central banks have negative rates: the European Central Bank (ECB), Swiss National Bank, Sweden's Riksbank, Danish National Bank and Bank of Japan (BoJ). While the US Federal Reserve (Fed) has been the only major central bank to increase official interest rates in recent years, it too has considered the possibility of negative rates, should conditions reverse.

Fed Chair Janet Yellen has published research suggesting a level of -6 per cent nominal Fed funds rate was appropriate in 2009,[3] but at the time the Fed believed in the sustainability of zero-bound rates and so it launched quantitative easing (QE) instead. That said, in a recent speech Janet Yellen expressed some scepticism about the effectiveness of negative interest rates. It seemed to underscore the gulf between Fed and European thinking, and direction on monetary policy.

Economics dominates the conversation on negative interest rates, its motivations and consequences. This paper's focus is different — it's on the need to reimagine fixed income investing in a negative interest rate, liquidity challenged world. However, the broader economic dimension is impossible to ignore and so we touch upon that in *Entering the negative zone: where will it all end?* on the following page.

SHORT TERM SUGAR HIT; LONGER TERM BITTER PILL

There was a time when investors only needed to focus on two dimensions of fixed income — risk and return. But like so much else, solely abiding by the ways of the past is insufficient now. Managing liquidity is essential.

In the short-term, at least, the negative official interest rates age which began in earnest in June 2014 when the ECB imposed negative rates on parts of European banks' reserves has been positive for existing fixed income holdings.

German government debt, which on average yields -0.33 per cent,[10] has returned 6.55 per cent since the beginning of the year mainly because of rising prices.

Japanese insurance companies, banks and pension funds are heavily invested in government debt and have benefited as Japanese government debt, which yields -0.18 per cent,[11] has returned 8.26 per cent over the same period. In fact, they've been able to book gains over the past several years as yields for these institutions' portfolios have fallen.

So far, so good. However, there is a sting in the tail.

Extremes, both positive and negative don't last and the low yield tailwind is transitioning into a headwind. Japanese banks are now passing on increased costs to certain customers and insurance companies are taking on incrementally higher risks to compensate for negative yields.

As time progresses and existing holdings mature, institutions ranging from banks to insurers to investment managers face the perverse prospect of paying to lose money by buying negative yielding bonds. Furthermore, in a doubling of misery, bond values in Japan and elsewhere will slide should yields do an about-face and rise.

A BRAVE NEW WORLD

The theory behind negative interest rate policy is that it should force people and businesses to spend — rather than save — and thus spur economic growth and positive inflation. However, not for the first time, people are behaving in ways that confound theorists.

In Japan, consumers are hoarding cash — the opposite of what the BoJ had hoped when it introduced negative interest rates. Signs are emerging of higher demand for safes — a place where the interest rate on cash is always zero, no matter what the central bank does.

One safe that costs about US$700 was reportedly out of stock and stories of elderly people thinking of keeping money under mattresses are doing the rounds.[12]

Curious things are happening elsewhere too, like in Sweden. Although retail banks have yet to pass on negative rates to Swedish consumers, the longer it's held there the more financial pressure there is for banks to pass the costs onto their customers.

That's a problem because Sweden is the closest country on the planet to becoming an all-electronic cashless society. Sweden is a place where, if people use too much cash, banks call the police thinking that terrorist or criminal activities are behind such behaviour.

More recently, Swedish banks have started removing cash ATM machines from rural areas, annoying old people and farmers. Sweden may become the first country where its citizens may have to accept negative interest rates (probably in the form of higher bank charges or fees) or be forced to spend their money in order to "save" it from those rates.

A resistance is forming, and some people are protesting the impending extinction of paper money by keeping cash in microwaves.[13]

The ECB is currently thinking of abolishing the €500 note, ostensibly as an anti-laundering initiative. As a share of the value of total Euros in circulation, the €500 note is the second-highest, after the €50 note.[14]

Sceptics, however, think different motives are at work. In their view, what Europe would be truly doing is setting the scene for ever more aggressive negative interest rate policy, and by removing the highest denomination bank notes, it would make evading negative that much more difficult and costly.

COMMONSENSE RELAXATION OF BENCHMARK CONSTRAINTS

Rather than following the eccentric route of Japanese or Swedish consumers, we think investors need to get active now by adopting more worldly strategies. In the first instance, that means fresh thinking on fixed income benchmarks currently weighed down by trillions of dollars of negative yielding bonds.

Intuitively, only positively yielding securities would be in a benchmark. After all, clients require positive returns, usually something ahead of the inflation rate.

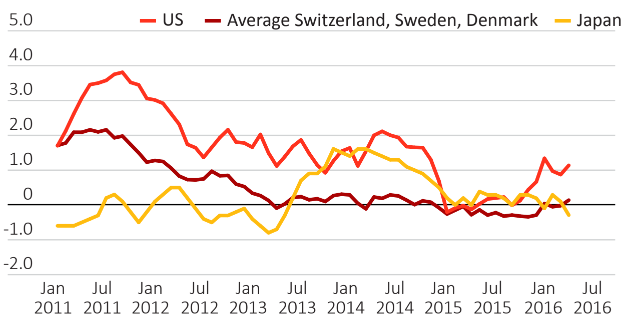
ENTERING THE NEGATIVE ZONE: WHERE WILL IT ALL END?

"Negative interest rate" is a phrase seemingly designed to confuse all but the experts. Instead of paying interest on commercial banks' reserves held by the central bank, the central bank taxes these deposits. The idea is to impel the banks to reduce their unspent balances and increase their lending or investments.

They are the latest effort since the 2008 global financial crisis to revive economies (and inflation) by monetary measures. When cutting interest rates to historically low levels failed to revive growth, central banks took to quantitative easing: injecting liquidity into economies by buying long-term government and other bonds. It did some good, but mostly the sellers sat on the cash instead of spending or investing it.

Enter negative interest rate policy. The central banks of Denmark, Sweden, Switzerland, Japan, and the Eurozone have all gone down the negative path. Frustratingly for the central banks involved, the suite of measures including negative interest rates have not clearly succeeded in reviving moderate inflation (**Figure 2**). Even Sweden with official interest rates at -0.50 per cent still has less than 1 per cent inflation.

Figure 2: Unusually low inflation dominates developed economies*
Inflation as measured by movements in the consumer price index (yoy%)



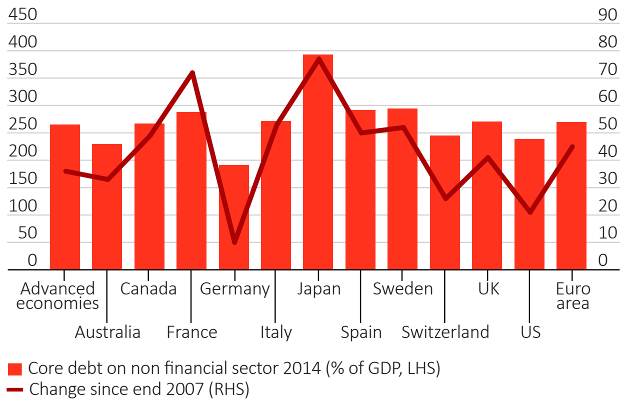
***The steep decline in US inflation in late 2014 derived from the sharp oil price fall. The figure for Japanese inflation in this chart removes the impact of the April 2014 rise in the country's consumption tax from 5 per cent to 8 per cent, the first rise since 1997.**

As of 31 May 2016
Source: Bloomberg, QIC

Structural factors such as the global debt overhang (**Figure 3**), which rather than diminishing has worsened over the past eight years are an explanation for why despite central banks' efforts to boost inflation, it has remained "the dog that didn't bark."[4] In fact, some central bankers have been pointing out that the level of real interest rates may have to be necessarily lower than in the past for a given level of GDP because of structural constraints.[5]

Meanwhile, the World Bank pointed out[6] that negative rates can have undesirable effects on the financial system by eroding banks' profitability by narrowing interest-rate margins. This is especially true in Japan where the country's banks are limping with average net interest margins of 1.2 per cent, among the lowest in the world, according to data compiled by Bloomberg.[7]

Figure 3: Since 2007 developed market debt has risen to 265% of GDP from 229%
Debt % GDP



Source: HSBC, BIS

Japan's banks have been complaining about the danger of further erosion as lenders will understandably resist passing on negative rates to depositors.

Japan has become a poster child for what happens when a country falls into a disinflationary funk. Sub-zero official interest rates can dent consumer confidence, if people think that central banks are panicked. That can prompt people to save more, as appears to be occurring in Japan and this must be disconcerting Europe's central banks.

Deeply negative policy rates have already taken their toll on Danish and Swiss banks' net interest income and net interest income as a percentage of assets declined in 2015 for both Danish and Swiss banks following the introduction of very negative policy rates in these countries in January 2015.[8]

Rather than encouraging credit creation, negative interest rates also appear to be having the opposite effect with credit creation and the stock of loans deteriorating in both countries in 2015 versus 2014.[9]

All of this is aggregating to a conclusion that reduced bank profitability curbs the risk-taking activity of banks, which reinforces a vicious cycle.

So where to from here?

Official interest rates could go further down, despite the declining marginal utility from doing so. Negative interest rates in Japan and across Europe are already hurting banks and savers including pension funds. But that may be outweighed by central banks' desire to do all they can to steady a global economy that's become more uncertain post the Brexit vote.

While tracking error (the deviation from benchmark) is a time-honoured way of keeping managers on the straight-and-narrow, the negative yield regime is not going away any time soon and adjustments must follow. Rather than letting portfolios slowly erode by being chained to benchmarks increasingly disconnected from client needs, a head-on tackling of complications stemming from negative yields is required.

A few things to consider: currently Japanese debt accounts for around 66 per cent of negative yielding debt worldwide, with an estimated U$6.5 trillion worth of fixed-rate debt obligations yielding less than zero per cent. The BoJ now owns about one-third of outstanding Japanese government bonds owing to its asset purchase program.[15]

The thing is, an unyielding benchmark-centric approach would mean that an investor would be reflexively following suit saddling a portfolio with a slew of negative yielding bonds. Truly active investing, especially in a negative yield world, calls for a commonsense relaxation of benchmark constraints.

The alternative, creating new benchmarks able to gain widespread support would be a contentious, not to mention, large undertaking. Agreements between clients and investment managers to relax benchmarks would be a sensible mid-point giving managers the ability to deviate from holding large benchmark-mandated weights towards Japanese or European bonds.

In this scenario, benchmark exposure could be efficiently and cost-effectively accessed through the addition of derivatives rather than by only holding cumbersome physical bonds.

As it is, Japanese institutions are starting to loosen themselves from benchmarks that don't make as much sense amid negative yields.

Many Japanese investors, to avoid buying negative Japanese government bond (JGB) yields, are shedding intermediate bonds dated 10-years or less, and assuming greater interest rate sensitivity by aggressively buying super-long JGBs dated over 10-years in an effort to potentially add a few basis points of positive returns.

As yields become negative in more and more parts of the curve, there will be fewer attractive JGBs left for Japanese investors to buy and they could be forced to change their investments even more.

It's not a simplistic case of: "Where Japanese investors go, the world should follow", but there are lessons from the Japanese experience.

Negative yields are ultimately corrosive and fixed income portfolios need to adjust before their full impacts hit.

Investors need to get back to basics and question the risk/reward they want from fixed income. The past is not necessarily a good guide for what to do in today's unusual environment.

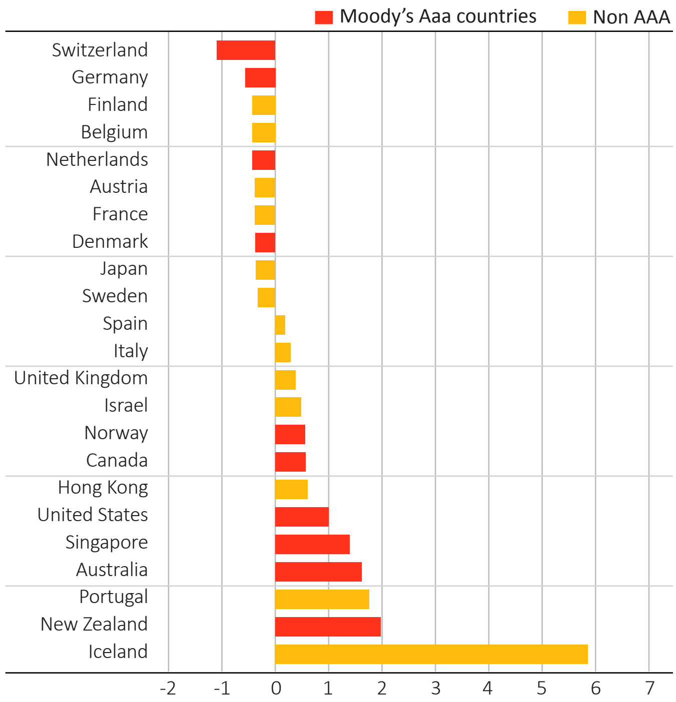
In an effort to achieve higher potential returns, investors could give up some short term returns for prospectively better longer term gains. Again Japan provides a case in point. In the Citi World Government Bond Index, the Japanese component has a 24 per cent weight and has returned 8.5 per cent in the last 12 months.[16]

THERE'S NO PLACE LIKE HOME

For Australian investors, we think that the local bond market is the most appropriate performance gauge, even for globally diversified portfolios. There are a few reasons for this.

Firstly, the Australian bond market offers a positive yield (**Figure 4**) versus the growing negative yielding club. Secondly, clients want positive returns and consequently a positive benchmark is the logical performance measure. Finally, thanks to unprecedented central bank actions, there is now significant correlation between major fixed income markets.

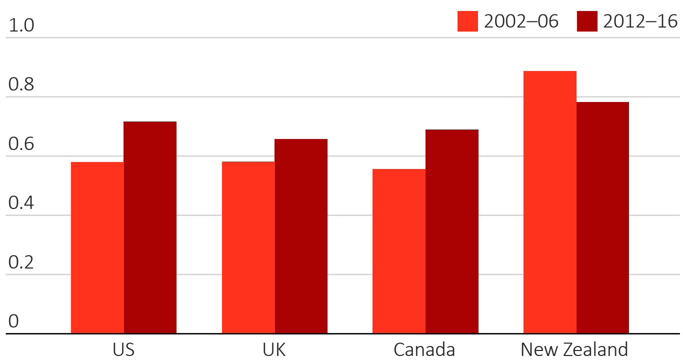
Figure 4: Australia's positive yields remain relatively attractive
Developed market bond yield (5-year tenor)



Source: Bloomberg, QIC

Actions by a major central bank in one part of the world, have significant knock-on efforts to bond markets in far corners of the globe. The Australian, US, UK and Canadian markets have become appreciably correlated (**Figure 5**) because of this ripple effect. This, to our view, is another support for an Australian benchmark for local investors.

Figure 5: Bond markets have become more correlated
Weekly correlations of 10-year government bonds



Source: Bloomberg, QIC

MONEY MARKETS DISRUPTED

The speed with which the BoJ's negative interest rate policies have disrupted other pockets of financial markets is instructive.

All 11 Japanese asset managers have closed their money market funds and returned assets to investors, which has shifted the focus now to whether money reserve funds (MRF), which have higher balances and also function as settlement accounts for the securities industry, may begin to limit accepting new funds and change their investment policies.[17]

Judging from a breakdown of the assets under management — short-term JGBs, commercial paper, call loans and long-term JGBs account for a relatively high percentage of MRFs investments. As negative policy rates have made these investments more difficult, they may have to consider relaxing investment restrictions and investments in riskier assets.[18]

Stresses are also emerging in European money markets with a significant slowdown in money market activity in the Euro area since March last year, when QE was combined with negative rates. Indeed, daily data show that money market volumes have downshifted significantly since the ECB began its bond purchase program with further deterioration more recently.

REDUCED BOND MARKET LIQUIDITY

It is not only the functioning of money markets that appears to becoming impaired. Liquidity in bond markets is also affected when bond yields are negative as real money investors are in general less willing to hold or trade bonds with negative yields.

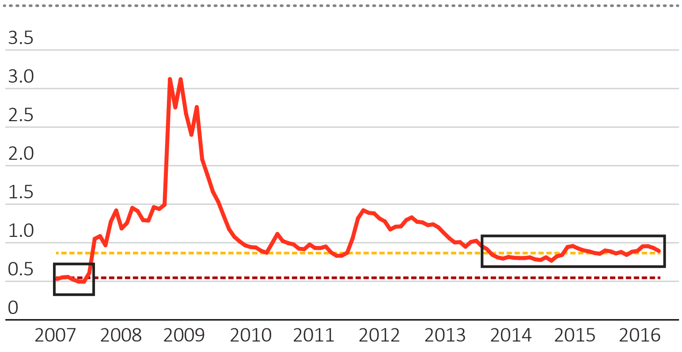
The reduced liquidity issue provokes strong opinions on both sides of the argument.

Nailing down the debate on liquidity requires defining some metrics and among the most commonly used is bid-offer spreads.

For some major asset classes, like US and European stocks, bid-offer spreads today are a lot smaller than their pre-crisis levels and even for US Treasuries and corporate bonds, the increase in spreads is marginal. While current bid-offer spreads, by themselves, don't signal a major malfunction in markets, what matters to large institutional investors is the ability to execute trades in size. Here, prima facie at least, things are more problematic.

According to the "Barclays Liquidity Cost Score (LCS)," which measures the cost of a round-trip transaction in the US investment grade corporate market, the LCS has increased about 70 per cent since mid-2007 and blew out to 6x during the financial crisis (**Figure 6**).

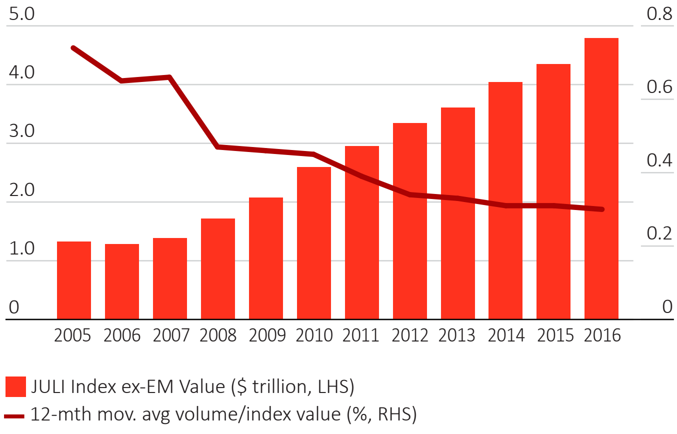
Figure 6: Cost of transacting in US investment grade corporate market is up from pre-crisis levels



As of 31 May 2016
Source: Barclays Liquidity Cost Score (LCS), is defined as the cost of a standard, institutional-size, round-trip transaction. This measure relies on simultaneous two-way quotes issued by Barclays traders to other market participants.

Market depth, or rather declining market depth, reinforces the assertion that liquidity is no longer what it was. As the big banks shrink back from their market making and warehousing functions, and investors like hedge funds are more reluctant to put on trades or less willing to exploit market discrepancies, overall volumes even in the investment grade US corporate bond market are trending down (**Figure 7**).

Figure 7: Secondary volume is declining as a % of outstanding US investment grade debt

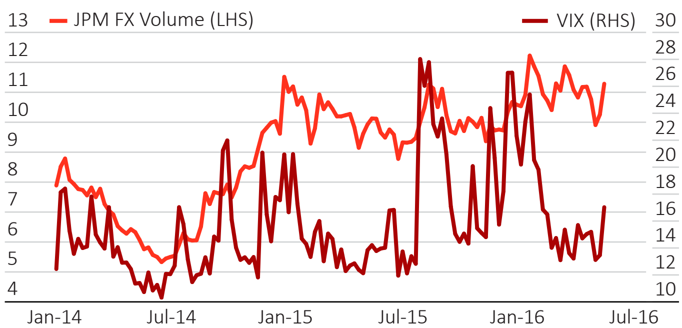


As of 31 May 2016
Source: JPMorgan and Trace

An upshot is that liquidity is more fragile. In calm times, trades can be executed, albeit occasionally a little slower than in bygone days.

But it's a different story in less calm times. When volatility is up, there are fewer willing and able participants on the other side of transactions. Volatility spikes, a proxy for low liquidity events according to a New York Federal Reserve analysis, have trended up in both equity and currency markets (**Figure 8**).

Figure 8: Volatility spikes are more common
FX Volume vs VIX



The CBOE VIX Index, often referred to as the "fear index," is a widely quoted measure of the market's expectation of US stock market volatility. The JPMorgan VXY Index measures volatility in a basket of G7 currencies.
As of 31 May 2016
Source: Bloomberg

CONSEQUENCES OF FEWER BOND MARKET PLAYERS

There has been a surge in bond issuance that has led to a corresponding increase in the assets under management in the buy-side industry. Exacerbating this is the increasing concentration in the buy-side with the share of the top-20 US asset managers increasing to nearly 50 per cent of the market, according to Willis Towers Watson data.[19]

As assets under management grow the demand for market making services also rises. With more assets controlled by fewer managers, many of whom are being pushed into more higher-yielding products by central bank policy, there is increased risk of herd-like behaviour, especially when market sentiment shifts or important new information emerges.

The increasing size of buy-side firms and the corresponding rise in demand for liquidity has coincided with shrinking inventories at dealers. Hobbled by higher capital requirements, curbs on proprietary trading and other regulation, the ratio of dealer inventories to amount outstanding of US treasuries has fallen by about three-quarters since the financial crisis.

Given many of the changes that have led to the current liquidity environment are structural in nature, things look unlikely to improve materially in the near future. However, not all investors have equal liquidity pressures. Some may even benefit.

The liquidity issue is far more important for high-trading investment styles or those with near-term redemption requirements.

By contrast, for investors with longer time horizons and unencumbered by short-term redemption requirements, liquidity matters only insofar as it allows them to mark-to-market their portfolio which becomes far more difficult during illiquid windows. Their liquidity premium will be determined by this burden on buy-to-hold investors, which should be far less than the liquidity premium desired by those with shorter time spans.

This makes buy-and-hold investors the marginal buyer. If liquidity premia gap out, they step in and buy. We addressed some of these issues in ***Corporate credits come to the fore in liquidity-challenged world***. Our underlying argument was that investors not needing instant liquidity or unencumbered by mark-to-market pressures could benefit from the current higher premium for "illiquidity risk."

The key for investors is to be aware of the extent of liquidity risk premia embedded in various asset classes. Estimates from academic studies vary significantly but can offer a useful starting point.

For instance, in public equity markets, stocks with low liquidity levels are found to earn higher returns than liquid stocks, ranging from four to seven per cent.[20] Similarly, other studies have attributed the gap between government bonds and government guaranteed agency securities to a liquidity premium.

However, if flash crashes and other bouts of illiquidity can impair what were traditionally the most liquid markets, like developed world sovereign bonds, investors need to recalibrate whether those embedded liquidity risk premiums are priced appropriately for the current environment. An alternate approach is to embrace less liquid instruments, thereby earning the extra potential return while keeping some cash on the side to buy on low liquidity-driven dips.

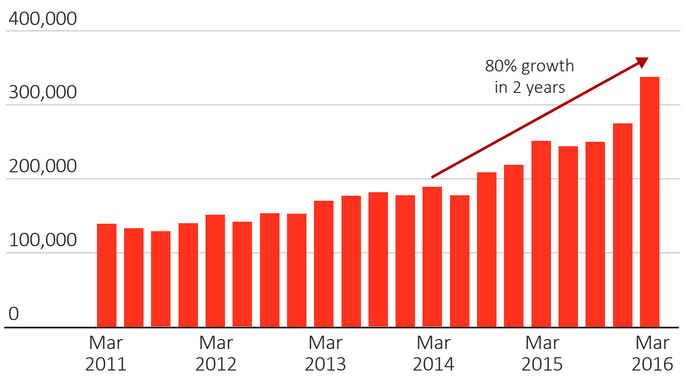
Markets, by definition, are innovative and so there is the potential for new players and practices to fill the terrain that's been left empty by bank balance sheets no longer able to fulfil their historic role as agents for secondary trading.

Peer-to-peer (P2P) trading is one such intriguing innovation. It's still early days for P2P trading, but it is exhibiting promising growth (**Figure 9**) from a standing start. As it matures, P2P trading could emerge as one way of overcoming the structural issues currently frustrating bond investors like the higher cost of intermediation.

We believe it holds promise as large bond managers with deep relationships could eventually take on some of the market making and marginal buyer functions being ceded by the big banks.

Until then, the regime of low yet volatile liquidity conditions is set to persist and increasingly investors will have to start pricing in the additional costs and associated risks into their investment decisions.

Figure 9: P2P trading is on the upswing
Quarterly trading volumes on MarketAxcess platform* ($MM)



*MarketAxcess operates an electronic trading platform for fixed income securities
As of 31 March 2016
Source: MarketAxcess

EMPHASISING THE HUMAN ELEMENT IN TRADING

Many asset managers traditionally ran their portfolios assuming vast and deep liquidity as a given. They now have to optimise portfolios for a much more stressed liquidity environment and need market intelligence on what is readily available to sell.

The changed liquidity environment and propensity for sudden bursts of volatility has brought to the fore the importance of the human element in trading. There is some irony in this given the investment industry's technological prowess as well as the rise of algorithmic High Frequency Trading.

At times during the market ructions of recent years, critics have pointed to the culpability of High Frequency Trading (HFT). HTF is a relatively new phenomenon and critiques, including Michael Lewis' best-selling *Flash Boys*, feed unease. See ***Neither villains nor innocent bystanders for some insights*** on the next page.

Over the past 18 months, a number of storied investment institutions have hired more bond traders, overhauled the technology their traders use and encouraged those responsible for executing deals to work more closely with portfolio managers.[21]

Traders have also begun to influence investment decisions more. These changes are a big departure from the days when traders simply executed the buy and sell orders placed by fund managers, with little interaction between the two teams.

Highly skilled traders are now recognised as a vital source of information for portfolio managers, in an environment where it has become increasingly difficult to find suitable buyers or sellers at the opposite end of complex fixed income trades.

Our response to this is "hear, hear." Our trading professionals and portfolio managers too work in a tightly knit fashion as equals and so our practice is consistent with the broad industry trend.

Industry feedback as well as our experience is that having more traders who specialise in a wider range of fixed income asset classes helps institutional investors combat the growing difficulty of identifying suitable trades. For us, it's vital that specialised traders come to portfolio manager meetings, research analyst meetings and portfolio construction team meetings.

Each party provides a reality check for the other and traders with their intimate knowledge of markets look for the most liquid opportunities ahead of any order coming from portfolio managers. This absolutely influences portfolio managers' decisions.

The relationship of equals means that portfolio managers trust experienced traders on the execution timeline as well as strategy. It's a far cry from outdated thinking that looks upon traders as order-takers.

Asset managers are keen to avoid swamping the market with one large trade that could alert potential buyers or sellers in the market. They are instead bringing a series of smaller trades to the market, which is a more labour-intensive process.

Furthermore, there is a more complex universe of securities in fixed income portfolios, with more high yield and convertible debt, which emphasises the value of a skilled dealing desk.

In an industry where size does matter and consolidation is observable, large fixed income managers with their deep dealing teams can deliver other benefits to clients. For instance, they can be the first to receive a call when new market opportunities present themselves or complex transactions emerge.

Liquidity in fixed income has become more difficult to source now the major brokers are not allowed to hold inventory on their balance sheets. As a result, market participants have to work harder to find the other side of the trade. All this takes time, with increased human interaction.

THE WORLD HAS CHANGED: PORTFOLIOS MUST RESPOND

Like John Maynard Keynes, who said that he changed his mind when the facts changed, fixed income investors need to take a different path against a backdrop of negative interest rates and fragile market liquidity.

The shibboleths of a lifetime like unbending faithfulness to benchmarks and liquidity need to be revisited.

Those who survey the horizon with fresh eyes and recognise trends early-on and are quick and flexible to adapt their investment strategies will be able to successfully navigate the strange new world of fixed income. By contrast, those who miss the great turning points stand the risk of suffering painful portfolio attrition.

NEITHER VILLAINS NOR INNOCENT BYSTANDERS

HFT probably came to widespread investor attention (and concern) on the heels of the May 6, 2010 Flash Crash. On that day, in the course of about 36 minutes, US financial markets experienced one of the most turbulent periods in their history.

Broad stock market indices the S&P 500, the Nasdaq 100, and the Russell 2000 collapsed and rebounded with extraordinary velocity. The Dow Jones Industrial Average (DJIA) experienced the biggest intraday point decline in its entire history.

In the aftermath of the Flash Crash, the media became particularly fascinated with the secretive blend of high-powered technology and hyperactive market activity known as high frequency trading (HFT). To many investors and market commentators, high frequency trading has become the root cause of the unfairness and fragility of automated markets.

A detailed study[22] concluded that HFTs did not cause the Flash Crash, but contributed to it by demanding immediacy (exacerbating already trending price movements) ahead of other market participants. HFTs' impulse for ultra-swift exiting results in price adjustments that pressure all slower traders, including the traditional market makers.

This stems from HFTs using their technological advantage to aggressively remove the last few contracts at the best bid or ask levels and then establish new best bids and asks at adjacent price levels.

Even a small cost of maintaining continuous market presence makes market makers adjust their inventory holdings to levels that can be too low to offset temporary liquidity imbalances. A large enough sell order can lead to a liquidity-based crash accompanied by high trading volume and large price volatility, which is what occurred in the E-mini S&P 500 stock index futures contract on May 6, 2010, and then quickly spread to other markets.

Under calm market conditions, this trading activity somewhat accelerates price changes and adds to trading volume but does not result in a directional price move. However, at times of market stress and elevated volatility, when prices are moving directionally due to an order low imbalance, this trading activity can exacerbate a directional price move and contribute to volatility.

Higher volatility further increases the speed at which the best bid and order queues get depleted, which makes HFTs act faster, leading to a spike in trading volume and setting the stage for a crash-crash-type event. On May 6, HFTs exacerbated the Flash Crash by aggressively removing the last few contracts at best bids and demanding additional depth while liquidating inventories during key moments of dwindling market liquidity.

Flash-crash-type events temporarily shake the confidence of some market participants but probably have little impact on the ability of financial markets to allocate resources and risks.

HFT is not going away any time soon. Institutional investors are going to have to get used to it and adjust, including to potentially sudden outbursts of volatility.

FOR MORE INFORMATION

www.qic.com

Craig Balenzuela CFA
Head of Business Development – Australia
Level 34/52 Martin Place, Sydney NSW 2000
PO Box R1413 Royal Exchange NSW 1225
T +61 2 8045 8001
M +61 417 684 154
E c.balenzuela@qic.com

Chris O'Connor
Senior Business Development Director
Level 34/52 Martin Place, Sydney NSW 2000
PO Box R1413 Royal Exchange NSW 1225
T +61 2 9347 3380
M +61 401 567 792
E c.oconnor@qic.com

Andrew Arkell
Director Business Development – Queensland
Level 7 Central Plaza Two, 66 Eagle Street
GPO Box 2242 Brisbane Qld 4001 Australia
T +61 7 3360 3856
M +61 419 735 791
E a.arkell@qic.com

Melissa Impiazzi
Business Development Director
Level 7 Central Plaza Two, 66 Eagle Street
GPO Box 2242 Brisbane Qld 4001 Australia
T +61 7 3360 3831
M +61 401 662 730
E m.impiazzi@qic.com

Ryan Gordon
Director – Investment Specialist,
Global Liquid Strategies
Level 7 Central Plaza Two, 66 Eagle Street
GPO Box 2242 Brisbane Qld 4001 Australia
T +61 7 3020 7016
M +61 434 605 056
E r.gordon@qic.com

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