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Ten Years After the Global Financial Crisis: A Changed World

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Executive summary

Overview

- J.P. Morgan researchers across a wide range of asset classes examine the causes, responses, consequences, and risks ahead stemming from the 2008 Global Financial Crisis.

Causes of the Global Financial Crisis (GFC)

- Excessive leverage, inadequate lending standards, and poor risk controls came together came together to bring about a collapse of the housing market that led to the 2008 GFC.

Responsive Policies to End GFC and Their Unintended Consequences

- Lower potential growth, higher public sector debt, and higher fiscal deficits are legacy costs of the 2008 GFC.
- Unconventional monetary policy instruments are here to stay with an unlikely return to pre-crisis monetary norms for G-4 central banks.
- Central banks' quantitative easing (QE) programs have contributed to the total tradable universe for global bond markets increasing to US$57 trillion from US$27 trillion pre-crisis.
- EM external vulnerabilities remain well contained with a few exceptions, but China is in no position to provide large policy-driven support given high cost and legacy debt from the 2008-2009 policy response.

Regulatory and Market Consequences

- Global banks are far better capitalized and less complex from a liquidity and risk perspective, with new tools for resolution, reducing systemic risks.
- Structural increase in bond market supply and demand has fueled rapid increase in lower rated nonfinancial corporate bond issuance.
- Growth in passive investment through ETFs, indexation, swaps, and quant funds over the past decade has transformed equity market structure and trading volumes.
- Sharp decline in market depth and liquidity due to regulatory changes and rise of passive investment raises the risk of a Great Liquidity Crisis (GLC).

What Does the Next Cycle Hold? Future Risks to Monitor

- A major concern is market liquidity as G-4 central banks shift to reduce QE programs next year, leading to the private sector having to reabsorb government-related bonds.
- The next downturn will possibly occur before interest rates have risen much or balance sheets have shrunk much.
- Unprecedented G-20 policy coordination in the wake of the GFC has virtually disappeared, while support for populist or extreme parties has surged, with social tensions likely to be amplified in the next financial crisis.
- Severe liquidity disruptions could play out as the rise in electronic trading and growth in Passive and Systematic strategies alongside the reduced role of banks as market makers affect liquidity provision.
- The most material rotations in multi-asset portfolios are still to come as it is too early for the great rotations (Equities to Bonds, Cyclicals to Defensives, Growth to Value, USD to JPY, and USD to Gold) without strong conviction that markets will soon price the expansion's end.
- Our strategists recommend income-producing assets instead of those that depend on price gains and highlight that the best trades based on risk-adjusted returns and success rates have been UW Credit, OW Quality vs. Growth stocks, and long Oil and Gold. The worst have been UW Emerging Markets assets and Peripheral European bonds.

This is the third special report in our new quarterly series, J.P. Morgan Perspectives, which brings together views and analysis from across the broad scope of J.P. Morgan's Global Research franchise. This new series features in-depth analysis of critical global issues impacting economics and markets across all disciplines. We hope this series will both inform and foster public debate on evolving economics, investment, and social trends.

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Ten years after the Global Financial Crisis

- **Lower potential growth, higher public sector debt, and higher fiscal deficits are legacy costs of the 2008 Global Financial Crisis (GFC).**
- **Unconventional monetary policy instruments are here to stay with an unlikely return to pre-crisis monetary norms for G-4 central banks.**
- **Central banks' QE programs have contributed to the total tradable universe for global bond markets increasing to US$57 trillion from US$27 trillion pre-crisis.**
- **Global banks are far better capitalized and less complex from a liquidity and risk perspective, with new tools for resolution, reducing systemic risks.**
- **House price asset gains are unlikely to spark a mortgage market crisis, but risks are rising from non-bank lenders and in the nonfinancial corporate sector.**
- **Structural increase in bond market supply and demand has fueled a rapid increase in BBB-rated nonfinancial corporate bond issuance.**
- **EM external vulnerabilities are manageable, but China is in no position to provide large policy support given high-cost, legacy debt from the 2008-2009 policy response.**
- **Unprecedented G-20 policy coordination in the wake of the GFC has virtually disappeared, while support for populist or extreme parties has surged.**
- **Reduced systemic vulnerability makes a mundane recession and equity correction more likely than another GFC, but changes in the market structure since the GFC make it more prone to liquidity disruptions.**
- **Rise in electronic trading and growth in passive and systematic investing alongside the reduced role of banks and value investors negatively affect liquidity, increasing market tail risks.**
- **The most material rotations in multi-asset portfolios are still to come, and our strategists recommend income-producing assets over those that depend on price gains.**

On the fortnight of the 10th anniversary of the September 15, 2008, Lehman bankruptcy, we examine causes, responses, consequences, lessons learned, and risks ahead stemming from the Global Financial Crisis (GFC). Our analysts, strategists, and economists assess the impact of the GFC in 32 separate chapters, analyzing the implications on the global macro outlook, households, corporations, and the banking system in both developed and emerging market countries. We highlight the shifts in market structure and the regulatory environment since 2008 and provide thoughts on what the next crisis could look like and investment implications. The timeline of macro and market developments (Roever, A. Ho) offers a concise history of the global events leading up to the GFC, key policy and market milestones, and regulatory actions.

The 10th anniversary of the CFC of 2008 coincides with the 20th anniversary of the 1998 Asia Financial Crisis, the 30th anniversary of the 1988 Savings and Loan Crisis, and the 50th anniversary of the 1968 global protests against political and military elites. Each of these disruptions contributed to the four major economic and social trends that were in place before the 2008 GFC. As Loeys notes, globalization, deregulation, innovation, and falling macro volatility created a system vulnerability that was both hard to detect and to time for market participants.

Causes of the Global Financial Crisis

In the years leading up to the GFC, the high macroeconomic volatility of the 1970s and 1980s led virtually all monetary authorities to pursue better counter-cyclical polices. From the mid 1980s, real and nominal global growth became much more stable during expansions, and expansions lasted longer and recessions became shallower. Investors and borrowers benefited from greater stability of income and asset values as the Great Moderation took hold (Loeys). The Case-Schiller index, which tracks national home prices, showed that between 1976 and 2007 home prices grew by an annual rate of 24%. In the decade leading up to the 2008 GFC, U.S. house prices rose by 90%. Against this backdrop, Jozoff, Samant highlight the booming growth of the securitized products market. Spreads in fixed income were tight, and investors turned to new forms of securitized products to find incremental yield. Borrowers took advantage of higher home prices to take out more cash; between 2004 and 2009, US$4 trillion of equity was taken out even though home prices were unchanged. Between 2000 and 2007, delinquency rates were stable and low despite the weakness in collateral quality. Rising risks in the housing market were not captured by broker dealer or rating agency models, most of which were backward looking.

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By 2007, housing affordability had been squeezed and housing had shifted from an acute to a chronic drag on growth, accompanied with drags from rising energy prices and tighter subprime lending conditions. In the years leading up to the GFC, the Fed tightened monetary policy by 425bp between 2004 and 2006, but mortgage credit growth still increased by nearly 45% on U.S. household balance sheets. In 2008, the beginnings of a recession quickly encountered massive imbalances in the form of financial vehicles that were ultimately more levered to historically high levels of housing prices (Edgerton). Issuance rose from US$125 billion in 2000 to over US$1 trillion by 2005-06 in the securitized products market. Government-sponsored enterprises Fannie Mae and Freddie Mac bought large volumes of these mortgages from banks and resold them as mortgage-backed securities to investors. The use of second liens increased as borrowers took on more leverage. From 2003 to 2007, the fraction of loans with second liens rose from 12% to 42%. These factors, along with inadequate lending standards for housing and poor risk controls, exacerbated the GFC as credit models were trained on price appreciation and low delinquency. By the end of 2008, the housing market had collapsed and Fannie Mae and Freddie Mac required a bailout. Household net worth fell by US$10.5 trillion between 3Q07 and the end of 2008, which was the greatest drop in any postwar downturn. The S&P 500 peaked to an all-time high in late 2007 before collapsing to hit its financial crisis low in March 2009, sinking to 677—a fall of over 50% from its peak, making it the worst recession fall since World War II.

What began as a credit crisis rapidly morphed into a liquidity crisis when issuers realized they had significant rollover risk. The mechanics of tri-party repo compounded liquidity issues for dealers, exposing significant vulnerability in the money markets and banks' overuse of maturity transformation to create leverage. Both Bear Stearns and Lehman struggled to find enough secured financing as they spiraled toward insolvency and the vulnerability of the financial system was fully exposed. Borrowers in the money markets were overly reliant on money market funds (MMFs) as a source of short-term wholesale funding. When an MMF "broke the buck" after the Lehman bankruptcy, the safety of cash became questionable and MMF shareholders redeemed shares *en masse* in fear of losing their money. The liquidity crisis forced the Fed to intercede on behalf of certain non-banks intertwined in the banking system, taking on a role beyond serving as the lender of last resort for banks, as it provided a US$85 billion line of credit to AIG. (Roever, T. Ho, Lessing). At the same time, the U.S. funding crisis took on global ramifications as large U.S. banks cut funding abroad.

Macro responses to the Global Financial Crisis

Unconventional monetary policy

The GFC forced central banks to innovate in terms of instruments of policy, responding with unconventional monetary policy instruments, including negative policy rates, asset purchases, low-cost loans to banks, and enhanced forward guidance. As the U.S. housing markets sold off, deleveraging pressures amplified stress in the financial system, forcing central banks globally to become the lenders of last resort to intermediaries in short-term markets. Asset purchases were the first unconventional policy instrument that most central banks reached for, with the G-4 purchasing more than US$10 trillion of financial assets, mostly government obligations. Governments became the providers of capital and the underwriters of debt to financial institutions. As Mackie, Feroli, Ugai note, there is no return to pre-crisis norms as a number of central banks have pushed the effective lower bound to rates into negative territory. Only the Fed has announced a shrinking of the balance sheet to be completed, with a move down to approximately US$2.5-3.0 trillion, while the ECB should only start to reduce reinvestment in 2021. Since the GFC, there has been an increased use of explicit rate guidance, and the Fed started publishing its interest rate dots in 2012. Government bonds and other private sector assets on the BoJ's balance sheet now amount to almost 90% of GDP, compared with 14% at the start of 2008.

Market and regulatory responses to the Global Financial Crisis

New global regulatory and supervisory frameworks introduced

Regulators have implemented a variety of rules to prevent another liquidity crisis from happening. In the aftermath of the GFC, international standard setters introduced bank regulatory frameworks that incorporated a macro-prudential policy approach. New institutions were created to supplement the Basel Committee, including the Financial Stability Board. New regulatory and supervisory frameworks were introduced through Dodd Frank and CCAR. Bank regulatory frameworks incorporating a macro-prudential policy approach were adopted with banks subject to higher risk-based capital and liquidity requirements. Market regulators also reduced the opacity of and increased the transparency and stability of the derivatives market, and MMFs has been reformed (Roever, White). Ten years later, the Trump administration and Republican lawmakers are looking to make many post-crisis rules and regulations less onerous,

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particularly for small and medium-sized banks. Last year, the release of Treasury's report on bank and capital market regulations refocused attention on the impact of certain regulations on the lending market and the economy, recommending a recalibration of some rules.

Higher bank capital and liquidity ratios introduced

Capital and leverage ratios for banks are significantly better both in quality and quantity. Global banks have never been better positioned from a solvency and liquidity perspective going into the next potential recession, and the probability of a systemically important bank failing has declined, while resolvability has improved substantially as more tools are available to the regulators (Abouhossein). U.S. large banks are less complex and far better capitalized and must undergo harsh stress tests annually for market-related losses, losses from failure of a counterparty, operational losses, and scenarios of sharply higher credit losses. The tangible common equity ratios for U.S. banks have almost doubled from 4.1% in mid-2008 to 8.1%, currently. Liquid assets plus Treasuries have risen to about 12% of total assets compared to 6.6-6.8% of total asset in 2007. New tools for resolution, including the submission of "living wills," or plans for how the banks could be liquidated, were created to protect tax payers (Juneja). U.S. regional banks are now in a very strong position from a capital, liquidity, and risk management perspective, with 9% tangible common equity, up from 6% pre-crisis (Alexopoulos). European banks have massively deleveraged, with balance sheet leverage falling to 12x from 19x in 2007 (Doctor).

Macro consequences of the Global Financial Crisis

Rise of domestic politics and end of global policy coordination

The unprecedented G-20 policy coordination in the wake of the GFC has virtually disappeared as support for populist or extreme parties globally has surged. Oganes, Aziz, Szentivanyi highlight three factors that have contributed to growing income inequality: technological advances, globalization, and financial markets deregulation. As winners and losers have emerged, the pendulum appears to be swinging away from deep economic integration toward stronger nation states. Kolanovic notes that the next crisis is likely to result in social tensions similar to those witnessed 50 years ago, in 1968. Just as TV and investigative journalism provided a generation of baby boomers unfiltered information on social developments such as Vietnam, the Civil Rights movement, and income inequality, the internet today provides millennials with unrestricted access to information on a surprisingly similar range of issues. Barr sees that the likelihood of any individual country leaving the euro over the next decade is low, at around 10%, as the existential threat has shifted from markets to politics. The rise in support for political parties that challenge both the national and international policy consensus means that the impulses for change appear far more likely to come from the political decisions taken in individual countries rather than from markets. We highlight the macro consequences of these economic and policy shifts to the global economy below:

Global economy

- **Unconventional monetary policy instruments are here to stay.** While central bank independence, inflation objectives, and flexible inflation targeting have all survived the GFC, there will not be a path to return to pre-crisis G-4 monetary norms. The clear separation of monetary policy and financial stability policy that existed before the GFC is likely to be more nuanced in the future. During the GFC, macro-prudential instruments were introduced, including counter-cyclical capital buffers, loan-to-value ratios, loan-to-income ratios, debt service–to–income ratios, as well as risk weights on particular loans and amortization requirements. Mackie, Feroli, Ugai discuss the central banks' instruments to manage financial stability, including negative policy rate, asset purchases, low cost loans to banks, and enhanced forward guidance.

- **Lower bound on interest rates.** Barry notes that 10-year Treasury yields declined by nearly 300bp from mid-2007 through end 2008 as the Fed funds rate fell 500bp over the same period. The FOMC will have much less scope to lower policy rates than it had in past easing cycles in a recession. The Fed eased by an average of 575bp in the last three easing cycles (1989-93, 2000-03, 2007-08). Our economists project that the Fed funds rate will rise only to 3.5% by the end of 2019, a full 175bp lower than where the Fed funds rate peaked in 2006, and 300bp lower than the 2000 peak. Mackie, Feroli, Ugai argue that the effective lower bound will be reached more often due to a lower neutral rate of interest, r*, that could stabilize the economy at full employment. One might think that a much higher debt and deficit could create a debt crisis in the U.S., and thus prevent a UST rally. Edgerton and Barry do not think so and expect flight to safety buying to dominate, thus again pushing 10yr Treasury yields to under 2% in the next recession. Prior to the GFC, the effective lower bound for the policy rate was

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assumed to be zero. Bank of Japan (BoJ) and European central bank (ECB) moves into negative policy rates have pushed down long-term yields. At its peak in July 2016, 32% of J.P. Morgan's Government Bond Index for Developed Markets (GBI-DM) traded in negative yield territory but has since nearly halved, to now comprising 17% of the GBI-DM (*Negative Yield Index Monitor*, Linzie, August 9, 2018). The sub-zero yield portion of our MAGGIE Credit Index, which tracks the euro-denominated investment-grade credit sector, remains high at 25%. Our economists are calling for the first ECB rate hike to occur only in September 2019 and the first BoJ rate hike in April 2020 (Salford, Yamawaki).

- **Lower potential growth.** The GFC produced a significant loss of output, generating a 3.8%-point GDP shortfall in 2008-09 relative to its pre-crisis path. We estimate that global potential growth had dropped to 2.7% over the past decade, a decline of 0.3%- pts for DM and 1.6%-pts for EM (Kasman, Lupton, Aziz, Szentivanyi). In the decade before the GFC, powerful forces contributed to the decline in potential growth independent of the effects of the GFC. But some forces, such as reduced capital deepening, increased financial regulation, labor market hysteresis, and sectoral reallocations were exacerbated by the GFC and thus seriously depressed productivity growth. Global productivity growth has fallen by roughly 1% point on average since 2012. Productivity gains should pick up from the 2010-16 pace, but demographics point to lower labor force growth and productivity relative to the pre-crisis pace.

- **Lower inflation expectations.** Despite entering a record 10th year of expansion, global core and wage inflation remains modest. Lupton, Kasman argue that core inflation should follow the business cycle, but the risk is that inflation expectations have moved down after the GFC and have only partially recovered these declines. We do not think that the GFC changed the Phillips curve, as it was never very steep nor fast. With slack having eased up, inflation should rise modestly. We expect core inflation for DM to reach 2% by the end of 2019, while EM core inflation is projected to slip to 2.7%.

- **Higher DM public sector debt.** The legacy cost of the GFC has been a 41%-point surge in DM public sector debt as a share of GDP, with gross debt of the *global* public sector surging from 65% of GDP in 2017 to 92% at present (Lupton). Edgerton also notes that U.S. debt held by the public is already above 75% of GDP, and the U.S. Congressional Budget Office projects it will reach 96% of GDP by 2028.

- **Higher fiscal deficits.** Between 2008 and 2010, discretionary fiscal packages reached 4.0% of GDP for DM countries. The fiscal lending position of DM as a share of GDP fell sharply by more than 8%-points to a post-World War II low of nearly -9% in 2009. Despite a substantial decline from its 7.3% peak in 2009, the global fiscal deficit remains elevated at 2.9% of GDP. We expect the U.S. fiscal deficit will reach 5.4% of GDP in FY2019 compared to 1.1% of GDP in FY2007. Barry explores the impact of higher budget deficits for yield levels and estimates that each 1%-pt increase in budget deficit expectations has increased 10-year yields by 11bp, over the last quarter century, and could limit declines in long-term yields in the next recession.

Emerging Markets

- **Higher sovereign and corporate debt levels.** The 2008 GFC marked the first time that EM countries were able to serve as a stabilizing force as they were better positioned than DM counterparts entering the crisis, in part because EM governments had been wary of large debt burdens following the 1998 Asia and Russia financial crises. In the decade preceding the 2008 GFC, EM policy makers had embarked on a decade of reform and abandoned fixed exchange rates, adopted inflation targeting, increased foreign exchange reserves and dramatically reduced external debt levels (Szentivanyi, Ramsey, Ong, Murray, Shal). Lessons from earlier crises should hold, including adherence to more flexible exchange rate regimes, disciplined monetary and fiscal policies, and adequate FX reserves. EM overall debt levels are going into this part of the cycle at all-time highs as a percentage of GDP for both EM sovereigns and corporates. EM general government debt now stands at 50.8% of GDP, while EM private sector debt has increased to 116.5% of GDP (Szentivanyi, Aziz, Goulden, Hong). Hong estimates the increase in EM external corporate bond stock to US$2.1 trillion from US$548 billion in 2007 but does not see this as a systemic risk as more than 50% of EM corporate bonds are quasi-sovereigns and local investors within EM also hold over 50% of EM corporate bonds.

- **Lower growth with downside risks.** External vulnerabilities for the most part remain contained 10 years after the GFC (Szentivanyi, Aziz, Goulden, Hong), particularly as EM funding has shifted to domestic sources rather than external funding (Goulden, Hong). EM FX reserves have more than doubled since 2006 to reach US$7 trillion and are now significantly higher than that of DM economies (US$4.8 trillion). While external buffers provided a cushion, they did not shield EM from the growth

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shock. Although EM economies now account for 40% of global GDP compared to 27% in 2007, potential growth rates for emerging economies have fallen by 1.6%-pt. The EM growth differential with DM should stay positive, but it faces headwinds from a trade war. A sustained shift toward anti-globalization could have a serious and lasting impact on EM potential growth. Excess EM savings have declined by 2% of GDP, while DM savings increased by a similar amount (Szentivanyi, Aziz, Goulden, Hong).

- **Growing risks from China.** The stabilizing role that China played during the GFC came at a high cost. Looking toward China for large policy-driven support for global manufacturing and commodities would likely end in disappointment. In 2008, China led the fiscal stimulus, with the equivalent of 7% of GDP of stimulus measures funded partly by the private sector, and helped to limit the global spillover from the GFC, contributing about one-third of global growth as the rest of the world fell into recession (Zhu, Ng, Liao, Guo). China's policy response came at a high cost as it chose not to devalue the currency. CNY has appreciated in real terms by more than 25%, while the current account surplus has fallen from 9.9% of GDP in 2007 to 1.3% of GDP in 2017. Total debt in the non-financial sector rose from 157% of GDP in 2008 to 261% in 2017, with corporate and local government debt now the key vulnerabilities for China's financial sector. With an augmented fiscal deficit projected to reach 10.9% of GDP (including off-budgetary items such as local government financing vehicle (LGFV) debt, net land sale revenue, and fiscal spending via policy bank special bond issue) this year versus 11.1% in 2017, China has little scope to provide stimulus.

Market and regulatory consequences of the Global Financial Crisis

While the regulatory rules have made the banking system safer and more liquid, the unintended consequences include the decline in market liquidity, shifting risks to investors and away from banks.

- **Structural increase in bond market supply and demand.** The GFC has had a dramatic impact on the global bond markets, with the total tradable universe reaching US$57 trillion, more than double from 10 years ago (US$27 trillion in 2007). Inkinen, Panigirtzoglou estimate that G-4 central banks' QE programs, along with FX reserve managers, currently own around US$22 trillion or nearly 40% of the tradable global bond universe. If commercial banks were included, the total that all banks hold would be US$30 trillion or over half the global bond universe. The U.S. corporate bond market has been transformed and is much larger now, with more issuers, longer maturities and more hybrid bonds, alongside lower ratings and lower issue sizes (Beinstein, Doctor). The reduction in bank financing increased the number of bond market issuers, with the number of U.S. high grade dollar issuers doubling since 2009 to reach 1,000, while the duration for U.S. high grade bonds, ex EM, has risen to 7.3 years from 6.3 years in 2007.

- Inkinen, Panigirtzoglou highlight the structural causes of rising bond demand, including the need to delever and increase savings, with a significant proportion of these savings deployed in bond markets. Higher bond holdings reflect greater caution and an increased focus on diversification. At the same time, regulatory changes prompted pension funds to reduce allocations to riskier assets such as equities.

- **Increase in BBB-rated corporate bond issuance.** An increase in corporate leverage and rapid growth in the lowest rated high grade rating category (BBB-) are byproducts of the increase in U.S. corporate bond issuance. The amount of BBB-rated non-Financial bonds has grown by 70% between 2013 and 2017 to reach US$575 billion, according to Beinstein, now representing 16% of the U.S. High Grade market. Doctor notes the same trend in European credit markets, where the share of BBB-rated bonds has increased to 48% of the High Grade market from 25% pre-crisis. The size of the European High Yield market has increased four-fold to €320 billion today compared to €80 billion in 2007. The current stock of EM corporate external bonds is now US$2.1 trillion or almost four times the US$548 billion outstanding at end 2007 (Hong). Asia has accounted for US$900 billion of the US$1.6 trillion increase, with China standing out, as bonds outstanding rose from only US$25 billion in 2010 to US$627 billion to become the largest country segment by far (Hong).

- **Lower fixed income market depth and liquidity.** While the bond market has more than doubled since the pre-crisis days, and investors are less levered today, a major concern is market liquidity as G-4 central banks shift to reduce QE programs next year and government-related bonds need to be re-absorbed by the private sector. Signs of deteriorating liquidity are apparent across fixed income markets as banks are playing less of a role in providing liquidity. Banks have reduced exposure to even very low-risk assets, which, combined with the G-SIB capital buffer requirement, contributed to lower repo and CP/CD

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activity. Overall, banks now represent only 35% of money markets compared to 67% before the GFC. The result is that Libor is no longer a reliable indicator of bank funding as Libor fixings have been transformed from a credit-based market to a rate-based market (Roever, T. Ho, Lessing). Negative interest rate policies (NIRP) have further reduced liquidity and contributed to the extension of duration risk while increasing risk taking and constraining bank profitability (Salford, Yamawaki).

The market depth in U.S. Treasuries (reflected by the volume of top bids and asks in broker screens) has been steadily declining. The volume concentrated in the top dealers has grown in both Treasuries and MBS. The volume traded in the MBS market is down by roughly 30% from its peak, while U.S. Treasury market liquidity remains roughly 10-15% below average post-crisis levels, with liquidity more impaired in the front end (Roever, White). Credit market turnover has been declining versus pre-crisis levels, driven by changes in the issuer, investor, and dealer base, as the amount of bonds outstanding has grown faster than the rate of trading activity as U.S. proprietary trading desks have been shut down and there are fewer credit hedge funds. Beinstein estimates that the turnover of the U.S. high grade market in 2017 was 42% lower than in 2006, while the U.S. high yield market was 24% lower. The number of U.S. corporate bond market issuers has doubled since 2007, while the market capitalization has quadrupled from US$1.5 trillion to US$6.1 trillion. Gross high grade bond supply has increased by about 50% for the past decade. During that same time period, dealer positions have fallen by 75% (Beinstein).

- **Shift from active to passive investment.** Kolanovic highlights the growth in passive investment through ETFs, indexation, swaps, and quant funds over the past decade, transforming equity market structure and trading volumes. As of May 2018, total ETF assets under management (AUM) reached US$5.0 trillion globally, up from US$0.8 trillion in 2008. The shift from active to passive assets, and specifically the decline of active value investors, reduces the ability of the market to prevent and recover from large drawdowns. The ~US$2 trillion rotation from active and value to passive and momentum strategies since the last crisis eliminated a large pool of assets that would be standing ready to buy cheap public securities and backstop a market disruption.

Risks ahead

The next downturn will possibly occur before interest rates have risen much or balance sheets have shrunk much, but it is unlikely to trigger a coincident severe financial crisis (Mackie, Feroli, Ugai). Edgerton highlights the growing risk that the current virtuous circle of strong sentiment, asset prices, and business and consumer spending will turn into a vicious circle of falling confidence, prices, and spending, eventually bringing unemployment and asset prices back closer to historical norms.

The next recession could be shallower but accompanied by greater social tensions. Edgerton believes that the risk of a European-style debt crisis is low in the U.S. given the Federal Reserve's legal mandate to buy unlimited amounts of U.S. government bonds as necessary to maintain full employment and price stability. Edgerton points out that the Federal Reserve controls the supply of U.S. dollars, and can lower interest rates and allow a dollar depreciation to stimulate both domestic spending and export demand. Such depreciation would not threaten the government's ability to repay its debts because the debts are denominated in U.S. dollars. A majority of U.S. debt is still held by domestic investors, with government trust funds and the Federal Reserve holding trillions of dollars each. Edgerton concludes that the most likely recession scenario would be a relatively mild downturn, similar to 1990 and 2001, but he suspects that it could be accompanied by deeper than normal concerns about the future of Western democracy. Oganes, Aziz, Szentivanyi highlight rising income inequality as a source of social tension as the top 10% income share for China, India, and North America rose rapidly after the GFC to reach 45-50% of total income in 2017.

Kolanovic and Barr concur and reflect that recent developments such as the U.S. presidential election, Brexit, independence movements in Europe, etc., already illustrate social tensions that are likely to be amplified in the next financial crisis. Edgerton and Kolanovic discuss the risk of recession triggered by a trade war. The escalation of trade tensions could result in new tariffs that adversely impact business sentiment and confidence, disrupting supply chains. Mackie discusses the strong co-movement of U.S. and Euro area growth, estimating that Euro area growth has declined by 0.7%-pt alongside each percentage point decline in U.S. growth since 1971. However, the impact of a U.S. recession in the next few years would likely be smaller than the historical pattern given the behavior of monetary policy. A significant tightening of monetary policy has typically proceeded every Euro area recession.

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Risk of a great liquidity crisis. Kolanovic believes that liquidity disruptions from market developments since the last crisis could cause the next crisis, highlighting the risk of a *Great Liquidity Crisis.* In equities alone, some US$3.5 trillion of mutual funds are managed on a passive basis globally. Kolanovic estimates that Indexed funds now account for 35-45% of equity AUM globally, while Quant Funds comprise an additional 15-20% of equity AUM. With active management declining to only one-third of equity AUM, we estimate that active single-name trading accounts for only ~10% of trading volume, while ~90% of trading volume comes from Quant, Index, ETFs, and Options. The shift from active to passive, and specifically the decline in active value investors, reduces the ability of the market to prevent and recover from large drawdowns. At the same time, the AUM of strategies that sell on autopilot has increased with futures-based strategies increasing by ~US$1 trillion over the past decade. A market shock would prompt these strategies to programmatically sell into weakness. The sharp increase in private assets (private equity, real estate, and illiquid credit holdings) also increases liquidity-driven tail risk. Over the past 20 years, pension fund allocations to public equity have decreased by ~10% (Inkinen, Panigirtzoglou), while holdings of private assets increased by 20%.

Excessive valuations amplify volatility. Prices across many asset classes are high by historical standards. Edgerton highlights that debt levels in the nonfinancial corporate sector and the federal government are at all-time highs. Kolanovic points out that sectors most directly comparable to bonds (e.g., credit, low volatility stocks) and technology and internet-related stocks are at the high end of historical valuations given the extended period of monetary accommodation. The massive price volatility for cryptocurrencies and several hyper growth stocks is an additional sign of valuation excesses.

Rise of corporate leverage over housing and bank leverage. Beinstein highlights that both U.S. leverage and interest coverage are near the weakest end of their post-crisis ranges. Corporations have seen their debt-to-EBITDA ratios increase steadily since the crisis as issuers have taken advantage of lower interest rates to issue debt. While banks have historically been the largest single corporate issuers, non-financial issuers are nearly as big as the largest banks in terms of debt outstanding, with the technology, media, and telecom (TMT) sector standing out. AT&T now has US$97 billion debt outstanding and is the third largest debt issuer after J.P. Morgan (US$103 billion) and Bank of America/Merrill Lynch (US$100 billion) (Beinstein). The period of low funding costs for corporates appears to be over, and the cost of newly issued debt for U.S. high grade corporates has exceeded the cost of maturing debt this year for the first time since 2009.

Feroli and Silver point out that media reports of an overleveraged household sector are not borne out in official data, with the household sector aggregate debt-to-income ratio virtually unchanged for the past five years. Total household debt increased to US$13.3 trillion in 2Q18, but household debt stood at 75.9% of income, well off the peak of 104.5% reached in 1Q09. Although house prices have increased faster than income in recent years, we do not see the foundation for a housing price asset bubble and mortgage market crisis to be sparked again. Paolone, Mueller, Streeter argue that real estate should demonstrate less downside in the next recession since there is less leverage in the system, and they point to the defensive attributes of real estimate (i.e., cash flow, contractual leases, and tangible assets). Publicly traded REITs also own higher quality real estate with better earnings quality, while the investor base for Commercial Real Estate (CRE) has also become more institutional with larger, well-capitalized, longer term investors. Jozoff, Samant point out that debt-to-income levels for households have declined to 1x from 1.3x at the 2007 peak. Moreover, only 15% of the outstanding mortgage market is adjustable rate and 90% of new originations are fixed rate. Home ownership rates have fallen nearly 10%-pts among 18-35 year olds as student loan debt has increased by US$1 trillion to reach US$1.5 trillion over the past 15 years.

Expect more fallen angels. Fallen angel rates will likely rise in the next recession given the skew toward lower rated companies in the investment grade corporate bond market. Tail risk remains concentrated in a few sectors such as Food/Beverages, Cable/TV, Diversified Media, Utilities, and Healthcare (Beinstein). The size of the BBB-rated and BB-rated market now exceeds US$3 trillion, making it more difficult for the high yield market to absorb fallen angels in quantity. Investor protection in high yield transactions has also weakened, and recovery rates are likely to be lower in the next default cycle (Beinstein, Doctor).

More consumer debt and higher commercial-related losses. Juneja argues that large U.S. banks are better positioned to withstand a recession with higher levels of capital and liquidity, but he believes that the next recession will likely be marked by higher losses on commercial-related loans, while losses in consumer loans will likely be higher in non-mortgage debt. Mortgage debt service has declined, but consumer debt has increased due

to faster growth in unsecured lending such as credit cards, installment loans, and other unsecured loans plus growth in other consumer loans such as auto loans. Non-bank lending has surged to over 80% of the market, from under 20% before the crisis. Non-bank lenders are typically less capitalized than banks, and there is no mechanism to determine who would take over the servicing role of non-banks if they were to go out of business. Shane is more cautious on consumer finance companies as credit normalizes and late cycle behavior emerges, and he would expect credit card industry losses to more than double current levels in his downturn scenario. He also sees auto lenders facing more credit pressures. Under the adverse scenario used by the Fed, loss severities on auto loans could reach 65% to 75%. Although bank and hedge fund leverage have declined, Inkinen, Panigirtzoglou argue that U.S. retail investor leverage remains elevated, providing one source of vulnerability to a negative shock.

Investment implications

While the forces of low macro vol and innovation have geared up again, a pause in globalization and a reversal of deregulation have reduced system vulnerability to make a mundane recession and equity correction more likely than another GFC (Loeys). J.P. Morgan Equity Strategy's end 2018 S&P target is 3,000. Earnings momentum might justify an even higher S&P target, but trade conflict remains an obstacle. Tail risk for equities and other risky asset classes will increase in 2019 as the impact of monetary stimulus is reduced on levels of risk premia across asset classes, levels of leverage, and valuations. The tail risk could manifest itself with forced deleveraging of systematic strategies (options hedging and dynamical delta hedging, volatility targeting, risk parity, trend following), disruptions to market liquidity, and failure of bonds to offset equity risk. Equity allocations held by non-bank investors have risen to 45%, their highest level since the Lehman crisis, with only 19% allocated to bonds according to Inkinen, Panigirtzoglou. Bonds will likely not be able to offset equity losses in the next crisis due to low rates and already large central bank balance sheets. Loeys stresses the importance of income-producing assets instead of those that depend on price gains. In his long-term strategy asset allocation, he continues to prefer a strategic overweight of higher income equities and bonds over a portfolio of growth stock and government debt.

We detail a likely playbook for the next recession based on which trades across equities and fixed income have delivered the best and most consistent returns during previous recessions. Normand notes that market performance for most styles deteriorates late cycle and believes that the most material rotations in a multi-asset portfolio are still to come as it is too early for the great rotations (Equities to Bonds, Cyclicals to Defensives, Growth to Value, USD to JPY, and USD to Gold) without strong conviction that markets will soon price the expansion's end. Historically, the best trades based on risk-adjusted returns and success rates have been UW credit, OW Quality versus Growth stocks, and long Oil and Gold. The worst have been UW Emerging Markets assets and Peripheral European bonds. Meggyesi highlights that EM currencies are most susceptible to recessions, while JPY is the cheapest of the recessionary hedges. The best performing recessionary hedges in FX are CHF, SGD, USD, and JPY based on the experience of the past five recessions. Barry notes that the Fed will have less room to lower policy rates compared to previous recessions and expects 10-year Treasury yields to fall by half around the next recession, from a likely peak of 3.5%, if the FOMC were to lower the Fed funds rate to 0%.

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Global Research
J.P. Morgan Perspectives
04 September 2018

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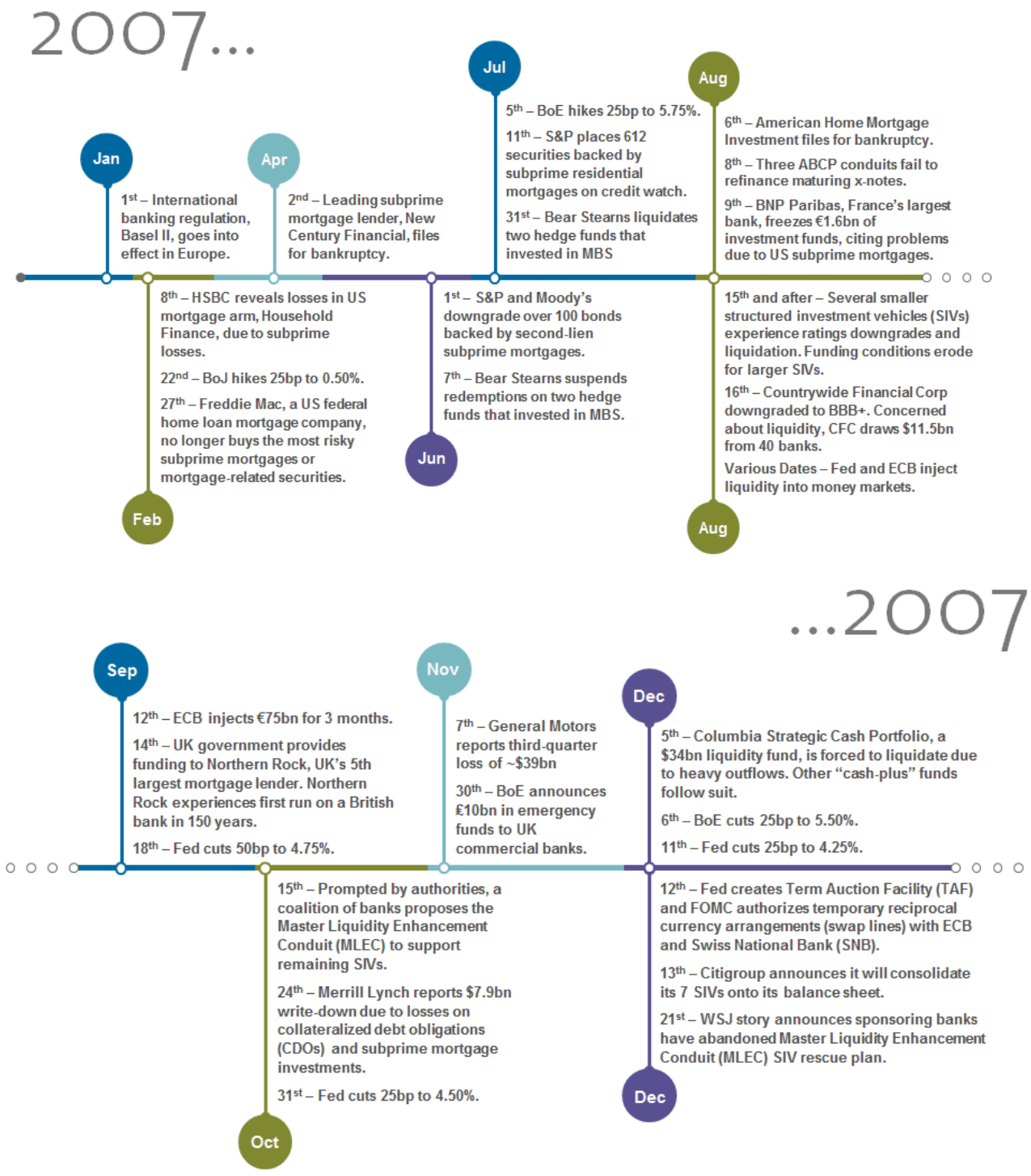
A GFC Chronology



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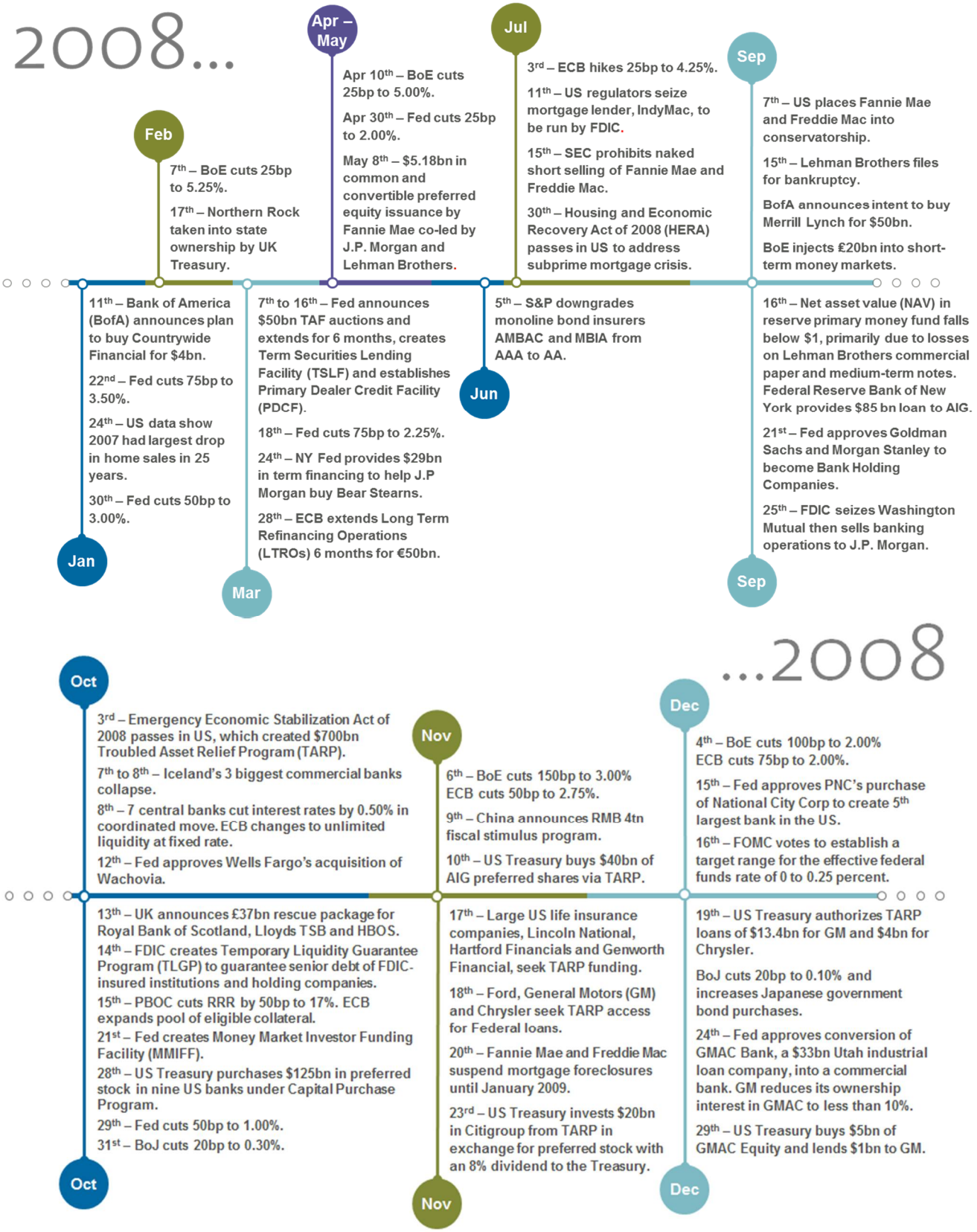

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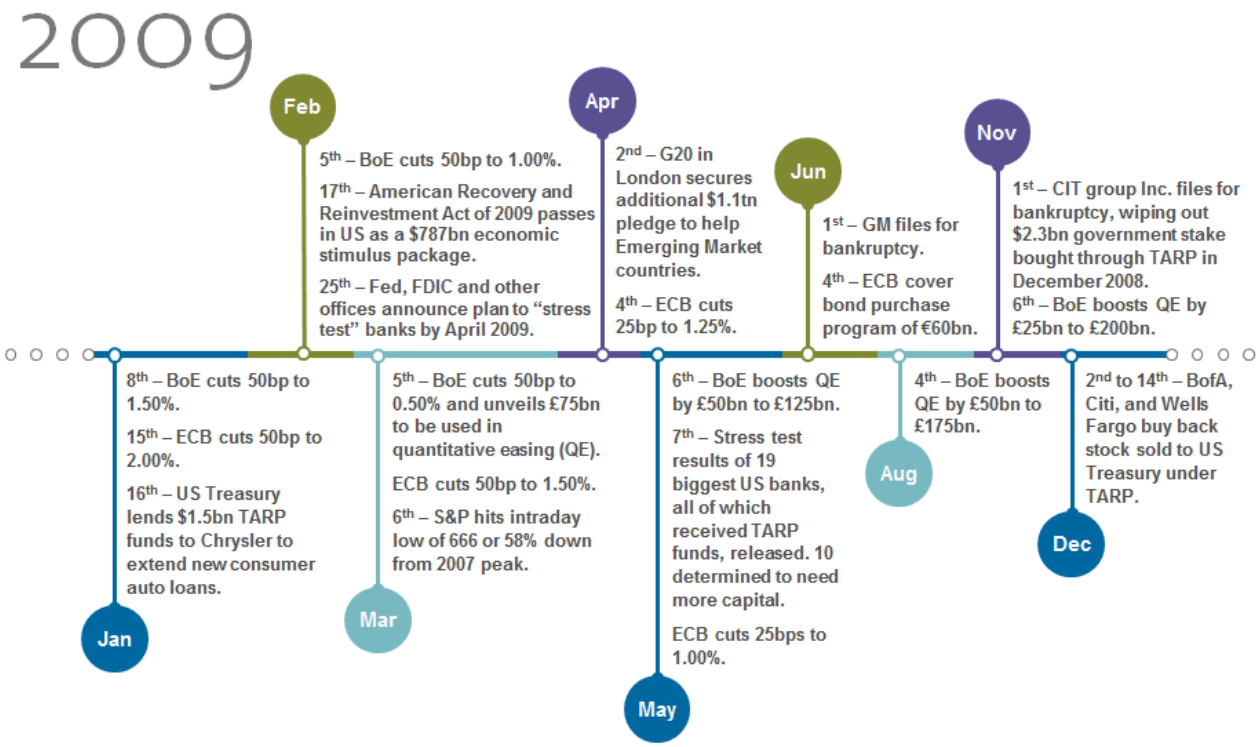

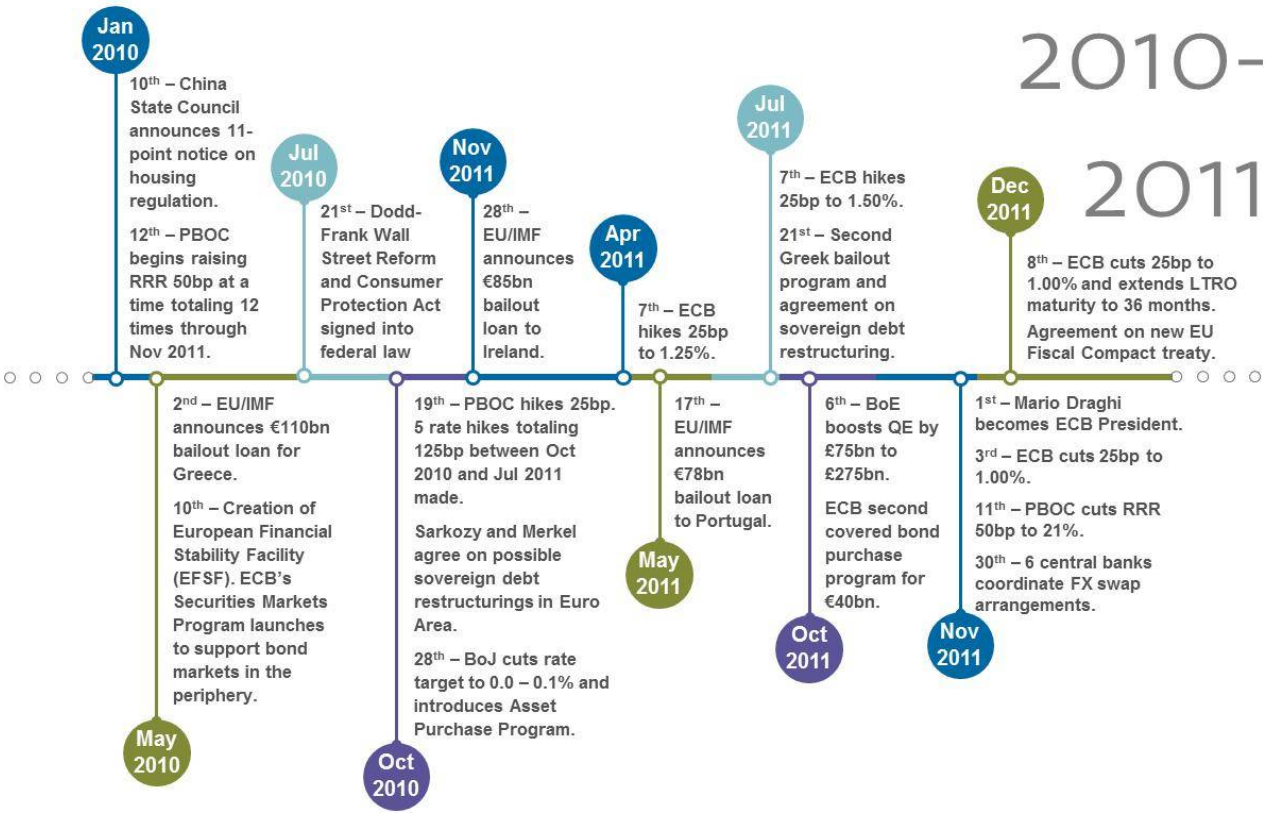

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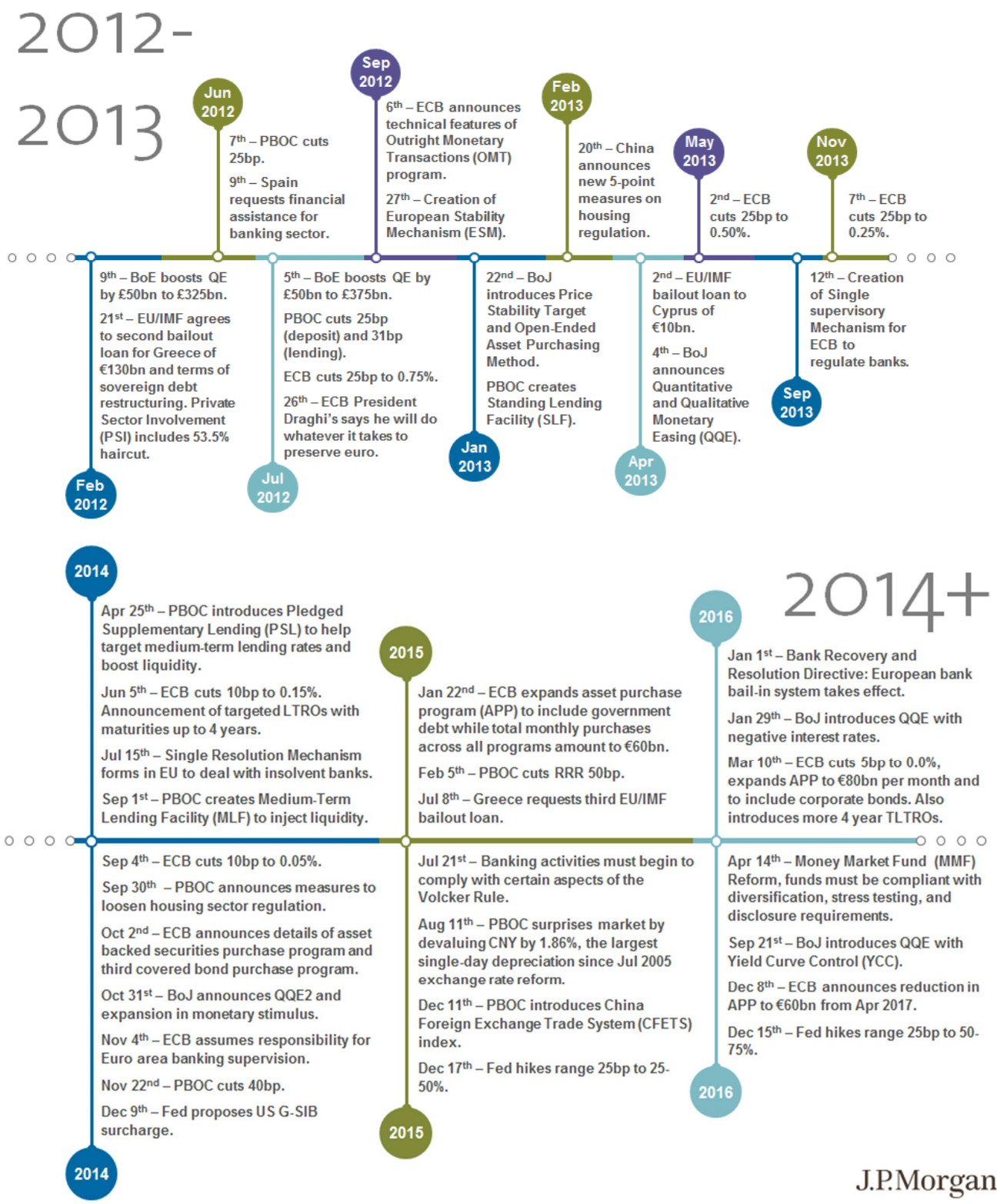

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Source: St. Louis Fed, official news sources, J.P. Morgan

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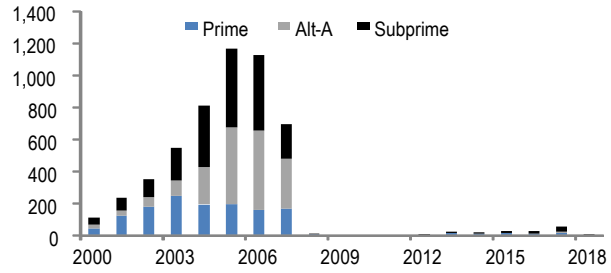
The mortgage market and the financial crisis

- **We reexamine the factors within the mortgage market that helped drive the crisis.**
- **Borrower leverage, particularly via home equity withdrawal, helped make the crisis much bigger than it would have been otherwise.**
- **Specifically, we estimate borrowers withdrew trillions of dollars of equity between 2004 and 2009, a period where home prices were net unchanged.**
- **Inadequate lending standards and affordability products were an underlying cause of higher defaults . . .**
- **. . . while securitization structures helped leverage that risk, and ratings agencies underestimated the correlation of the underlying credit risk.**
- **Securitization today provides more than half of the consumer credit in the U.S. We discuss the outlook for securitization in a later section.**

In the years leading up to the financial crisis, the securitized products market was booming, particularly non-agency residential mortgages. Issuance rose from US$125 billion in 2000 to over US$1 trillion by 2005-06 (Figure 1). Sectors focused on weaker borrowers (subprime and alt-A) grew tenfold in this period and were met with strong investor demand. Unfortunately, much of this growth was accompanied by excessive leverage, inadequate lending standards, and poor risk controls. Eventually these factors came together to bring about a collapse of the housing market that led to the financial crisis of 2008. We review how each of these contributed to the scale and breadth of the crisis.

Figure 1: Issuance of non-agency securities surged to over US$1 trillion in 2005-06
Annual issuance of selected non-agency securities, $bn

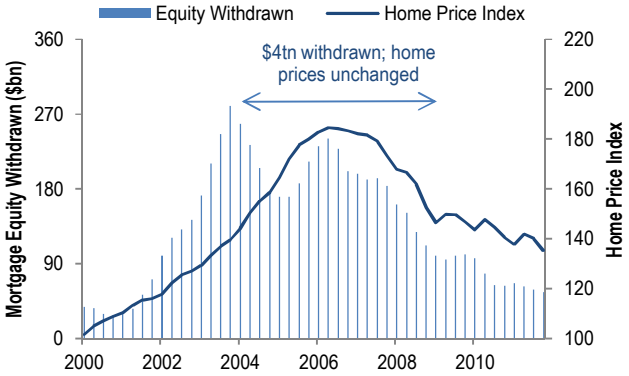


Source: J.P. Morgan, Loan Performance, FNMA, FHLMC, GNMA

Leverage: Borrowers, investors, and structures

The spectacular growth in home prices prior to 2008 lulled borrowers and investors into taking more risk in the housing market, and leverage in the system grew as a result. One example is the stunning amount of equity that was cashed out of the housing market as homeowners discovered that these gains could be capitalized and extracted. Simply put, a greater assessed value for a home meant a borrower could refinance the original mortgage with a bigger one (taking out the difference in balance as cash) or take out a second mortgage. For instance, a borrower may have bought a home for US$100,000 using a mortgage of US$80,000 and US$20,000 of equity. When home prices doubled, this same borrower could cash out, growing the mortgage to US$160,000 and receiving US$80,000 in cash. As home prices continued to soar through the decade ending in 2008, the amount of equity withdrawn grew commensurately. In 2007 alone, a little less than US$200 billion of mortgage equity was withdrawn per quarter—translating into roughly US$750 billion for the year (Figure 2).

Figure 2: Borrowers took advantage of higher home prices to take out more cash; between 2004 and 2009, US$4 trillion of equity was taken out, with home prices unchanged
Quarterly mortgage equity withdrawn in the U.S. (US$bn, left) vs Case-Shiller home price index (right)



Source: J.P. Morgan, Corelogic, New York Fed Consumer Credit Panel / Equifax

Why does this matter? The amount cashed out dramatically raised the stakes of what a decline in home prices meant, both for losses as well as the willingness of the borrower to default. We have highlighted that the 2004-2009 period was particularly problematic: during these years, a total of US$4 trillion was extracted through cash-out refis, yet after the correction in the housing market, home prices on net were unchanged over the period. In the example above, the borrower would have seen home prices return to the original US$100,000 but

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now would hold a mortgage of US$160,000. Many in this situation chose to default. On a national scale, much of the US$4 trillion cashed out above was underwater by 2009, triggering borrower defaults. While many defaults were driven by an inability to repay, others were driven by unwillingness to pay, given that there was no more economic interest in the property, as the mortgage had sunk underwater.

This changing borrower dynamic coincided with investors' increasing use of structural leverage. Spreads in fixed income were tight, and investors turned to new forms of securitized products to find incremental yield. For example, under the assumption that the underlying loans were relatively uncorrelated, ratings agencies allowed the repackaging of subordinate RMBS tranches into new securitizations called CDOs. Taking it a step further, CDO-squareds sliced up these subordinate CDO tranches and provided investors with even higher yields (at the cost of greater leverage and less liquidity), increasing the cumulative leverage in the system. In total, a single subordinate tranche from a CDO-squared would increase the leverage of an 80LTV loan by orders of magnitude—and spread that risk much more broadly throughout the financial system owing to the broad ownership of these tranches. Such high levels of leverage made the financial system more vulnerable to a correction in the housing market.

Inadequate lending standards

At the core of it, the greater leverage might not have been a problem if there were no defaults, but lending standards weakened at the very foundation of the housing market. Much of this worsening occurred at the margins as aggregate FICOs and LTVs did not materially change between 2000 and 2007 (Table 1). However, the portion of loans with > 90CLTV increased from 8% in 2002 to 32% in 2007. Documentation requirements were also reduced, and the fraction of full doc loans decreased from 54% in 2003 to 36% in 2007. The use of second liens increased as borrowers took on more leverage: from 2003 to 2007 the fraction of loans with 2nd liens rose from 12% to 42%.

Table 1: Lending standards worsened into the crisis as documentation requirements were eased and interest-only loans surged

Collateral characteristics by origination year for securitized non-agency loans

	FICO	CLTV	%2nd Lien	%CLTV>90	%Full Doc	%IO
2000	664	73	5%	7%	65%	3%
2001	689	73	4%	7%	67%	4%
2002	690	70	4%	8%	61%	12%
2003	685	71	11%	12%	54%	16%
2004	677	76	22%	19%	51%	32%
2005	679	79	30%	25%	44%	37%
2006	678	83	37%	39%	37%	33%
2007	700	80	29%	32%	36%	42%

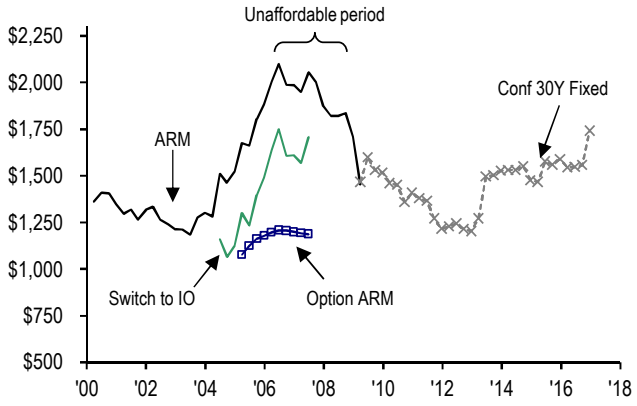
Source: J.P. Morgan, Corelogic

Affordability products also increased in usage. Interest only loans, where only interest payments need to be made for a certain period of time, rose from 12% of the non-agency market in 2002 to 42% in 2007. Other affordability products, such as option ARMs, were also created around this time. These allowed the borrower to make a minimum payment that was less than the interest due on the loan, resulting in negative amortization of the loan.

These affordability products made the problem worse as they broadened access to credit at a time when rising home prices would otherwise have left many borrowers out of the market (Figure 3). Starting in 2004, as home prices started increasing, a borrower could make a roughly US$1,500 payment on an ARM loan and purchase a 70LTV home. In 2005, that ARM payment had jumped to US$1,800 due to rising home prices. Borrowers that could not afford the US$1,800 monthly payment could take out an IO and pay US$400 less. Once IOs started getting too expensive, homebuyers could switch to option ARMs. In late 2007, all of these products became too expensive, resulting in prospective buyers being shut out of the housing market and a large correction in the housing market.

Figure 3: Affordability products became the main way borrowers could afford to buy a home

Estimated monthly cost of particular mortgage products for a US$500,000 home, 2000-13, in US$



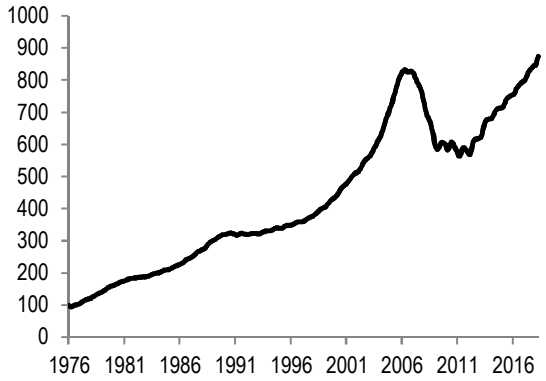
Source: J.P. Morgan, CoreLogic, LPS, Axiometrics, Freddie Mac, Bankrate.com, Case-Shiller

Poor risk controls

Unfortunately, the rising risks in the housing market were not captured by broker-dealer or rating agency models, most of which were backward looking. The housing market that they were calibrated to was one that had national home prices rising even during periods of economic slowdown. The Case-Shiller Index, which tracks national home prices, showed that between 1976 and 2007 home prices grew at an annual rate of 24%, with

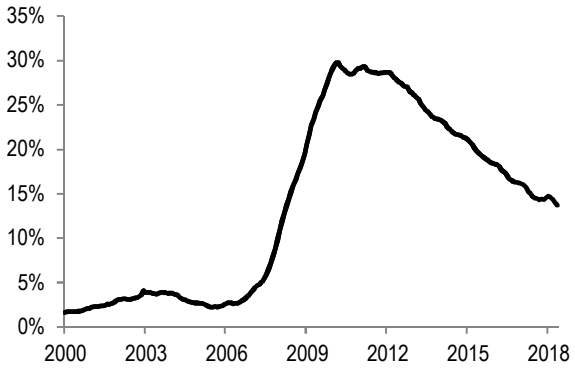
very few periods of weakness (Figure 4). Importantly, home prices had declined in specific regions at times (e.g., Texas in the oil bust in the 1980s, or Southern California after defense companies scaled back in the early 1990s), but it had been many decades since home prices had previously declined at the national level. Between 2000 and 2007, delinquency rates were stable and low despite the weakness in collateral quality (Figure 5). Credit models were trained on these low delinquency rates and continued home price appreciation.

Figure 4: Credit models were trained on rising home prices . . .
CS / HPI normalized to a 100



Source: J.P. Morgan, Corelogic

Figure 5: . . . and low delinquency rates
60+ DLQ rate for securitized non-agency loans

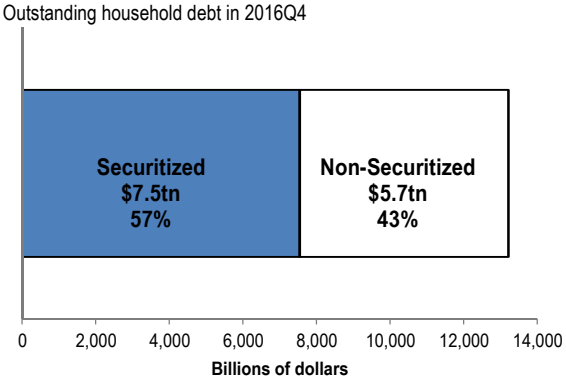


Source: J.P. Morgan, Corelogic

One of the most critical assumptions underlying ratings agency models was correlation: the linkages between home prices across geographic regions were very low. Home prices were thought to be sensitive to local economic shocks; therefore, a pool of mortgage loans well distributed across the nation was considered to be of low risk, regardless of its collateral attributes. During the crisis, this correlation broke down as home prices simultaneously dropped across several parts of the country. This tail risk scenario, which none of the risk models were designed to capture, finally occurred.

To be clear, we believe securitization plays a vital role, providing over half of all consumer credit in the U.S. economy today (Figure 6). Securitization helps attract global capital to the U.S. consumer market, helping to fund student loans, auto loans, credit cards, commercial property, and home purchases. Securitization helps provide banks with capital efficiency and true sale treatment, allowing them to reach out to more borrowers who desire credit. It also provides diversification for investors while helping lower borrower rates by linking investors and borrowers in the most efficient way. In a later section we will discuss how the market has evolved over the past decade to become more resilient to the risks that led to the crisis, while still performing its role as credit provider to the U.S. economy.

Figure 6: Securitization provides over half of consumer credit in the United States
Outstanding household debt in 2016Q4



Source: Federal Reserve

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Global Fixed Income Strategy
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Money markets: the forgotten epicenter of the GFC

- **The GFC exposed significant vulnerabilities in the money markets: banks' overuse of maturity transformation to create leverage was a central contributor to the GFC.**
- **What began as a credit crisis rapidly morphed into a liquidity crisis when issuers realized they had significant rollover risk; the mechanics of tri-party repo compounded liquidity issues for dealers.**
- **Borrowers in the money markets relied heavily on MMFs as a source of short-term wholesale funding. When an MMF "broke the buck" after the Lehman bankruptcy, MMF shareholders redeemed shares *en masse* in fear of losing their money.**
- **While the Fed had long served as the "lender of last resort" for banks, the liquidity crisis forced them to intercede on behalf of certain non-banks intertwined in the banking system.**
- **Since markets stabilized, regulators have implemented a variety of rules to prevent another liquidity crisis from happening.**
- **These changes have had a profound impact on the money markets, making ABCP and repo more expensive, limiting their use as a funding source.**
- **Reforms have also created a liquidity tug of war between borrowers and investors as banks seek longer term funding and MMFs seek shorter term investing.**
- **The money markets have morphed from a credit-based market to a rates-based market, contributing to the declining reliability of Libor.**

In investment terms, we think of cash as a safe asset—when there is trouble in other markets, market participants often seek out the safety of cash. It's also true that many households, businesses, and governments regularly invest in liquid assets—typically deposits and deposit substitutes—to safely prepare for future spending and investments. **So what happens when the safety of cash becomes questionable?**

In the early days of the GFC, money market participants found there were good reasons to question the safety and reliability of their cash investments thanks to risks that had gradually worked their way into banks and money markets in the preceding years.

When discussing causes of the GFC, there is a tendency to focus on subprime mortgage origination and securitization and the roles played by financial products like subprime MBS, CDOs and CDO-squareds, and credit derivatives. After all, that is how Selena Gomez and Richard Thaler explained it in the movie *The Big Short.* Not that they were wrong—the abuse of credit transformation principles via securitization and credit derivatives was a primary driver of the GFC. But so too was the overuse of maturity transformation techniques to create financial leverage. Financing risky long-term assets with short-term debt funded by conservative money market investors was a major contributor to the crisis. It is worth remembering that neither Lehman Brothers nor Bear Stearns failed due to realized losses on mortgage credit. They failed because they could not roll their overnight financing in the money markets.

To fully appreciate the central role of the money markets in the crisis, it is important to understand how and why banks, finance companies, and others found it an attractive place to borrow. More importantly, it is critical to comprehend how, in the years before the crisis, so many market participants, rating agencies, regulators, and policy makers failed to anticipate the dynamics of risk aversion in the money markets and that cash might not always be a safe asset.

Cheap funding, high cost

For banks, corporates, governments, and other institutional borrowers, money markets have long offered access to short-term credit at a lower cost than longer term borrowing. While borrowers could just access short-term funding directly from banks, regulatory costs and other considerations often made wholesale money markets a more attractive option. In the years prior to the GFC, U.S. money markets had become a low-cost source of borrowing for both banks and non-banks and had grown quite large as a result.

During 2H2007, the U.S. money markets were almost a US$12 trillion market, of which banks represented about US$7.6 trillion—about two-thirds—of outstanding money market instruments (Figure 1). Many U.S. and foreign banks actively participated in the money markets as borrowers, sponsors of a variety of investment and financing vehicles, liquidity providers, securities dealers, and custodians, and in numerous other ways. A wide variety of non-financial corporate issuers were also active, as were the U.S. Treasury, government sponsored entities, as well as state and local governments.

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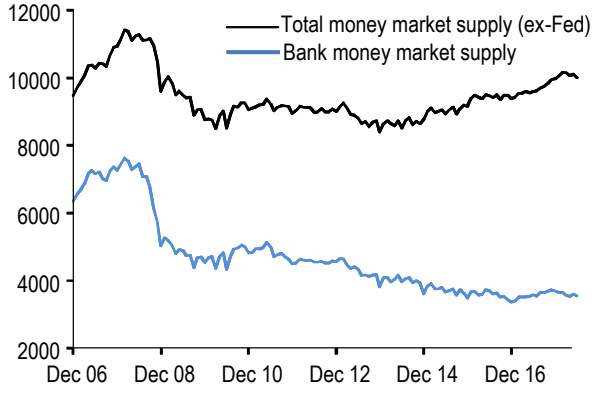
Prior to the GFC, global banks (including dealers) participated in the money markets mostly to engage in credit and maturity transformation. Via the money markets banks could fund long-maturity assets at short-term rates. Furthermore, through the use of securitization they could partially fund loan pools and other risky assets at nearly risk-free rates. From a product perspective, they did this in a variety of ways: through traditional money market instruments—repurchase agreements, commercial paper (CP), negotiable certificates of deposit (CD)—and securitized products like asset-backed commercial paper (ABCP[1]), term asset-backed securities (ABS), and extendible medium-term notes (x-notes).

Figure 1: At their peak, the money markets were an almost $12tn market

Total money market supply balances versus bank money market supply* ($bn)



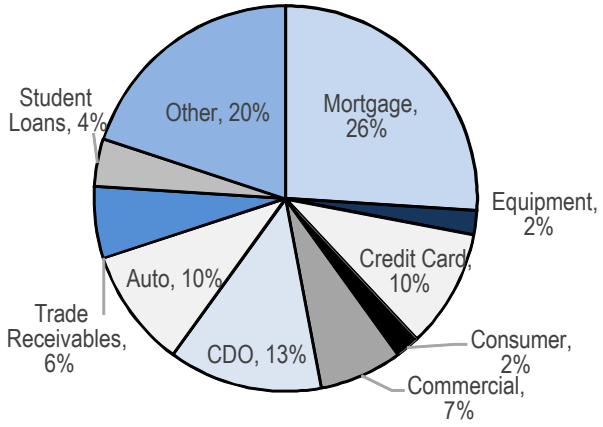
* Includes repo, financial CP, ABCP, and Yankee CDs

Source: J.P. Morgan

Securitization and related structuring techniques proved quite versatile both for banks and many types of non-bank financials, which actively used ABCP and the money markets to fund consumer and commercial loans, mortgages, securities arbitrage, and CDOs.[2] And, while ABCP programs were generally structured and rated as stand-alone entities, banks remained exposed to conduit funding risk through program-wide credit enhancement and liquidity facilities they were required to provide. According to Federal Reserve estimates, of the nearly US$2.2 trillion of USD commercial paper outstanding at the end of July 2007, about half was ABCP. In this highly rated CP lurked substantial exposures to what would prove to be quite risky assets. In 2007, Moody's estimated that nearly 40% of all ABCP was financing mortgages or CDOs (Figure 2). In comparison, Federal Reserve data show that as of June 2018, U.S. ABCP outstanding totaled about US$243 billion and contained no domestic mortgage or CDO collateral.

Figure 2: In 2007, Moody's estimated that nearly 40% of all ABCP was financing mortgages or CDOs

Breakdown of assets in ABCP conduits, 2007



Source: Moody's

Funding securities via the money markets had occurred for decades prior to the GFC, primarily through securities dealers sourcing cash to fund repurchase agreements (repo). However, financial engineering opened up money markets to a wider array of securities financing applications. Outside the ABCP market, asset managers created Structured Investment Vehicles (SIVs), which borrowed actively in money markets via CP and MTNs to fund a variety of mostly securitized, longer term investments. Prior to the crisis there were over 30 active SIVs with close to US$360 billion of short-term funding outstanding.[3]

Underappreciated risks

The cash that funded the debt issued in the U.S. money markets came from a variety of sources including money market funds (MMFs) governed by SEC Rule 2a-7, other similar short-term liquidity funds (non-2a-7), bank securities lending operations, and other investors. Of these, MMFs were the largest and potentially the most problematic. As a product, MMFs were historically structured as mutual funds with stable NAVs, giving the impression that they functioned more like checking account deposits, where liquidity could be accessed daily. But where bank deposits were protected by bank capital and in some cases deposit insurance, MMFs have neither. While MMFs

[1] An ABCP conduit is a special purpose entity whose sole purpose is to purchase and hold financial assets from a variety of asset sellers, financing the assets by issuing ABCP.

[2] See *An ABCP Cheat Sheet*, Alex Roever, 16 Aug 2007

[3] See *SIVs: More questions than answers,* Alex Roever. 7 Sept 2007

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were managed prudently according to the requirements of Rule 2a-7 (very highly rated assets with maturities ranging from overnight to 397 days and limits on average maturity), their capital structure was such that shareholders could withdraw all of their funds on any business day without warning. In extreme circumstances, shareholder demand for liquidity could outstrip a fund's supply of liquid assets and leave it insolvent. While an insolvency ultimately did occur to one prime MMF immediately following the Lehman bankruptcy in September 2008, that risk had loomed over prime MMFs for over a year. The steps the MMF managers took to protect their shareholders played a major role in fueling the financial crisis.

In late 2007, AUM of taxable MMFs totaled nearly US$3 trillion, of which roughly US$2 trillion was in prime MMFs. Prime funds extended credit to a variety of financial and non-financial issuers but had material exposures to banks on both an unsecured (CP/CDs) and secured (ABCP, repo) basis. In mid-2007, Moody's estimated that the 15 largest MMFs held nearly 40% of their assets in various forms of securitized products.[4]

By the time Bear Stearns collapsed in March 2008, the global money markets had been under extraordinary stress for over six months, and money market funds and other investors had long since grown extremely risk averse. Beginning in August 2007 through March 2008, these normally ultra-conservative investors experienced a marked decay in market depth and liquidity related to the still-building fear of subprime credit contagion. This was an especially problematic issue for prime MMFs and similar investment funds given their exposures to ABCP conduits that might be seen by shareholders as having hidden subprime exposures.

Both the fear and reality of credit rating downgrades on CP and MTNs issued by securitization conduits and SIVs led investors to cut funding to issuers, often regardless of whether there were actual subprime exposures. Not surprisingly, MMF demand for many ABCP programs declined, causing credit spreads to widen and in some cases making it difficult or impossible for some ABCP issuers to fund at all. In early August 2007, three mortgage-related conduits were unable to refinance their extendible ABCP, causing maturities to extend and investors to curtail further funding. Later that August a securities arbitrage program administered by HBOS plc, the largest single ABCP program of any type, announced that because funding spreads had widened so much since the beginning of the month, it would draw against its backstop bank line rather than attempting to fund itself with very expensive ABCP. This unnerved banks that provided backstop lines to ABCP programs, concerned that off-balance-sheet risk of third parties could become their on-balance sheet risk.

Over the course of the autumn, the SIVs were particularly hard hit by funding problems. Where there had been nearly US$360 billion of AAA-rated (or equivalent) short-term debt outstanding in mid-2007, by the end of the year the decline in investor confidence was such that virtually all funding was cut off, forcing programs into liquidation, or, in the case of Citicorp, Rabobank, and some other bank sponsors, onto the banks' balance sheets.

Although 2a-7 prime MMFs managed to survive the stresses of late 2007, some similar types of liquidity funds did not. Motivated by negative headlines, institutional shareholders in several privately managed cash-plus funds redeemed shares at a pace that outstripped available liquidity, causing the funds to end operations and liquidate over a period of months.[5] Similarly, a Florida based Local Government Investment Pool (LGIP) became insolvent for similar reasons, leaving municipalities, school districts, and other investors unable to access cash required for their operations.

The market stress that roiled ABCP and SIVs in 2007 also took a toll on other parts of the money markets, including repo, corporate and financial commercial paper, and negotiable bank CDs. When investors realized that banks had significant exposures to the housing market, many no longer wanted to lend, even on an overnight basis. **What began as a credit crisis morphed into a liquidity crisis when issuers realized they had significant rollover risk.** Non-financial issuers were not immune, given their investor base, and they exacerbated banks' capital problem when corporations turned to their bank liquidity facilities as a source of short-term funding. Suddenly, banks were confronted with significant credit risks and liquidity risks while their capital was quickly being depleted.

[4] "Portfolio Management Activities of Large Prime Institutional Money Market Funds," Moody's, 31 August 2007.

[5] "A $34 Billion Cash Fund to Close Up," Wall Street Journal, 11 December 2007.

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The intraday problem with overnight funding

For dealers, the mechanics of tri-party repo further compounded their liquidity issues. At that time, borrowing in overnight tri-party repo meant that dealers would secure funding from cash investors in the morning, then allocate collateral and settle the trade with the clearing bank in the afternoon. The next morning, the trade would unwind: the clearing bank would return cash to investors and collateral to dealers. However, between the time of the unwind and the time at which new trades are settled near the end of the business day, clearing banks could end up providing significant intraday credit to dealers. According to the Fed, the exposure of a clearing bank to a single dealer can routinely exceed US$100 billion.[6] Hence, during the GFC, when dealers' credit risks rapidly deteriorated—as was the case with both Bear Stearns and Lehman—clearing banks responded by demanding more collateral as margin from dealers in order to continue to facilitate the settlement of tri-party repos. In effect, this move not only reduced the amount of securities that dealers could use to obtain financing, exacerbating their liquidity risk, but it also exposed significant negative market risk should the clearing bank decide to lower its exposure to a troubled dealer through a "fire sale" of the collateral.

Even with more collateral, both Bear Stearns and Lehman struggled to find enough secured financing as they spiraled toward insolvency. In Lehman's case the bankruptcy still came as something of a surprise as there was some hope the firm could be saved via acquisition. Bankruptcy became the only option when a deal failed to materialize. The bankruptcy unfolded so rapidly that S&P and Moody's still had the unsecured debt of Lehman Brothers, Inc. rated investment grade as of the close of business on the Friday before it filed for bankruptcy on Monday.[7]

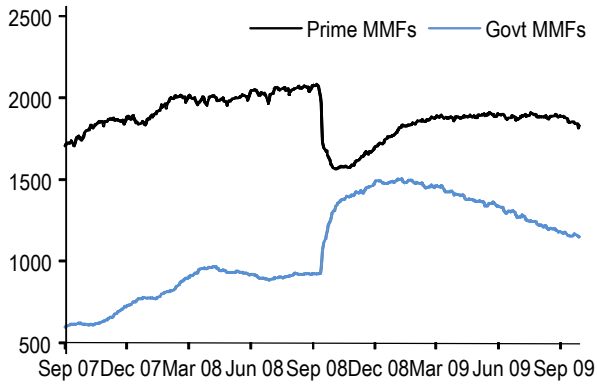
The suddenness of Lehman's bankruptcy left the few MMFs still holding short-term unsecured Lehman debt in a bind. Indeed, it prompted the NAV of a particular MMF to fall below US$0.995, otherwise known as "breaking the buck." In response, MMF shareholders began redeeming their shares *en masse* in fear of losing their money. It did not help that memories of private institutional MMF (cash-plus fund) insolvencies were still fresh. Over the next month, over US$500 billion were withdrawn from prime MMFs and moved into government MMFs (Figure 3). Like banks, MMFs were facing their own liquidity crisis.

Emergency response

To stem this MMF crisis, U.S. Treasury quickly established the Temporary Guarantee Program for MMFs, designed to guarantee the NAV of eligible MMFs such that they would not "break the buck" (*Short-Term Fixed Income*, 11 Sept 09). More significantly, the Fed interceded on behalf of certain non-banks intertwined in the banking system, even though it had long served as the "lender of last resort" for banks only.

Figure 3: In the month after Lehman's bankruptcy, over US$500bn rotated out of prime MMFs and into government MMFs

Prime MMF and government MMF balances (US$bn)



Source: iMoneyNet

The Fed responded on a number of fronts. It established multiple facilities to provide liquidity directly to borrowers and investors in the money markets. The Primary Dealer Credit Facility and the Term Securities Lending Facility provided funding to dealers, the Commercial Paper Funding Facility to financial and non-financial CP borrowers (see *Short-Term Fixed Income*, A. Roever, 31 Oct 2008), and the ABCP MMF Liquidity Facility and the Money Market Investor Funding Facility to MMFs (*Short-Term Fixed Income*, 8 May 2009). With the exception of MMIFF, the severity of the crisis led to significant usage of these facilities and months of use before the money markets began to stabilize, though this also expanded the Fed's balance sheet and temporarily created a significant amount of reserves in the banking system (Figure 4). Although MMIFF was never used, its presence helped calm markets.

[6] Key Mechanics of the U.S. Tri-Party Repo Market, Copeland, Duffie, Martin, and McLaughlin, 2002
https://www.newyorkfed.org/medialibrary/media/research/epr/2012/1210cope.pdf

[7] See *Short-Term Fixed Income*, p. 63, A. Roever, 19 Sept 08

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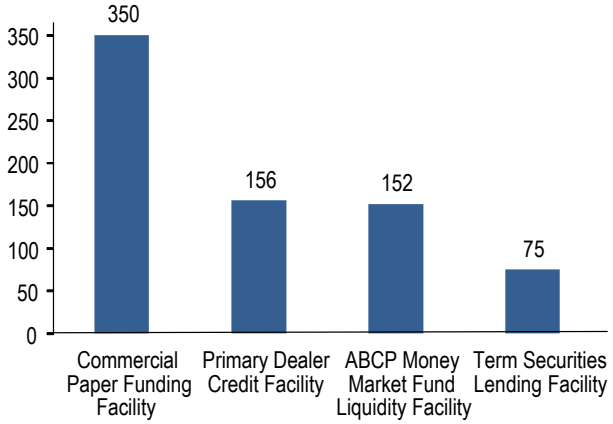
Figure 4: The severity of the GFC led to significant use of the Fed's emergency liquidity facilities

Peak use of the various Fed liquidity facility programs during the GFC (US$bn)



Source: Federal Reserve

The aftermath

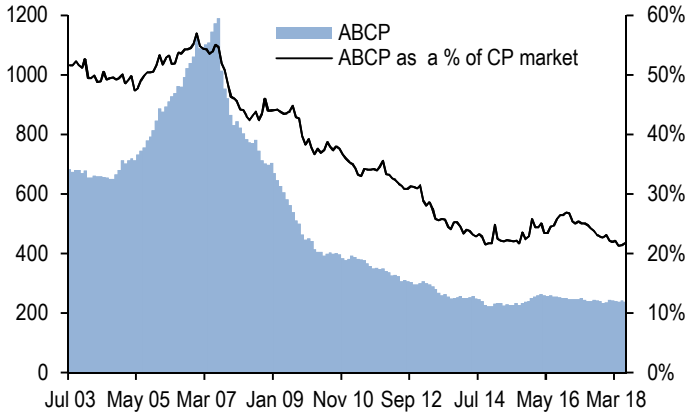
Once markets stabilized, policy makers and regulators began to implement a variety of rules to prevent another liquidity crisis. Most prominent among the rules has been Basel III, which not only requires banks to hold a sufficient amount of capital based on banks' risk-weighted assets but also a sufficient amount of liquidity (Liquidity Coverage Ratio), stable funding (Net Stable Funding Ratio), and leverage capital (Leverage Ratio). Additionally, global systemically important banks are required to hold an additional amount of capital (G-SIB capital surcharge). By and large, these rules are designed to reduce banks' reliance on short-term wholesale funding and ensure banks/dealers have sufficient liquidity and capital to withstand another liquidity crisis.

For MMFs, the SEC revised Rule 2a-7, altering not only the investment guidelines of MMFs but also their structure. Most importantly, these changes require MMFs to hold a certain amount of overnight/weekly liquidity and prime institutional MMFs to implement variable NAVs and liquidity fees and gates. With respect to repo, the implementation of tri-party repo infrastructure reform meant both the settlement and the unwind of a repo trade would occur in the afternoon, thereby significantly limiting the amount of intraday exposure clearing banks would have to dealers on any given day.

It is no surprise then the above regulatory changes had a profound impact on the money markets and long-lasting consequences. While they generally have made the financial system safer, stronger, and more liquid, they also fundamentally changed the way borrowers and investors access the money markets. Gone are the days of using ABCP as a primary source of short-term funding for banks' clients. Basel III has made the cost of ABCP, and securitization more generally, materially more expensive. Additionally, the assets held in ABCP conduits are more plain vanilla now, focusing on core products such as trade receivables or auto leases instead of more complex securities like mortgage-backed securities. For a market that had US$1.2 trillion of ABCP outstanding at its peak in 2007, it's ranged between US$200 billion and US$250 billion over the past several years (Figure 5). As a percentage of the CP market, ABCP is now at its lowest level ever. Though ABCP continues to be a useful source of funding for banks and their clients, the increased costs of running the conduits has limited banks' use of ABCP as a funding source post GFC.

Figure 5: The ABCP market has ranged between US$200bn and US$250bn over the past several years

ABCP balances (US$bn, lhs) versus ABCP as a percentage of the total CP market (%, rhs)



Source: Federal Reserve

The same is true with respect to repo as a source of short-term funding. Based on the Fed's weekly primary financing report, this market has shrunk by almost 50% since the GFC. Part of this is the realization that dealers took on too much leverage in the repo markets and delevered post crisis. Another part of it is again Basel III related. Similar to ABCP, the implementation of LCR, NSFR, LR, and the G-SIB surcharge has made repo an especially balance-sheet-intensive funding source. This is particularly true for U.S. banks/dealers, which currently comprise a small percentage of the repo markets (Figure 6). Due to differences in how foreign regulators implemented Basel III, foreign banks are less impacted by these rules relative to U.S. banks. Even so, the decline in the size of the repo markets has contributed to decreased liquidity in fixed income as dealers are unable to hold as much inventory, and hence trade as efficiently, as previously. This is particularly true in the U.S. Treasury

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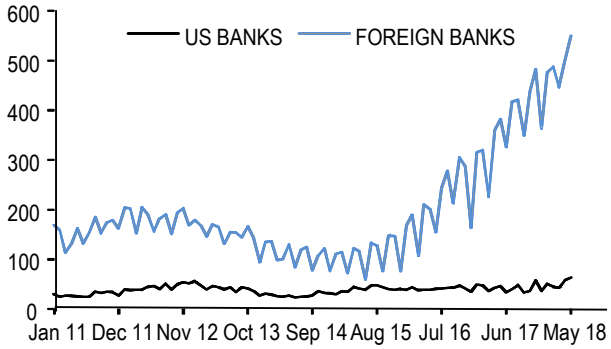
market where turnover has decreased since the GFC (Figure 7). Furthermore, there are also a smaller number of clearing banks that are willing to facilitate and settle tri-party repos as a result of the increased costs of doing this business (Bank of New York Mellon is the only clearing bank currently). Ultimately, not only has the tri-party repo market shrunk, but it has also impacted the liquidity of certain segments of the fixed income market as well as created significant concentration risks with respect to the clearing bank business.

Figure 6: Relative to foreign banks, U.S. banks currently comprise a small percentage of the repo markets

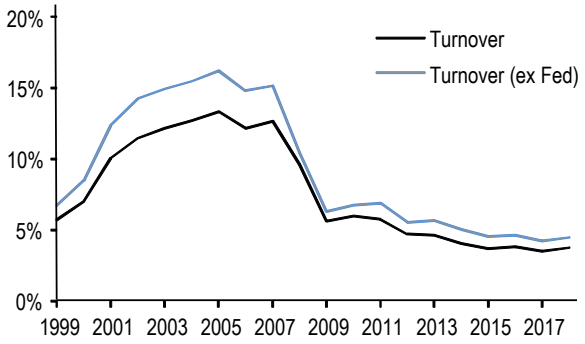
MMF exposures to foreign and U.S. bank repo counterparties ($bn)



Source: Office of Financial Research

Figure 7: Liquidity in the U.S. Treasury market has decreased since the GFC

Daily U.S. Treasury market turnover*, including and excluding



* Average daily trading volumes divided by amount outstanding

Source: U.S. Treasury, Federal Reserve Bank of NY, J.P. Morgan

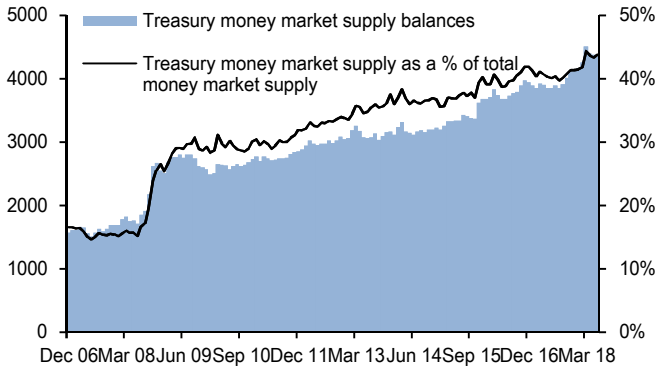
Perhaps the most notable, and somewhat ironic, impact of the reforms has been the liquidity tug of war between money market borrowers and investors. While LCR encourages banks to seek longer term funding, MMF reform encourages prime MMFs to seek shorter-term investing.

This mismatch has fundamentally altered the landscape of the money markets as banks look to diversify away from prime MMFs as a funding source. Currently, we estimate prime MMFs provide 25% of banks' CP/CD/ABCP funding versus 55% in late 2013, so banks have been successful in diversifying away from MMFs. That being said, this move toward non-MMF buyers has been a byproduct of the structural MMF reforms in 2016 where the typical shareholders of MMFs no longer want to park their cash in prime MMFs but instead prefer separately managed accounts or other similar liquidity products that do not have investment guidelines as strict as Rule 2a-7. While this achieves regulators' goal of obtaining more stable funding for banks, it has at the same time pushed money outside of regulated MMFs into products that are less transparent.

It's also worth noting that since the GFC and implementation of various regulations, the money markets have morphed from a credit-based market to a rates-based market. As we alluded to earlier, at their peak the money markets were an almost US$12 trillion market, of which banks represented about 67% or US$7.6 trillion. Comparatively, today the money markets are still about US$10 trillion, but banks only represent about 35% or US$3.5 trillion. Instead, through the issuance of Treasury bills, Treasury FRNs, as well as money market Treasury coupons, Treasury makes up 43% of the market (Figure 8). Even so, money market investors have had no issues absorbing this supply following the implementation of MMF reform in 2016 where more than US$1 trillion of cash moved from prime MMFs to government MMFs.

Figure 8: Treasury securities now make up the largest component of the money markets

Treasury money market supply balances ($bn, lhs) versus Treasury money market supply as a % of market (%, rhs)



Source: J.P. Morgan

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It is perhaps for this reason—the money markets having become more rates based—that Libor as a benchmark has increasingly become less reliable. While Libor is supposed to be a benchmark that reflects where banks are getting funded on an unsecured basis in the wholesale markets, the reality is that banks are borrowing significantly less in the money markets. To the degree that Libor panel banks do not have transactions on which they could base their Libor submissions on any given day, banks can resort to other methods. As a result, over the past couple of years, Libor has been less correlated with unsecured bank CP/CD transactions and more correlated with other factors such as repo, OIS, or the cross-currency basis.

Ultimately, the GFC and the resulting emergence of various regulatory rules have created a much safer, more liquid banking system. Even so, as the money markets have evolved, it has become apparent that there have been some unintended consequences, such as the decline in liquidity in the fixed income markets, the concentration risks of clearing banks that settle tri-party repos, and the unreliability of Libor as an indicator of bank funding, which the markets will still need to resolve.

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Why did we not see it?

- **If leverage was so high, why did we not see the crisis coming?**
- **Four major trends of falling macro volatility, globalization, deregulation, and innovation had built up since the 1980s to create a system vulnerability that was hard to detect and to time for tactical investors.**
- **The forces of low macro vol and innovation have geared up again, but a pause in globalization and a reversal of deregulation have reduced system vulnerability to make a mundane recession and equity correction more likely than another GFC.**

The U.S. economy peaked in December 2007, and the deepest recession since the Great Depression started the next month. But at the end of 2007, U.S. equities were down barely 5% from their all-time high set only a few months earlier. U.S. credit spreads were still at their cycle lows in mid-2007. On October 31, 2007, we wrote in our *Global Markets Outlook & Strategy* that U.S. recession risks had only risen to 30%.

Given the steady fall in U.S. house prices from late 2006 on and the clear problems in the subprime market, discussed in Jozoff and Samant, **why did we not see the GFC train wreck coming?** To loosely quote Queen Elizabeth, if it was all so large, **why did nobody see it?** I will argue here that most of our attention was, and almost always is, on the near and now as tactical investing tells you the trend is your best friend. Hence, we tend to miss extremes in the longer term forces until asset prices have actually started falling in a persistent manner.

Much of the momentum we follow tactically is in my mind really ultimately driven by powerful **longer term forces** that remain in the background as they move only slowly. The reality of these forces, though, is that they do not last forever, and **many do eventually turn.** Asset prices and risk premia do show short-term positive momentum (within a year), but they tend to mean revert over multiple years and decades, largely as these trends push fundamentals and prices to extremes that are not sustainable and invite counteraction. In the case of the GFC, I would argue that a set of four major long-term forces had come together and had built on each other to make the world economy and markets more vulnerable to even a mundane shock like U.S. subprime than would have been obvious at the time.

These **four major forces, or cycles,** are the **Minsky Risk** cycle; the **Innovation** cycle; the **Deregulation** cycle; and the **Globalization** cycle. **What we/I missed,** and what is so difficult to get right, is the timing of the ultimate reversal of such longer term forces as well as the degree to which each of these built on each other and compounded.

The Minsky/risk cycle

Hyman Minsky was a non-mainstream economist who linked the economics of business cycles with those of financial booms and busts. He argued, for example, in *Stabilizing an Unstable Economy* (1986) that periods of relative stability create overconfidence and complacency among economic agents that produce easy credit and leverage that in turn make the overall system vulnerable to any mundane shock that under normal circumstances would not have done great damage. The eventual bust following the boom then leads to excessive caution that over time will stabilize the system and will again gradually dull risk perceptions: the cycle starts all over again. **Stability thus begets instability,** which in turn creates caution and stability again.

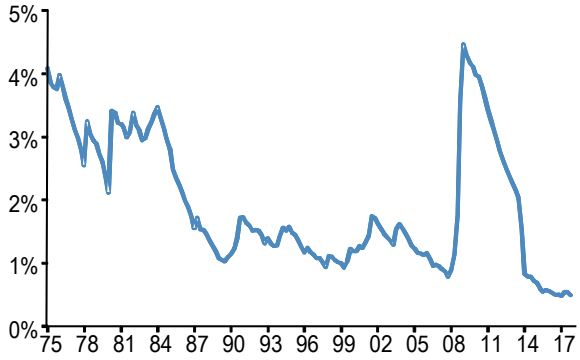
In my own work, I have called this an application of the **Fallacy of Composition** according to which what is true for the unit does not have to be true for the whole. In economics and markets, each one of us knows we are too small to affect the system: We are price takers. But when we all act in unison as we operate with the same objectives on the same information, we become the system: We become price makers. At times, we find that what is rational at the micro level becomes irrational at the macro level. The **Paradox of Thrift** is the best known example of this. **Buying risky assets given recent market stability is rational from an individual point of view, but it becomes dangerous when we do it all at the same time as it creates excessive leverage that will destabilize the system.**

This fallacy helps us explain why pre-GFC rational economic agents took what was, ex post, clearly irrationally high levels of risk. For this, we need to go back to the high macroeconomic volatility of the 1970s and 1980s that led virtually all monetary authorities to pursue better counter-cyclical policies. Since then, not only did real and nominal global growth become much more stable during expansions, but expansions lasted longer and recessions became shallower. This period is generally known as the **Great Moderation.** On the eve of

the GFC, the rolling five-year volatility of world real growth had fallen to a new all-time low (Figure 1).

It was very rational for any individual economic agent to adapt their behavior to this reality and to assume stability would persist for some time. Greater stability of income and of asset values allows greater reliance on tax-advantaged debt funding and less on more expensive equity funding, which translates to greater **leverage.** This is **rational at the micro level,** but when everyone uses more leverage, the overall system becomes fragile.

Figure 1: Global GDP growth volatility
20Q rolling stdev, Using exponential decay of 0.9



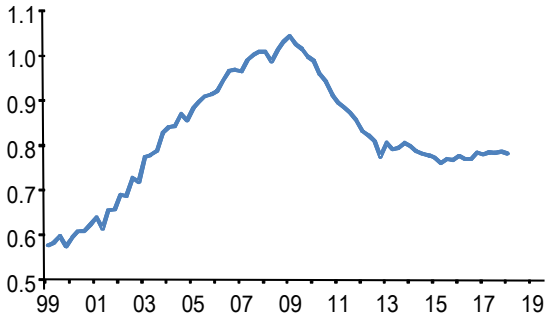
Source: J.P. Morgan, DQ Economics, last observation is Q4 2017

My preferred explanation thus for why households, banks, investors, rating agencies, and regulators took or permitted so much risk is not "greed" but simply that **they did not see the risks** as they had not experienced serious fundamental volatility for a full generation. They were **understandably and maybe rationally blinded by decades of low macroeconomic volatility.**

One could argue that investors and borrowers each drove too much with their eyes on the rearview mirror of the Great Moderation instead of looking at the train wreck heading their way. This is an unfair comparison as the past is the only data we have and it is extremely hard for anybody to project what the aggregate impact is of all of us doing the same thing at the same time. Investors do look forward in the short run when they see that "everyone" has bought asset class X and is now long, signaling a risk of a near-term position squaring price reversal. When the "everyone is buying" has been going on for decades, and one has not seen a reversal yet over this time, it becomes very hard to time the eventual reversal.

Concretely, the real-time experience that the world economy had steadily become more and more stable over the then past 20 years, that deep recessions were a thing of the past, banished by a pro-active Greenspan Fed, that free markets are naturally stabilizing, and that government interference is destabilizing (see below) all led to the increased leverage of U.S. households and global banks (Figure 2, and Jozoff and Samant), easier credit ratings and lending standards, as well as increased reliance on short-term market funding.

Figure 2: U.S. household debt to income
Ratio



Source: NY Fed, BEA, J.P. Morgan

The de- and re-regulation cycle

National economies can be differentiated by the relative role played by the public and the private sector, with freer economies dominated by the private sector. Over time, the role played by each of these also tends to change, largely as people change their mind on what is a better way to organize their economies. We can describe the movements between these two as a pendulum, or a cycle (see, e.g., Paul De Grauwe, *The Limits of the Market,* The Pendulum between Government and Market, 2017). When heavy government control is seen as detrimental to welfare, societies move back to greater reliance on the private sector. We saw such a deregulation move from the late 1970s as economists started to convince people that the private sector was more efficient. The GFC showed that free-market systems can in turn lead to massive instability. At a maybe simplistic level, **capitalism is micro efficient but macro unstable,** while government-controlled systems are micro inefficient but can be macro stable, at least until the micro-inefficiency catches up with it and forces regime change.

From a longer term perspective, we can think of 19th century capitalism leading to high growth but also to economic concentration and instability that from the early 20th century led to a backlash and a move to greater public control that did not start to reverse itself until the late 1970s, as by that time its inefficiencies had become more apparent. We can think of the GFC as a similar turn

as the Great Depression, though not as severe, that has since led to a steady move toward re-regulating, at least the financial sector (see Alex Roever and Phoebe White).

The macro instability of free markets was surely not widely accepted before the GFC with a view prevailing—surely in the U.S.—that free markets are naturally stabilizing. This was the clear view of the top U.S. regulator, Alan Greenspan, and one that he only partly reversed after the GFC in his last major book (*The Map and the Territory: Risk, Human Nature, and the Future of Forecasting,* 2013).

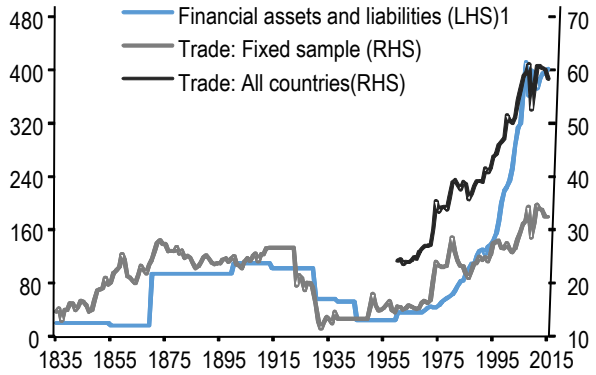
How did deregulation affect the GFC? The deregulation move was based on an idea that the market is more efficient than the public sector and that regulators should thus operate with a light touch. In the U.S., it had led to an effective balkanization of the different regulators that saw little coordination. It also allowed non-banks, financial institutions, and vehicles not regulated by the Fed to **offer bank-like services and products** without Fed supervision or **access to central bank liquidity.** And it led to an increased **reliance on money and capital funding** on a belief that there is always a market and a price at which debts can be rolled over.

The globalization cycle

Globalization started somewhere in the mid-1970s with countries gradually reducing constraints on cross-border trade in **goods, services, and capital** on the belief that if free markets are more efficient domestically, this should be true across countries also. And this has surely boosted global productivity since as the market moved production to countries with the best comparative advantage and money to countries with higher returns to capital. Figure 3 below shows how both international trade and finance have been expanding relative to their underlying economies from the mid-1800s to WWI, then receded badly during the Great Depression, and only started expanding again when the deregulation cycle started in the last 1970s.

The truism that free markets are micro efficient but macro unstable also proved correct across borders. This was most obvious with the breaking up of Bretton Woods in the 1970s. The move to floating exchange rates was meant to allow the markets to keep FX rates closer to their fundamental value but immediately created huge FX gyrations that led at least Europe to find ways to control them again through a monetary union.

Figure 3: Globalization in trade and finance: The second wave of economic globalization has outstripped the first
% of GDP



Source: J.P. Morgan, BIS.
1. Prior to 1970, calculated as external financial assets multiplied by 2

In its most recent annual report, the BIS concluded that globalization boosts welfare and growth but can also create **inequality and financial instability** (*Understanding Globalisation*, BIS 2017 Annual Report). International capital flows tend to be pro-cyclical and thus amplify and spread local shocks. The dominant role of the dollar in international finance and local protection of one's exchange rate mean that U.S. monetary policy is transmitted globally and local central banks do not have full independence to fight local shock. Globally active banks will delever globally when under funding stress, especially if that comes from the dollar market, which is the marginal funding source for most.

In the case of the GFC, globalization meant that a U.S. funding crisis forced large U.S. banks to cut exposure abroad, reduced dollar funding for foreign banks that had to cut credit domestically, and created large losses for foreign banks that had bought AAA-rated CDO tranches and held them under Basel rules that at that time required virtually no capital against these. **Globalization meant that a local U.S. housing and bank crisis became a global financial crisis and led to a global recession.**

The innovation cycle

Innovation is one of the core elements of productivity growth, which is the only way for people to become economically better off over time. The investor and first mover should in principle gather most of the return on their innovation, but in practice, it is the large, well organized companies with wide reach and distribution that will earn the lion's share of the profits of innovation. And while a new invention spreads across the economy, every

producer will need to get involved, because if they don't, they are left behind and risk getting competed out of the market. In this phase we frequently see a rush by all companies into a new product, innovation, or way of doing things, even if they are not all necessarily fully capable of doing so. This then leads to an eventual shake-out where only the truly capable companies can carry the innovation further and the also-run companies fall out. This happened after the dot-com boom of the 1990s and after the credit derivative and subprime innovation phase that followed it.

How did these four compound?

Each of these four forces **came together and peaked on the eve of the GFC.** Some market observers likely saw the risk from some of these, but I doubt that many—myself included—understood how each of these four built on the other and reinforced each other. The **whole was more risky than the sum. No diversification here.**

More concretely, we can "blame" the Great Moderation of 20 years of falling macroeconomic volatility and the lack of deep recessions as the root causes of increased leverage among households and the financial industry. **Economic agents did not see themselves as taking more risk but as adapting to a new world of low macro vol.** That is, they did not see their behavior as risky.

At the same time, the deregulation move, the defeat of world communism, and the victory of capitalism and free markets during that same period of low macro volatility led to a conviction that markets are self-equilibrating, that they are always open, and that there is always a price at which a position or debt can be rolled over and refinanced.

Globalization during this same period spreads capitalism out across the world and intensified trade and financial linkages to the point that any local shock got transmitted rapidly across the world. With money and capital as the most global mobile factors of production, banks became the prime beneficiaries of globalization and grew to immense sizes relative to their home economies and central bank backstops.

The Innovation cycle, which operates on a higher frequency and with faster reversal than the other three, had on the eve of the GFC arrived in the credit world where any reversal, through the too-rapid entry of less than capable companies, would have greater impact on the world economy and markets. The earlier innovation cycle of the 1990s, the dot-com era, had largely manifested itself in the tech sector and through equities (Nasdaq), which kept the banks and the credit markets largely unscathed, and thus had much less impact on the broader economy. 2001-02 was a shallow recession in the U.S. and did not show up in many other countries. In effect, a correction in tech and equities hurt the well-to-do who remained well-do-do afterwards. A shock that hits banks, housing, and credit also hits those less well-to-do and thus has much greater impact on the economy.

Four major long-term forces came together at the same time, and the combined impact of them was hard to gauge in advance.

What will we miss next time?

I have argued here that one of the lessons learned from the GFC is not to think purely tactically and short term but also to monitor long-term forces at play and how they can build on each other. This is obviously easier with hindsight than going forward as the mean reversion in these forces is so hard to time. Below I look at how the four forces we discussed above have developed since and whether there are new and dangerous ones that have emerged since.

Reviewing the four cycles discussed above, **the Risk and Innovation cycles remain in place,** but the **Deregulation and Globalization cycles are in reversal mode.** Figure 1 showed how global macro volatility had fallen to a historical low on the eve of the GFC, but since the recession it has come down again to **new lows.** In *Global growth volatility grinds even lower*, 17 Mar 2017, Hensley et al. show that this new low in macro vol is due to both individual country and regional growth volatility falling to old lows, but this time coming with little cross-country correlation, thus driving aggregate global growth vol to new lows. The latter in my mind is partly due to reduced globalization and linkages across the global banking system.

Record-low **macro volatility** and aggressive support from QE-ing central banks have surely helped offset the natural caution among economic agents that comes after any crisis, and definitely did after the GFC. But it did **not lead to record-low risk premia**. Credit and equity risk premia did not fall to the lows of previous cycles, even as term premia and equity implied vol reached new lows. This is, for one, because it takes many years, maybe decades, for the memory of a shock of the size of the GFC to fade from investors' risk perceptions. Caution has not gone away as we can see from the changed asset allocation of most investors (see Inkinen and Panigirtzoglou). In addition, the heavy buying of DM government debt by QE-ing central banks, EM FX reserve managers, and Basel-driven commercial banks combined to make government debt

special, preventing the risk premia on credit and equities from falling fully in line.

Globalization has paused in international trade and reversed in finance after GFC. Trade globalization has not yet picked up, and the threat of trade wars, which in itself is likely a result of low growth and populism, is making it more likely that globalization is reversing, thus depressing global productivity growth. In finance, the de-globalization trend would appear to have stalled, but there is as yet no sign of increased globalization, and trade wars could easily spill over into the world of finance.

Re-regulation of the financial sector has steadily proceeded in the aftermath of the GFC but seems largely complete for now, even as it does not seem to turn again into a deregulation phase. In a following note, Alex Roever reviews how the GFC led regulators to fill in the holes in their regulatory armor, primarily by dramatically raising capital and liquidity requirements on commercial and investment banks. It would seem to us that this process was **largely complete** in the U.S. several years ago and that Europe is now there also. There is a concern or hope that the current U.S. administration will try to swing the regulatory pendulum back, but we think we are more likely to see fine-tuning at the large bank level to make rules more functional and less onerous. Mid-sized to smaller banks will likely see more reduction in regulatory constraints. The de/reregulation cycle thus goes into pause, or **neutral mode.**

The **Innovation Cycle** remains in place. It has been obvious in the world of crypto-currencies and Blockchain, which we discussed in our January *J.P. Morgan Perspectives*. It produced a classical price bubble that has since imploded. But the economic and market impact of this price bubble bursting has been minimal as this market never grew large enough and its holdings were outside the normal capital market. The Blockchain technology underlying crypto-currencies, in contrast, is only now starting to spread and becoming applied in a variety of places, but it still is far from being a threat to financial stability.

Far more important an innovation cycle is the world of **Artificial Intelligence (AI), robotics, big data, and broad quantitative and systematic investing.** Here we see true innovation that can shape future growth in financial markets and the broader economy. It is in an acceleration phase where all market participants, capable or not, are required to join in. At some point, there will thus be a shake-out that only the truly capable will survive, with a negative, though temporary impact on the economy.

Any **new longer term forces** to keep track of? Several have emerged since the GFC that merit keeping an eye on. Quite a few we discuss in following sections, including the new and much bigger toolkit of QE-ing central banks, forever rising government debt burdens, the new world of negative rates and bond yields, and the growth of China. We have written elsewhere about the sudden collapse in global productivity growth that has depressed overall economic growth. In coming *Perspectives*, we will analyze the impact of the rise of populism, the apparent end of liberalism, the fading world leadership of the U.S., immigration, and demographics. One can throw technology, climate change, and worsening income inequality on this heap as well.

It is beyond the scope of this note to do a complete analysis of how these longer term trends will affect world economies and markets and how these effects could compound, but I think I can already draw one conclusion, which is that these forces in combination make for a **slow-growth world.** This is a world where the investor should focus on income-producing assets instead of those that depend on price gains (see also *The Long-Term Strategist: The Value of Income*, 15 June 2018). Low productivity growth is the core force behind low economic and earnings growth. But the re-regulation trend, the pause in globalization, populism, illiberalism, fading global leadership of the U.S., and the threat to cross-border labor mobility are surely not helping to reverse the collapse in productivity growth.

These forces, and especially those on the geopolitical side, would appear to make the **world more volatile.** However, the impact on risk premia could easily be offset by the positive long-term correlation between growth and volatility: slower real and nominal economic growth has for a long time also been more stable growth. We have seen this in this current cycle, which has produced the weakest growth pace of any post WWII U.S. expansion, but also the most stable one. It is thus not clear that risk premia will be on average higher than past cycles in the coming decade. For my strategic asset allocation—the benchmark around which one should trade tactically—I still prefer to hold a strategic overweight of higher income assets instead of a diversified combo of growth stocks and government debt.

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G-4 monetary policy: no return to pre-crisis norms

- **Central bank independence, inflation mandates, and inflation targeting have all survived the GFC.**
- **But unconventional monetary policy instruments are here to stay.**
- **The effective lower bound will be reached more often due to a lower r*.**
- **The next downturn will possibly occur before interest rates have risen much or balance sheets have shrunk much.**
- **Greater scope for monetary and fiscal policy coordination.**
- **The pre-GFC separation of monetary policy and financial stability policy will be more nuanced.**

In the decade prior to the Global Financial Crisis (GFC), monetary policy in the G-4 was focused on independent central banks using the policy rate instrument to achieve a low inflation objective (2%) in a flexible inflation targeting framework. The exception to this was Japan, where the policy rate had been at, or close to, zero since late 1995. Although there was much discussion before the GFC about whether a central bank should have a dual mandate, as in the U.S., or a single mandate, as in the Euro area, in practical terms all central banks behaved in the same way. Policy rates were used to influence financial conditions that impacted the real economy. Inflation would then be affected once full employment had been reached. Thus, central banks were aiming to achieve the lowest unemployment rate consistent with their inflation objectives.

Central bank independence, inflation objectives and flexible inflation targeting have all survived the GFC. Indeed, low inflation objectives have been reinforced: in early 2012, the Fed clarified its inflation objective as 2%, and in early 2013 the BoJ lifted its inflation objective from 1% to 2%. However, one thing that is striking since the GFC is that inflation divergences from central bank objectives have become much more persistent. In the U.S., for example, except for the first four months of 2012, core PCE inflation has been below the Fed's objective of 2% since late 2008, averaging 1.5%. In the Euro area, meanwhile, core inflation has been below the European Central Bank's (ECB) objective of below, but close to, 2% since early 2009, averaging 1.1%.

This failure to achieve mandated objectives over the last decade has not prompted any central bank to change its objective or its framework. Despite arguments in favor of a higher inflation objective, or a shift to a different framework such as nominal GDP targeting, price level targeting, or a broader mandate including financial stability, the only change we expect is a greater tolerance for temporary inflation overshoots in the U.S. and Japan in the coming years, for a number of reasons: first, to ensure that inflation expectations are firmly anchored at 2%; second, to reverse some of the structural damage caused by the global financial crisis (reverse hysteresis); lastly, to ensure that the inflation objective is met over the cycle as a whole. Clearly, if inflation isn't above the objective at the peak of the cycle, then it would always average below the objective. The Fed refers to this as a symmetric objective.

While independence, mandates, and operating frameworks have survived the GFC unchanged, the same cannot be said for the instruments of monetary policy. The GFC forced central banks to innovate in terms of instruments as policy rates reached the effective lower bound. Since 2008, central banks have been using unconventional monetary policy instruments, comprising negative policy rates, asset purchases, low-cost loans to banks, and enhanced forward guidance. These instruments affect liquidity, asset prices, expectations of future policy rates and term premia, and they tend to act to reinforce one another. Thus, while conventional monetary policy manages a short-term interest rate, unconventional monetary policy extends the central bank's influence further out along the curve and acts to directly compress risk premia on private sector assets.

Negative policy rates, asset purchases, low-cost loans to banks, and enhanced forward guidance are likely to remain key instruments of monetary policy for the foreseeable future, not because of the prospect of another financial crisis but for two other reasons.

First, because of a decline in the equilibrium neutral real interest rate (r*). A lower r* with unchanged inflation objectives means that the effective lower bound will be reached more often, and as a consequence unconventional monetary policy instruments will be used on a more frequent basis. This is likely to be the case even if the real policy rate reaches or exceeds r* at the peak of the cycle, which we see as likely in the U.S.

Secondly, because the next downturn could possibly occur before balance sheet normalization is completed in the U.S., and possibly before interest rate normalization is completed in the Euro area and Japan, and possibly

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before balance sheet normalization has even begun in these countries.

Because of perceived constraints on both monetary and fiscal policy, the next downturn is likely to see greater coordination where fiscal policy works toward relaxing monetary constraints and vice versa, but it would remain an environment where independent central banks still have unchanged inflation objectives. We do not expect a move to fiscal dominance where a central bank abandons its low inflation objective in favor of an objective of achieving debt sustainability.

The clear separation of monetary policy and financial stability policy that existed before the GFC is likely to be more nuanced in the future. In a flexible inflation targeting regime, central banks should only take account of financial cycles to the extent that they influence the inflation outlook. In this framework, other instruments should manage financial stability, notably regulatory and macro-prudential policy. In practice, central banks are unlikely to completely ignore the role of real interest rates in driving financial cycles.

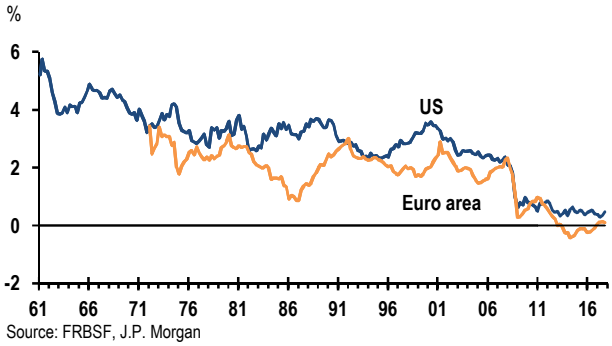
The consequences of a lower r*

The standard model of monetary policy has the central bank adjusting the interest rate instrument relative to a neutral real interest rate (r*) in order to manage demand relative to supply. The standard model assumes that r* is the interest rate that will align demand and supply growth and keep the economy at full employment and price stability once that position has been reached.

It is now widely assumed that r* has declined significantly over recent decades, for a number of reasons. Adverse demographic trends (increases in life expectancy at a faster pace than increases in retirement ages), increased inequality, and reduced growth potential are all thought to have increased desired savings. Meanwhile, the decline in the relative price of capital goods, the decline in public investment, and reduced growth potential are all thought to have reduced desired investment. The Bank of England considers such developments and uses them, alongside others, to account for 400bp of the 450bp decline in the long-term real interest rate over the past 30 years[1].

Perhaps the most widely quoted estimates of recent trends in r* is Holston et al.[2]; as well as highlighting longer term trends in r*, their analysis suggests a particularly sharp drop during the financial crisis. They estimate that r* in the U.S. has declined from around 2.5% in the last business cycle to around 0.5% in the current cycle. In the Euro area, r* is estimated to have fallen from around 1.9% in the last business cycle to around 0.1% in the current cycle (Figure 1).

Figure 1: Holston, Laubach and WIlliams r* estimates



Source: FRBSF, J.P. Morgan

In an environment where r* has declined, the effective lower bound for the policy rate will be reached more often than previously, so central banks will have to resort to unconventional monetary policy on a more frequent basis. A standard Taylor rule provides a useful way to illustrate this (see box below for an explanation of the method). Assume that inflation is anchored at 2%—in line with the policy objective—and that r* is 2%. Under these circumstances, a balanced Taylor rule would imply that the zero bound will be reached when the unemployment rate rises 2%-pts above NAIRU. For the U.S., this development occurred during three of the past nine recessions. If, alternatively, r* drops to zero, then the zero bound will be reached when the unemployment rate rises 1%-pt above the NAIRU. As Figure 2 shows, almost every U.S. downturn in the last 60 years has involved a rise in the unemployment rate of at least 1%-pt above the NAIRU.

[1] Secular drivers of the global real interest rate, Rachel and Smith, Bank of England working paper, 2015.

[2] Measuring the Natural Rate of Interest: International Trends and Determinants, Holston, Laubach and Williams, Federal Reserve Bank of San Francisco working paper, 2016.

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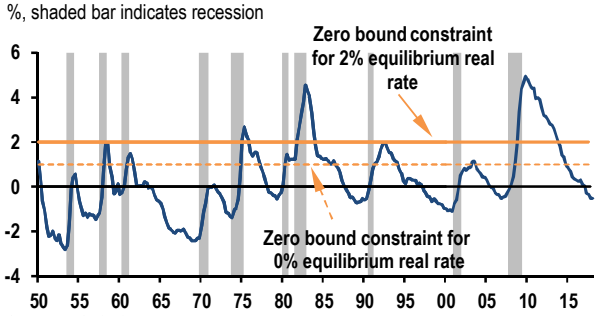
Figure 2: US unemployment rate minus NAIRU

%, shaded bar indicates recession



Source: BLS, CBO, J.P. Morgan

There are two caveats to this exercise. On the one hand, the conclusion is reinforced if inflation falls short of the central bank's objective. If that occurs, then the zero bound is reached with a smaller rise in unemployment. On the other hand, some mitigation is provided if the effective lower bound is below zero. Table 1 illustrates the relative magnitudes. If r* is zero, the unemployment rate needs to move 1.25%-pts above the NAIRU before an effective lower bound of -0.5% is reached. The rise in the unemployment rate relative to the NAIRU is only 0.9%-pts if inflation is falling 0.5%-pts short of the objective.

Table 1: Rise in unemployment relative to NAIRU to reach effective lower bound

%-pts

	r* = 2%	r* = 0%
Inflation in line with target; ELB = 0	2.0	1.0
Inflation 0.5%-pts short of target; ELB = 0	1.6	0.6
Inflation in line with target; ELB = -0.5	2.25	1.25
Inflation 0.5%-pts short of target; ELB = -0.5	1.9	0.9

Source: J.P. Morgan

Using the Taylor rule to assess the likelihood of reaching the ELB

The standard Taylor rule is described below, with i equal to the policy rate, r^* equal to the equilibrium neutral interest rate, π^* equal to the inflation objective, π equal to inflation, $NAIRU$ equal to the natural rate of unemployment, and UR equal to the unemployment rate.

$$i = r^* + \pi^* + 1.5(\pi - \pi^*) + 2(NAIRU - UR)$$

The right hand side can be manipulated to solve for $(NAIRU - UR)$ to get a given level of i.

Negative policy rates

Prior to the GFC, the effective lower bound for the policy rate was assumed to be zero. However, since the GFC, a number of central banks have pushed the effective lower bound into negative territory, to as low as -75bp in Switzerland and Denmark (Table 2), but this policy has proven very controversial. Part of this relates to concern that banks, households, and corporates will move into holding zero-yielding physical currency if rates fall too far into negative territory, and in part it relates to the impact of negative policy rates on bank profitability and financial stability. In the event, European central banks, which have moved the effective lower bound the most, view the policy as successful. There has been no flight to cash, and the adverse effects on bank profitability have been mitigated by other developments. However, we think much depends on local institutional arrangements. There is a particular concern in Japan where the policy rate has been close to zero since 1995 and financial institutions are prevented by an interpretation of the law from imposing negative rates on their deposits. Although, the appetite for using negative policy rates has been limited thus far, this is likely to increase in the next downturn.

Table 2: Lowest policy rates reached since GFC

Basis points

U.S.	12.5
Japan	-10
Euro area	-40
U.K.	25
Sweden	-50
Denmark	-75
Switzerland	-75

Source: Fed, BoJ, ECB, Riksbank, DNB, SNB

Asset purchases

Aside from emergency lending to banks and other financial institutions during the financial crisis, asset purchases were the first unconventional policy instrument that most central banks reached for. Early on in the U.S. and U.K., and more recently in the Euro area, asset purchases were about improving the transmission of monetary policy, as well as about easing the overall monetary stance. Assets purchased have included sovereign debt, supranational debt, mortgage-backed securities, asset-backed securities, corporate debt, commercial paper, and equity traded funds (Table 3). All of these are likely to remain in the toolbox of central banks for the foreseeable future.

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Generally, asset purchases have been specified as a fixed volume, but occasionally they have been open ended, such as in the U.S. with QE3 in 2012 when the Fed committed to buying US$85 billion a month until the labor market improved substantially. Only in Japan have we seen an explicit objective for longer term yields. Since late 2016, the BoJ has committed to buying government bonds to ensure that 10-year yields are anchored at zero. Yield curve control (YCC) could well become a more common instrument in the next economic downturn. Much will depend on the perceived success of this policy in Japan. However, there is concern that it will be hard to exit from a YCC policy. In YCC, the central bank determines the interest rate and the volume of purchases is determined endogenously. If economic conditions start to improve, and market participants anticipate that the yield target will move up, they may rush to sell all their bonds to the central bank ahead of the anticipated decline in bond prices. So perversely, the central bank's balance sheet could expand rapidly just before an increase in the yield target.

Table 3: Assets on central bank balance sheets (June 2018)

Local currency and % of nominal GDP in parentheses

	Fed $bn		ECB €bn		BoJ ¥tn		BoE £bn	
Sovereign debt	2378	*(12)*	2078	*(18)*	452	*(82)*	425	*(21)*
MBS/ABS	1734	*(9)*	291	*(3)*	0		0	
Corporate debt	0		157	*(1)*	3	*(1)*	10	
Commercial paper	0		0		2		0	
Trusts (ETFs, REITs)	0		0		22	*(4)*	0	
Total	4112	*(21)*	2526	*(22)*	479	*(87)*	435	*(21)*
Nominal GDP	19957		11420		549		2068	

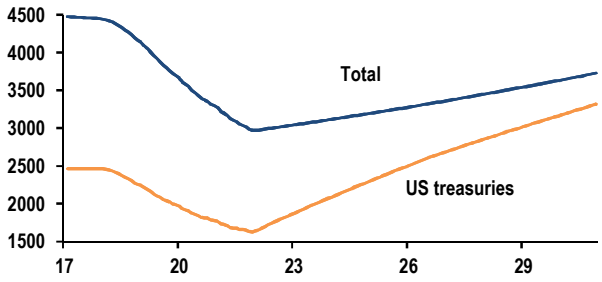
Source: Fed, ECB, BoJ, BoE, BEA, Eurostat, COJ, ONS

When central banks began expanding their balance sheets through asset purchases, the increase was viewed as temporary and balance sheets were expected to return eventually to pre-crisis levels. This no longer seems likely as central bank holdings of sovereign debt in particular are likely to remain very elevated relative to pre-crisis norms. There are three key reasons for this. First, the increased demand for cash. Since the GFC, outstanding currency in the U.S., U.K., and Euro area has doubled, reflecting the low opportunity cost of holding cash and reservations about the banking system. Second, excess reserves are likely to remain elevated because of considerations related to monetary policy operations and financial stability. For the Fed, a target level of excess reserves in the US$500 billion to US$1 trillion range looks likely. Third, the next downturn, which will likely require unconventional monetary policy, will possibly occur before balance sheet normalization is completed. This is true even in the U.S. where the balance sheet is now shrinking. In the Euro area and Japan, the need for asset purchases to manage the next downturn could well come before any balance sheet normalization has even begun.

Within the G-4, we have only produced detailed projected balance sheets for the Fed (see *The once and future Fed balance sheet*, M. Feroli, 30 Mar 2017) and the ECB (see *ECB: The journey to a "normal" balance sheet may never end*, G. Fuzesi, 13 April 2018), ignoring the risk of a downturn in the next few years. For the Fed, we expect the shrinking of the balance sheet to be completed by 2021, with a move down to US$3 trillion. One key implication of this view relates to Fed holdings of U.S. Treasuries. Following a roll-off in the coming years, it will eventually rise above current levels as it becomes the primary asset on the Fed's sustained large balance sheet (Figure 3). For the ECB, there is no official guidance on the balance sheet other than the statement that reinvestment will continue for an extended period of time after the end of net asset purchases. In our analysis, we assume that the ECB starts to reduce reinvestment during 2021 and that the stock of QE declines by €480 billion per year. Nevertheless, the ECB balance sheet will start shrinking from 2019 (Figure 4), reflecting a partial payback of long-term loans to banks (TLTROs).

Figure 3: Fed balance sheet assets

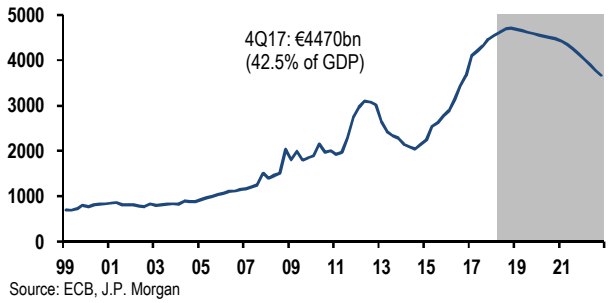
bn USD



Source: Fed, J.P. Morgan

Figure 4: ECB balance sheet

€bn, outstanding amount, shaded area denotes J.P. Morgan forecast



Source: ECB, J.P. Morgan

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The Bank of England has provided some guidance on its balance sheet by stating that it is unlikely there will be any QE unwind, by either sales or redemptions, until the policy rate has reached a level from which it could be materially cut, taken to be 1.5%. We expect that level of the policy rate to be reached in early 2020. The BoJ has not provided any explicit guidance other than to hint that balance sheet reduction will only start after inflation reaches 2%. Given the very low level of inflation, the flattish Phillips curve, and the low level of inflation expectations, we do not expect any balance sheet shrinkage this decade. Indeed, the BoJ's balance sheet is likely to continue expanding for a while longer.

Low cost loans to banks

At the effective lower bound, central banks can expand their balance sheets either by purchasing assets or by extending long-term, low-cost loans to banks. Aside from emergency lending during the crisis itself, central banks have chosen asset purchases as the principal way of expanding their balance sheets for monetary policy purposes. Only the ECB and BoJ have engaged in significant lending to banks as a monetary policy instrument.

Most recently, in the Euro area, low-cost loans to banks have come in the form of four-year refinancing operations where banks could borrow at an interest rate that was determined by how much they lent to households and corporates (TLTROs). At the extreme, banks could actually receive interest payments from the central bank, by effectively borrowing at the policy rate of -0.4%.

One drawback of expanding the balance sheet by way of long-term loans to banks is that the volume is determined by the banks rather than the central bank. Even with generous terms, Euro area TLTROs have turned out to be modest relative to asset purchases (Table 4). Nevertheless, they remain an option for central banks in future downturns.

Table 4: Outstanding TLTROs on ECB balance sheet

	Outstanding (remaining)	Start of early repay.	Final maturity
TLTRO-I (total)	€10bn	-	Sep-18
TLTRO-II - 1st	€399bn	Jun-18	Jun-20
TLTRO-II - 2nd	€45bn	Sep-18	Sep-20
TLTRO-II - 3rd	€62bn	Dec-18	Dec-20
TLTRO-II - 4th	€233bn	Mar-19	Mar-21

Source: ECB, J.P. Morgan

Enhanced forward guidance

Even prior to the GFC, central banks provided guidance on the policy outlook. For some central banks, this was explicit in the form of interest rate projections. For others, it was more implicit with the use of certain types of language. Forward guidance has become much more heavily used since the GFC, what we refer to as enhanced forward guidance, as central banks have sought to depress interest rates out along the curve. Enhanced forward guidance is likely to continue to be used in the coming years, especially in the next downturn.

Academics distinguish two types of forward guidance. Delphic guidance, which seeks to describe central banks' views on the macro economy and their reaction functions, and Odyssean forward guidance, which is when central banks commit to a time inconsistent policy. This involves a commitment to keep policy easier than a standard reaction function would suggest is appropriate as a way of creating more stimulus in the present in the face of the effective lower bound.[3]

All the forward guidance seen before the GFC, and much that has been seen since, has been Delphic. Since the GFC, there has been increased use of explicit rate guidance—the Fed started publishing its interest rate dots in 2012—and of language guiding markets regarding central bank expectations of future policy.

Some of the guidance seen since the GFC has been Odyssean. Threshold-based guidance, seen in both the U.S. and the U.K., is an example of this. Threshold-based guidance has focused on the unemployment rate: essentially central banks committing to not raise policy rates until unemployment fell below a certain threshold. For example, in late 2012, the Fed committed to keep rates unchanged as long as unemployment was above 6.5%, medium-term inflation forecasts stayed below 2.5%, and inflation expectations remained well anchored. The Odyssean nature of this forward guidance can be seen by considering the appropriate policy rate from a standard Taylor rule. In late 2012, the Fed thought that r* was 2.0% and that the NAIRU was 5.6%. The appropriate policy rate if unemployment reached 6.5% and inflation reached 2.5% is close to 3%. Thus, the Fed's commitment to keeping the funds rate target in a range of 0-25bp was an attempt to persuade people that policy would be easier in the future than they might have expected. In the event, the

[3] Macroeconomic Effects of Federal Reserve Forward Guidance, Campbell, Fischer, Evans and Justiniano, Brookings papers on economic activity, 2012

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first Fed rate hike came much later at the end of 2015 when the unemployment rate was 5%.

What the ECB is currently doing might also look like Odyssean forward guidance. Not only has the central bank stated that key ECB interest rates are expected to remain at their present levels at least through the summer of 2019, but that even beyond the first hike the central bank will move gradually as indicated in the current money market yield curve. Given the forward curve, we can see that the central bank expects the real interest rate to move from the current level of -1.5% to -1.8% at the end of 2019, even as the unemployment rate approaches the last cyclical trough. The real interest rate is still expected by the ECB to be -1.7% at the end of 2020, even as the unemployment rate approaches a level not seen since the early 1980s. There is a time inconsistency between this guidance and the ECB's stated inflation objective. One of these will need to change over the coming couple of years.

No central bank has yet provided threshold-based guidance focused on inflation outcomes: essentially a commitment to not raise rates until inflation rises above a certain threshold. Although ECB guidance has looked like it was based on inflation, it was not about outcomes but rather the central bank's subjective and probabilistic assessment of the inflation outlook.

Monetary and fiscal policy coordination

Prior to the GFC, there was little in the way of explicit coordination between monetary and fiscal policy. During the GFC, monetary and fiscal policy both eased, but the impression of coordination was short-lived. This is likely to change in a future downturn. Due to perceived constraints on both monetary and fiscal policy acting alone, there is scope for these constraints to be eased by coordination. This would involve the following.

First, a shift in fiscal priorities away from medium-term budget targets in order to support short-term aggregate demand. Not only would fiscal stimulus help directly to lift demand, but in addition, it could raise the equilibrium neutral interest rate in a manner that increases the efficacy of monetary policy.

Second, central banks ensuring that market interest rates do not rise, which could lead to crowding out or higher private saving (Ricardian equivalence). Setting the policy rate and engaging in asset purchases would keep market interest rates low. To the extent that Ricardian equivalence applies with the issuance of debt with a fixed maturity, this can be mitigated by the issuance of short-term irredeemable central bank liabilities in the form of reserves.

Importantly, coordination of this kind would only be maintained until specific macroeconomic objectives were achieved. The central bank would retain its independence and its low inflation objective. We would not expect a move to fiscal dominance, where the central bank abandons the inflation objective and instead sets monetary policy to ensure that the fiscal position can be sustained without creating financial instability.

Financial stability

Prior to the GFC, monetary policy was focused on the price stability objective. There was an intense debate about whether monetary policy should lean against financial excesses in order to try and ensure financial stability, but, in the event, the flexible inflation targeting regime prevailed: monetary policy only responded to the financial cycle to the extent that it affected the inflation outlook.

The damage caused by the GFC led to a lot of soul searching about appropriate monetary policy. A number of lessons have been learned over recent years. First, financial stability is a crucial requirement for price stability. Financial instability directly affects the real economy and the transmission mechanism of monetary policy. Second, price stability does not guarantee financial stability. Inflation rates were close to central bank objectives prior to the GFC. Lastly, central banks do not have enough monetary policy instruments to achieve an inflation objective and a financial stability objective simultaneously.

In theory, central banks could broaden their mandates to include financial stability if they were willing to tolerate prolonged deviations of inflation from their objectives. In the event, no central bank has moved in this direction. Instead, we have seen the development of macro-prudential instruments, such as counter-cyclical capital buffers, loan to value ratios, loan to income ratios, debt service to income ratios, risk weights on particular loans, and amortization requirements.

These instruments, which may be implemented by the central bank or a separate regulator, are intended to be used to mitigate the financial cycle. They are viewed as more selective and targeted measures than monetary policy and are used to manage particular markets or sectoral problems. The extent to which they will do this successfully remains to be determined. It is also unclear

to what extent they will interact with the setting of monetary policy.

The separation of monetary policy and financial stability policy is unlikely to apply in practice, despite the development of macro-prudential instruments. It is unclear how effective such instruments will be. There is also a sense that monetary policy still needs to play a role in managing the financial cycle. In the words of ex Fed governor Jeremy Stein, "while monetary policy may not be quite the right tool for the job, it has one important advantage relative to supervision and regulation—namely that it gets in all of the cracks."

Conclusion

Unconventional monetary policy instruments are here to stay, not only because of a decline in r* but also due to the possibility that the next downturn will come when policy rates are still very low. Nonetheless, there are concerns about the effectiveness of unconventional monetary policy instruments. Aside from last year, growth in the G-4 has not been spectacular despite huge amounts of monetary easing. While this might provide evidence of limited efficacy, it is hard to evaluate the impact of monetary policy—both conventional and unconventional—during a time of private and public balance sheet repair. In any event, the next downturn will likely see increased coordination of monetary and fiscal policy with the intention of increasing the efficacy of both.

The experience of Japan, where government bonds and other private sector assets on the central bank's balance sheet now amount to almost 90% of GDP, compared with 14% of GDP at the start of 2008, shows that once inflation expectations fall, and in an environment of a flattish Phillips curve, it is very hard to lift inflation back to a 2% objective. This suggests that central banks might choose to act more preemptively in future downturns with more aggressive use of conventional and unconventional monetary policy in order to limit declines in inflation and inflation expectations.

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Central bank interventions during the global financial crisis

The idea of the central bank as a lender of last resort (LOLR) to banks has been around since the 19th century. In 1873, Bagehot gave his famous advice that in a crisis, the central bank should lend freely to solvent banks against good collateral at a penalty rate. This provided the starting point for central bank crisis management in the GFC. Given the depth, breadth, and complexity of the GFC and its international dimension, central banks had to significantly broaden their LOLR operations across a number of dimensions: increased duration, including out to four years at the ECB; lending to non-bank financial institutions; an expansion of the eligible collateral pool, including collateral swaps; lending to SPVs, or banks, for the purchase of specific assets; and providing liquidity in foreign currency via swaps with other central banks.

These LOLR interventions were to ensure adequate liquidity provision in the banking sector and to improve the functioning of credit markets. In addition to these actions, DM central banks began purchasing assets, both public and private. Initially, these asset purchase programs (APPs) were intended largely to improve the functioning of credit markets in order to ensure the appropriate transmission of the monetary stance. For example, when announcing its first APP (of obligations of housing-related government-sponsored enterprises) in November 2008, the Fed stated that *"This action is being taken to reduce the cost and increase the availability of credit for the purchase of houses, which in turn should support housing markets and foster improved conditions in financial markets more generally."* As time went on, and financial stress faded, APPs became more about adding additional monetary stimulus. In announcing a new APP at the end of 2012, the Fed stated: *"To support a stronger economic recovery and to help ensure that inflation, over time, is at the rate most consistent with its dual mandate, the Committee agreed today to increase policy accommodation by purchasing additional agency mortgage-backed securities."*

The broadening of central bank operations to purchasing assets gave rise to the notion of the central bank as a market maker of last resort (MMLR). We are not persuaded that MMLR is an accurate description for the APPs. However, the notion of a MMLR was particularly important for the Euro area. During the 2010/12 sovereign crisis, yields for peripheral Euro area countries were significantly higher than non-Euro area countries with similar fiscal positions. A number of commentators argued that the reason for this was the uncertainty about the ECB as a backstop buyer of sovereign debt in the region. Due to concerns about monetary financing, there was considerable uncertainty about the ECB's attitude to sovereign debt purchases. In non-Euro area countries, it was clear that the commitment of central banks to ensure both price stability and financial stability meant that there was never any need for a restructuring of domestic sovereign debt. In the Euro area this was not the case as indeed there was a debt restructuring in Greece in 2012.

The Euro area crisis improved dramatically from mid-2012 when, in announcing the Outright Monetary Transactions (OMTs), Draghi made it clear that the ECB was an MMLR for sovereign debt in the Euro area. Although no bonds have yet been purchased under the OMT, this policy has been very successful in reducing financial fragmentation by changing the risk characteristics of sovereign debt in the Euro area. The ECB did eventually do more a conventional APP with sovereign debt purchases from 2015.

Initially, central bank operations had little effect on the size of their balance sheets due to actions that sterilized the impact. But once the policy rate reached the effective lower bound (January 2009 in the U.S.), and once the ECB moved to fixed-rate, full-allotment tenders (October 2008), sterilization was no longer necessary.

With deepening globalization, financial institutions had broadened their intermediation activities into non-domestic currencies. In particular, dollar liquidity became a huge concern, especially among European financial institutions, which led to FX swap arrangements between the ECB and the SNB and the Fed. After the collapse of Lehman Brothers, FX swap arrangements were broadened to include the BoE, BoJ, and the Bank of Canada. In 2011, six major central banks established bilateral swap arrangements so that liquidity could be provided in each jurisdiction in any of the currencies, and these became permanent in 2013.

A financial landscape characterized by significant market-driven financial intermediation and deep globalization is unlikely to change dramatically. Thus, the significantly broader LOLR functions should remain in the central bank toolbox. Depending on its nature, central banks may have to innovate further in any future financial crisis. The GFC illustrated that central banks have the ability to manage a complex financial system in a crisis. One caveat is that the Fed is more constrained now in what it can do in a crisis. For example, the US$85 billion line of credit the Fed provided to AIG in September 2008 would no longer be legal in the post Dodd-Frank world.

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Supply-sliding away: Lasting GFC damage on growth

- **GFC has produced a significant loss of output . . .**
- **. . . that will likely rise as potential growth is lower**
- **There is reason to look for productivity gains to pick up from their 2010-16 pace**
- **But productivity and labor force growth look to remain depressed relative to pre GFC pace.**

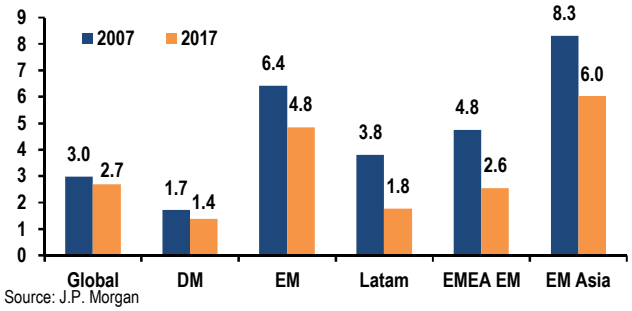
The global financial crisis (GFC) is nearly a decade behind us, and a substantial amount of healing has taken place. A long private sector deleveraging cycle that held back growth appears completed, as do the headwinds from extensive fiscal austerity that unwound crisis-mode easing. Labor market slack has largely been eaten up and inflation looks on track to rise back to its pre-crisis norms, but the legacy costs of the crisis will linger. Public sector debt has increased significantly, and despite the normalization of unemployment and inflation, there has been a significant loss of income relative to the path of the global economy's pre-crisis path. Perhaps most concerning is the sharp deterioration in the long-run fundamental determinants of growth, which suggest that these losses could increase over time.

Our analysis suggests that global potential growth has dropped to 2.7% over the past decade, a decline of 0.3%-pts from its pace a decade earlier (Figure 1). This decline underestimates the actual damage as the DM and EM regional drops—of 0.3%-pts and 1.6%-pts, respectively—are far larger than the slide in the global aggregate would suggest (Figure 2). The aggregate decline is tempered by the rising share of the faster-growing EM in the global economy. Assuming fixed GDP weights, the slide in global potential growth from 2007 would be a much larger 0.9%-point.

Secular forces underway before the GFC took hold contributed to this supply-slide, notably the slowing growth in working age populations. However, the GFC has been accompanied by a significant weakening in global productivity growth. In the DM this is associated with a sharp drop in the pace of capital deepening. In the EM we attributed much of the decline to a significant slowdown in globalization (supply-chain expansion) that had helped these economies increase productivity prior to the crisis.

Figure 1: Potential real GDP

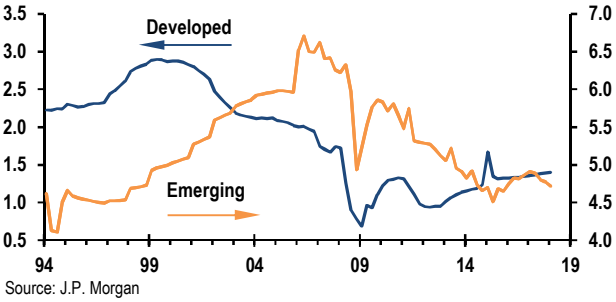
%change annualized



Source: J.P. Morgan

Figure 2: Potential real GDP

%y/y; both scales



Source: J.P. Morgan

There is some cause for optimism as our projection of synchronized above-trend global growth over 2017-18 is lifting capital spending and productivity growth and has arrested the slide in DM labor force participation rates. However, this lift is likely to be modest as experience shows that supply-side improvements tends to be limited in a mature expansion as capacity constraints begin to bite. Intensifying trade tensions raise the risk of a negative global supply shock. In all, our forecast is for a modest late-cycle improvement concentrated in productivity growth that does not materially reverse the past decade's global supply slide.

There are significant negative implications arising from the prospect of permanently lower potential growth. With output growing more slowly, it will be more difficult to service the buildup in public sector debt and finance the rising cost of aging populations. Lower potential growth is also likely to depress equilibrium interest rates, raising concerns that the effective lower interest rate bound will be reached when the next global recession takes hold. More generally, a pie that is growing more slowly makes it more difficult to deal with political pressures that arise from structural changes and from income inequality.

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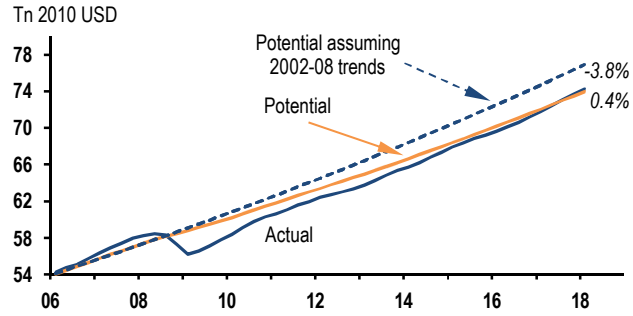
Potential growth has fallen broadly

The GFC generated the deepest downturn for the global economy since the 1930s. Overall, global GDP fell 4% peak-to-trough in the 2008-09 recession despite the unprecedented supports coming from monetary and fiscal policy. This deep downturn was followed by a shallow upturn as the credit aftershocks of the crisis—first in Europe and later in EM—limited global GDP gains during this expansion.

The result of the deep downturn and shallow recovery has been a significant loss in global output relative to its pre-crisis path. We estimate that the 2008-09 financial crisis generated a GDP shortfall of 3.8%-points relative to this path (Figure 3). Although some of this loss may still be reversed through a late-cycle phase of above-trend growth, it seems certain that this expansion will end with incomes significantly lower than would have been expected before the financial crisis.

Figure 3: Real GDP, global



Source: J.P. Morgan

The notion that financial crises are followed by a slow and painful healing process is well established. and it is therefore no surprise that the crisis has generated a loss in the level of global output. However, it appears that the crisis has been accompanied by a broad-based decline in potential growth—the growth rate consistent with stable utilization rates.

Powerful forces have weighed on potential growth over the past decade, which were operating independently of the effects of the financial crisis. Demographic trends were pointing in this direction for some time, and a slide in DM investment shares was well established before the crisis. However, there are a number of channels by which the crisis may have exacerbated this decline, and there is a risk that potential growth will remain depressed. These channels include:

- Reduced capital deepening. Financial crises could weaken incentives to invest for a sustained period as they increase the perceived risks and uncertainty about medium-term returns. This sense of corporate "post-traumatic" stress disorder may be reflected in the sustained low levels of business confidence during 2010-16.
- Increased financial regulation. The needed regulatory reforms that followed the financial crisis will likely reduce credit availability for some time to come.
- Labor market hysteresis. A sustained rise in structural unemployment (or underutilization of employed workers) can lower labor productivity and reduce labor supply. The labor supply decline may be particularly large for older workers where publicly funded early retirement benefits are generous.
- Sectoral reallocations that depress productivity. The sectoral changes related to the great recession and its aftermath may have reduced productivity if the capital stock is not easily transferable across sectors.

Demographics are destiny

In considering the lasting impact of the decline in potential, we do not attempt to isolate the specific role of the GFC. Instead, we evaluate the path ahead for the key determinants of global potential growth—labor supply and productivity. With regard to labor supply, it is likely that demographic factors will continue to push potential growth rates lower across the globe in the coming years.

An economy's labor supply is defined as its population multiplied by its participation rate. For the most part, population growth is determined by slow-moving demographic trends. Participation rates likewise are affected by these trends, but they also exhibit an important cyclical component.

Global population growth has been steadily declining since the 1970s, falling to a 1% ar over 2000-07 (Figure 4). This downshift continued over the past decade—to a 0.8% per annum over 2010-17. The slowing in population growth was broad-based but particularly acute in the Euro area (Table 1). UN population forecasts show that this slide is expected to continue with global population growth estimates to slow to a further to a 0.6% pace in the coming five years.

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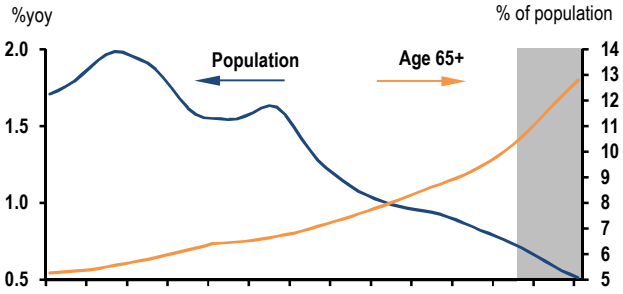
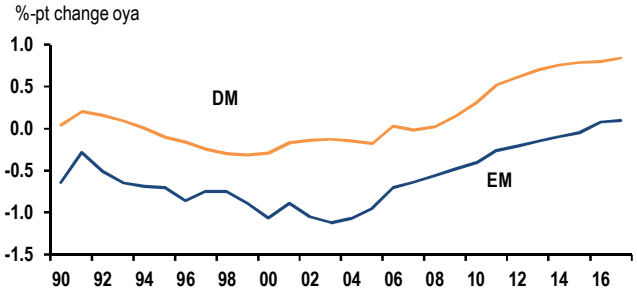
Figure 4: Global population and old age share



Source: J.P. Morgan; United Nations

Figure 5: DM and EM dependency ratios*



Source: U.N. * Ratio of non-working age population to working age popultation

Table 1: Population demographics

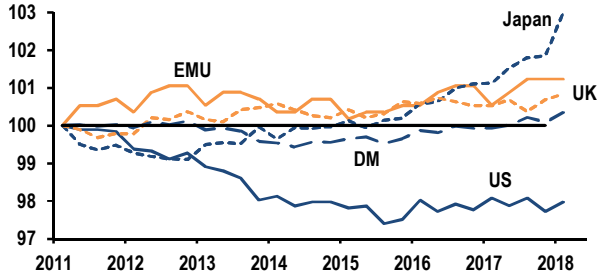
UN Population data

	Total pop. growth, %yoy			Age 65+ share of total, %		
	2000-2007	2010-2017	2019-2025	2000-2007	2010-2017	2019-2025
Global	1.0	0.8	0.6	8.2	9.6	11.8
DM	0.6	0.4	0.3	15.4	17.7	20.7
U.S.	0.9	0.7	0.7	12.3	13.5	16.6
Euro area	0.5	0.1	0.1	17.1	19.5	22.2
Japan	0.1	-0.1	-0.3	19.0	25.3	30.2
U.K.	0.6	0.7	0.5	15.9	17.0	19.0
EM	1.1	0.9	0.6	6.5	7.7	9.9
LatAm	1.3	1.1	0.9	5.8	7.3	9.4
EM Asia	1.1	0.9	0.7	6.1	7.3	9.6
EMEA EM	0.2	0.5	0.2	10.7	11.5	13.5

Source: J.P. Morgan

Figure 6: DM labor force participation rate

Cumulative %-pt change since 2011



Source: J.P. Morgan

Beyond slowing overall population growth, the aging of the population is set to weigh heavily on labor supply (Figure 5). As the composition of the population shifts into older age, the share of people in the labor force declines. In EM, the share of non-working age population to working age population fell between 1985 and 2005, but the conjunction of lower fertility and rising life expectancy culminated in a demographic shift: the secular rise in working-age populations peaked and dependency ratios stopped falling.

If left unaddressed, population aging is likely to be an important factor weighing on potential growth over the coming decade, but these effects will be slow to play out. In the near term, they will rather lead to a greater dispersion in savings patterns (demographics are much worse in Asia than Latin America, for example). While population aging will be a powerful and persistent force, recent developments suggest that there may be offsets to this drag (Figure 6). Indeed, in the DM participations rates have stabilized recently with a mixed pattern evident across G-4 economies.

In the U.S., the prime age participation is rising due to cyclical influences as tighter labor markets are encouraging discouraged workers back into the labor force. Elsewhere, public policy has been changed to promote higher labor force participation as governments have curtailed benefits for non-work, raised the age of eligibility for retirement benefits, and increased support for child care. These policy-induced changes have dominated the structural drag on participation from the aging of the large baby-boom cohort into retirement.

There is room for the forces pushing participation rates higher to continue to offset the demographics of aging. However, the stabilization in U.S. participation rates will likely end as shadow slack gets exhausted. And overall it is unlikely to be powerful enough to do more than stabilize participation rates for another year or two. As a result, demographic forces are likely to continue to place downward pressure on global potential growth in the coming years.

EM participation rates have declined in recent years but also show a mixed pattern across regions (Figure 7). In CEE, labor market reforms and strength in the export-oriented industrial sector have driven a steady increase in participation rates, which in some cases has even

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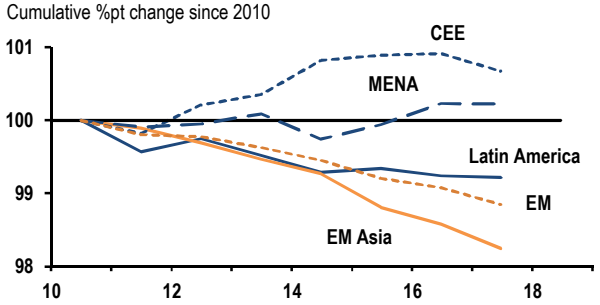
outweighed negative demographics. However, participation rates are falling sharply in EM Asia.

Figure 7: EM labor force participation rate

Cumulative %pt change since 2010



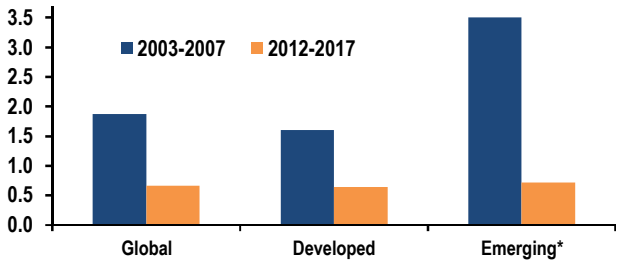
Source: World Bank, ILO, Haver and J.P. Morgan

Productivity decline has multiple sources

Although the demographic forces slowing potential growth have been well anticipated, the dramatic slide in global productivity growth since the financial crisis has come as a surprise to economic forecasters. Global productivity growth has fallen by roughly 1%-point on average since 2012 (Figure 8). Although the fall in the EM (excluding China/India) has been the most striking, the DM has also experienced a ¾%-pt decline. This broad-based deterioration in supply-side performance explains why global unemployment rates have fallen rapidly even as the pace of GDP growth over the course of the recovery has been modest.

Figure 8: Productivity growth

% annualized, average



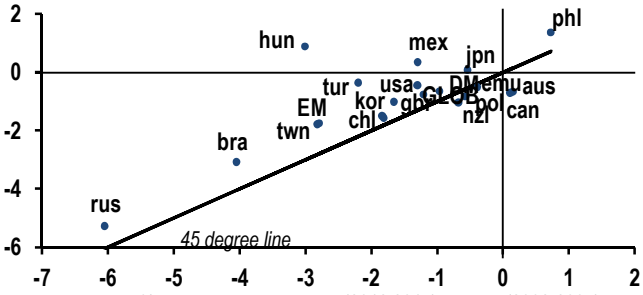
Source: J.P. Morgan; * Productvity is GDP/Employment (excludes China, India)

In a series of reports, we have analyzed the slowdown in productivity growth (see *Supply-sliding away*, Lupton, 30 Mar. 2015 and *Global productivity slowdown lowers sights on potential GDP*, Lupton, 25 Nov 2015) and have attributed a sizable portion of the productivity slowdown to forces slowing potential growth that took hold in the aftermath of the financial crisis (Figure 9). In particular:

- The historical evidence shows that changes in the global investment share of GDP align well with changes in productivity growth over the past 35 years. In the DM, investment shares have been trending lower since the 1970s. However, the drop after the GFC was particularly large, with investment shares and capital deepening remaining below the trend line for nearly an entire decade (Figure 10 and Figure 11).

Figure 9: Change in productivity and potential GDP growth

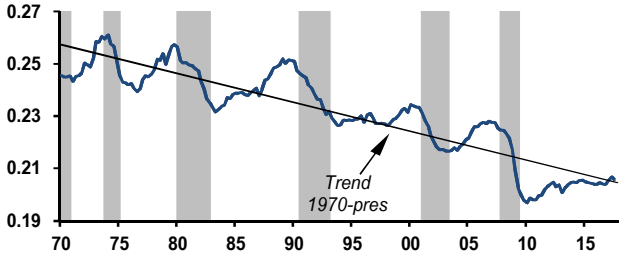
%pt chg potential, 1Q18 less 4Q05



Source: JPMorgan

Figure 10: Fixed asset investment, Developed Markets

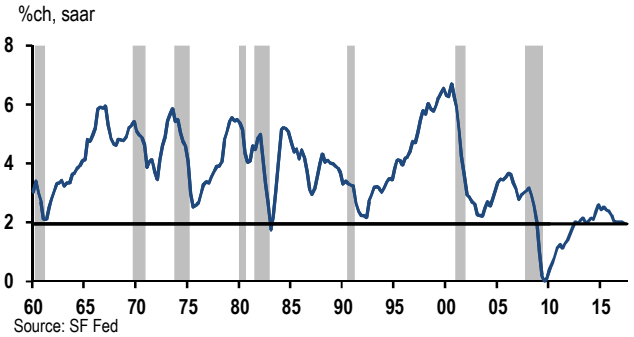
% of GDP



Source: J.P. Morgan; Recession bars are for DM

Figure 11: US capital input

%ch, saar



Source: SF Fed

- Our analysis (*Where has all the growth gone?*, Aziz, 9 Feb 2017) suggests that the rise in global trade, especially after the entry of China into the

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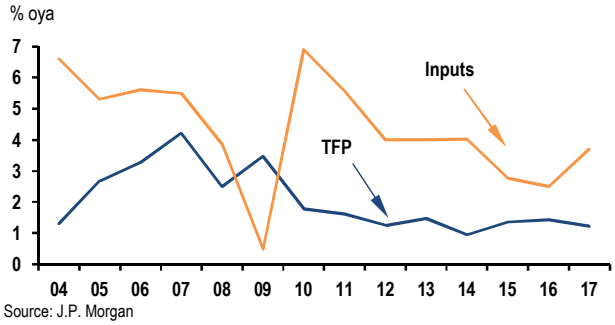
WTO in 2002, significantly increased both input usage, as well as productivity growth in EM. As the GFC produced a collapse in global trade, EM capital and labor input utilization also dropped, as they did in DM. Except for the brief (but sharp) recovery immediately after the GFC, the contribution of inputs has trended lower again, but with some recovery in the last two years with the revival in global trade (Figure 12). Between 2007 and 2017 the contribution of total productivity growth to EM potential has declined by 160bp and contribution of inputs has declined by 250bp.

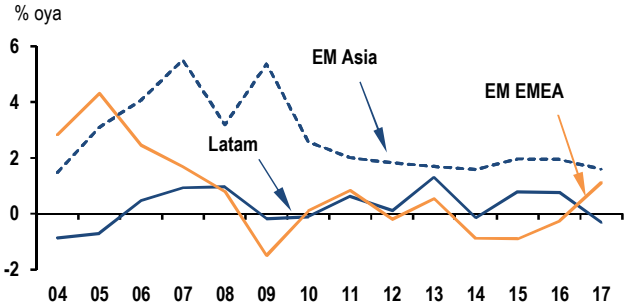
Figure 12: Contributions to EM GDP growth



Source: J.P. Morgan

- The pattern of low productivity growth over the past decade is broadly similar across three EM regions, differing mainly in magnitude (Figure 13). To be sure, there are some green shoots in EMEA EM with TFP growth turning higher in recent years. In contrast, productivity growth in EM Asia seems to be on a secular decline led by China. In Latin America, TFP growth remains unconvincing and is still hovering close to zero.

Figure 13: TFP by EM region



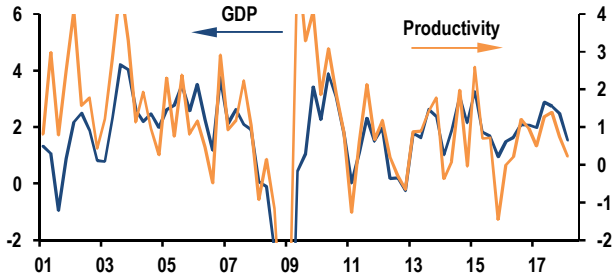
Source: J.P. Morgan

Only modest lift expected in potential growth

Although there is a large imprint of the GFC on the fall in global potential growth, it is not clear how much of this decline is permanent. To be sure, demographic forces reflect secular trends, which should continue to weigh on global potential growth for some time to come. However, the pro-cyclicality of productivity growth displayed by DM economies (Figure 14) suggests that part of the post-GFC downturn may be reversed if the global expansion can be sustained.

Figure 14: Real GDP and productivity, Developed Market

%q/q, saar; both scales

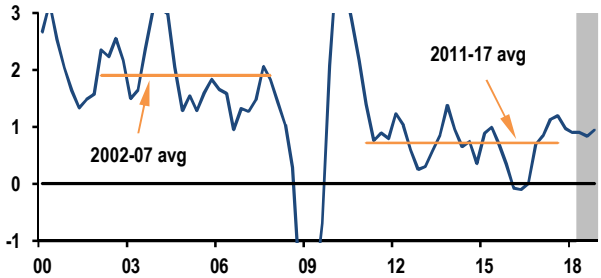


Source: J.P. Morgan; Productivity is GDP/Employment

A recovery in productivity growth is built into our forecast as we believe that lingering cyclical drags related to the GFC—in the form of credit aftershocks and cautious private sector behavior—have faded (Figure 15). Business investment, which has been weak, is now recovering alongside a cyclical recovery in profits and business confidence. With profitability and sentiment bouncing, business capex has seen a substantial acceleration over the past year.

Figure 15: Global productivity

%oya



Source: J.P. Morgan

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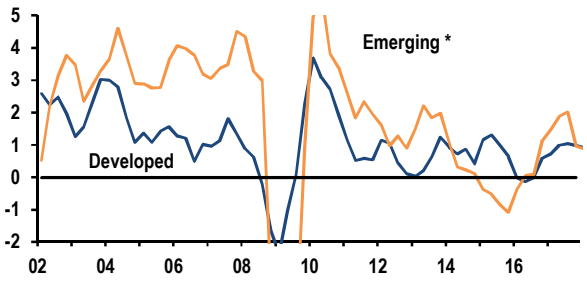
As the cyclical drags are fading, labor productivity growth is on the rise. After contracting outright in 2015 and into 2016, both DM and EM productivity growth have picked up to a 1% pace over the past year (Figure 16). To be sure, the pace of growth remains depressed relative to the last expansion, but this is already built into our forecast.

Figure 16: Productvity growth

%oya; estimated as real GDP growth less employment growth. Thru 1Q18

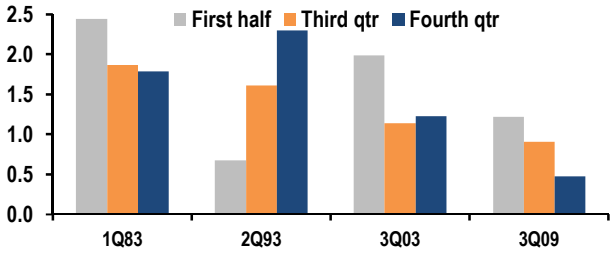


Source: J.P. Morgan; Excludes China and India

Although there is some opportunity for supply-side performance to improve, we believe it is limited by the cyclical position of the global economy (Figure 17). Generally, supply-side performance is strongest in the first half of an expansion as productivity performance is boosted by companies raising utilization rates of existing capital and labor. In addition, the quality of new labor hired tends to be highest when unemployment rates are high. Although, these developments can be offset by strong investment spending, and rising participation rates—as was the case in the 1990s expansion—supply-side performance tends to deteriorate when labor market conditions tighten.

Figure 17: Productvity growth over expansions, developed market

%oya; estimated as real GDP growth less employment growth

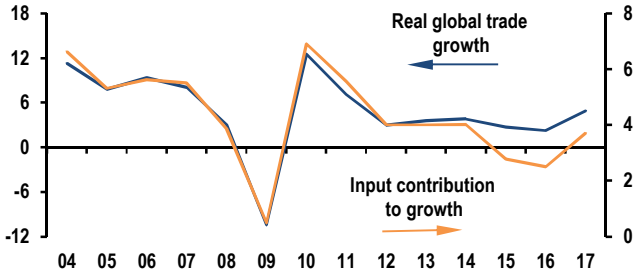


Source: J.P. Morgan

In addition, globalization is a critical part of our framework for thinking about EM potential growth. In the 2000s with globalization in full force, global trade was booming, which translated into higher input utilization and thus EM productivity growth (Figure 18). With the decline in global trade flows in 2010, input utilization and EM growth slowed. However, in the last few years global trade has begun to move higher again.

Figure 18: Global trade and input contribution to EM growth

%oya, both axes



Source: J.P Morgan

If anti-globalization trends now gain strength and become permanent, this could have a serious and lasting impact on EM potential growth.

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Global Economic Research
J.P. Morgan Perspectives
04 September 2018

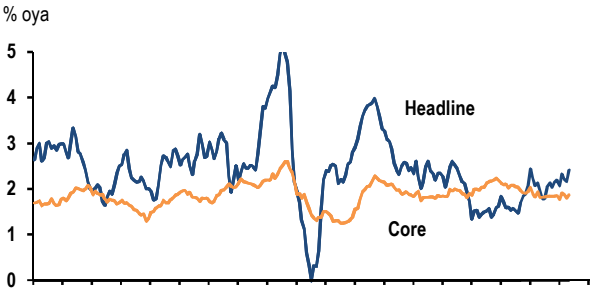
J.P.Morgan

Inflation in a post-GFC world

- **Global core CPI has been stable since the GFC, despite a steady fall in unemployment rates.**
- **This can be explained by a Phillips curve relation where inflation was pulled lower by slack and higher by anchored expectations.**
- **With slack eaten up, inflation should rise modestly.**
- **We do not think the GFC changed the Phillips curve: it was never very steep or fast.**
- **The risk is that expectations have moved lower.**

Although there has been considerable variation in headline CPI inflation over the past two decades, most of it reflects temporary swings in food and energy prices. Excluding these volatiles, global core inflation has hugged close to its average 2% annual pace (Figure 1). The "stickiness" of core inflation over the past two decades has been particularly surprising given the large swings in measures of slack.

Figure 1: Global CPI



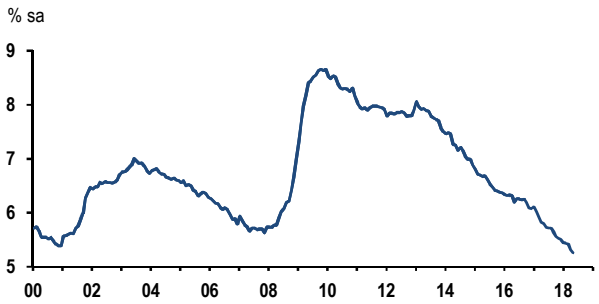
Source: J.P. Morgan

The global financial crisis (GFC) generated a deep recession that pushed global unemployment rates to their highest level in decades. At the same time, a sustained expansion, now in its 10th year, combined with weak supply-side performance, has succeeded in eliminating slack. Global unemployment rates are currently below their levels at the peak of the past two economic expansions (Figure 2).

These rare large swings in resource utilization have provided a unique natural experiment to test a fundamental tenant of macroeconomics: economic slack damps inflation while the removal of slack pushes inflation back up. The lesson of the GFC with regard to the Phillips curve relationship is mixed and likely provides evidence on both sides of the argument.

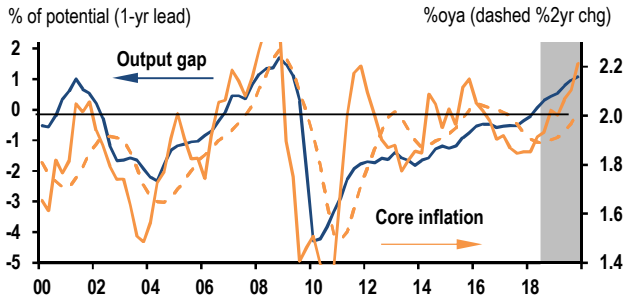
In favor of the Phillips curve, the experience of the last decade suggests that resource utilization rates are indeed translating into inflation—suggesting that there is a global aggregate supply curve (Figure 3 and 4). While global core inflation has generally been anchored with a tight range of 1.75-2.25%, the sharp swing in slack around the GFC clearly took steam out of inflation that was running above that range and pushed it to below the lower end of the range.

Figure 2: Global unemployment rate



Source: J.P. Morgan

Figure 3: Output gap and core inflation, global



Source: J.P. Morgan

However, even if the Phillips curve relationship is alive, the evidence also suggests it is not kicking all that much as the **slope of this supply curve is quite flat.** Specifically, our analysis of global, regional, and country-level inflation dynamics suggests:

- The stickiness of inflation at the global level over 2010-2017 can largely be explained by the tension between low utilization rates putting downward pressure on core inflation tempered by inflation expectations that remained anchored at a higher level.
- Consequently, the estimated slope of the Phillips curve points to a very flat curve whereby a **1% decline in output gaps raises core inflation by just 0.12%-pts**. The estimated slope is statistically significant across both the DM and EM.

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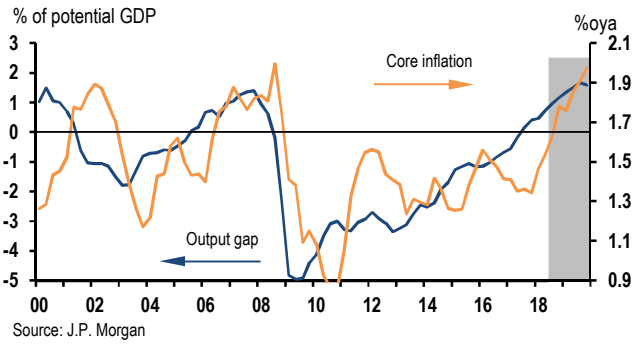
- Other factors buffet core inflation dynamics. Although the Philips curve is alive, it only explains a modest portion of inflation variation over the past two decades. A number of factors that generally do not look to have had persistent impacts—including commodity price swings and policy changes—can influence core inflation movements.
- Another factor impacting inflation is the **slowing in long-run potential growth.** This reduction in the growth of supply has accelerated the removal of slack. This has been (and still is) the risk of doing too little in response to an economic downturn—hysteresis leads to a Pyrrhic victory whereby full employment is reached via reduced supply rather than from a return of pre-downturn levels of demand.
- **It appears the Phillips curve may have flattened since the GFC.** However, this owes in part to a surprising overshoot in core inflation in 2012 that was then countered by a surprising undershoot in 2017.
- **We do not think there has been significant damage to the pricing transmission mechanism.** The advent of e-commerce has likely been a depressing force on pricing, but this sector is a relatively small weight in the CPI and it is not clear that this is more than the disinflationary impact from the wave of consolidation into big-box retailers in the 1990s and 2000s. Moreover, it is hard to reconcile the disinflationary impact of e-commerce with still-elevated retail margins.

The upshot of our analysis for the outlook is that core inflation should follow the business cycle. Indeed, as we expect global growth to remain above-trend, core inflation should move higher. However, the upward trajectory for core inflation should be mild and should be further tempered in economies in which inflation moves above inflation expectations in the coming year.

Figure 4: Output gap and core inflation, developed



Source: J.P. Morgan

Phillips curve: Alive but not kicking

Despite entering the 10th year of the expansion, global core and wage inflation remain modest. This has raised doubts about the role of slack in determining inflation. However, we find considerable evidence that the Phillips curve is still alive on a global, regional, and country level. To be sure, it explains only part of the variation in core, it varies by country, and it is notably flat. However, our analysis shows that it would be a mistake to dismiss the inflation implications of business cycles dynamics.

The Phillips curve framework has several variants. Perhaps the most commonly implemented version is the triangle model, which asserts that headline inflation is driven by commodity prices, slack, and expectations. An alternative is to abstract from the commodities component and focus on core inflation as a function of slack and expectations. This is the approach we take here. Specifically, we consider the following model:

$$\pi_t = \alpha + \rho\pi_{t-4} + \beta Gap_{t-2} + \gamma\%\Delta FX_{t-2} + \varepsilon_t$$

Where core inflation (π_t, %4qtr change) is a function of inflation expectations ($\alpha + \rho\pi_{t-4}$) and economic slack is measured by real GDP as a share of potential (i.e., the output gap: βGap_{t-2}). We also allow for an impact of exchange rate moves $\gamma\%\Delta FX_{t-2}$; we use the nominal effective/trade-weighted exchange rate.

Inflation expectations are allowed to be dynamic if the data indicate as such. Alternatively, if inflation expectations are well anchored, then $\rho = 0$. Long-run inflation expectations over the sample are estimated as the level of inflation that exists when the output gap is zero and the currency is stable. This implies a long-run expectation of $\alpha/(1-\rho)$.We estimate this model from 2000 to the present.

Table 1: Global and regional Phillips curves

Regression of core inflation (%4qtr chg)

	Global	Developed	Emerging	EM Asia	LatAm	EM Eur.
Constant	1.86	1.37	1.91	2.01	2.91	4.44
	(6.0)	(6.3)	(8.1)	(7.7)	(9.6)	(6.4)
Core, t-4	0.07	0.15	0.39	-0.21	0.34	0.18
	(0.5)	(1.0)	(6.1)	(-1.3)	(6.8)	(1.5)
Gap, t-2	0.12	0.09	0.21	0.34	0.07	0.36
	(4.5)	(4.8)	(2.4)	(5.0)	(0.9)	(3.4)
NEER, t-2	...	-0.01	-0.04	0.00	-0.07	-0.12
	...	(-0.9)	(-1.2)	(0.3)	(-3.2)	(-3.2)
Std Err	0.18	0.18	0.49	0.45	0.72	1.22
Adj R-sq	0.42	0.48	0.63	0.49	0.64	0.43
LR Inf. Exp.	2.0	1.6	3.1	1.7	4.4	5.4

Source: J.P. Morgan; Sample 1Q00 to 2Q18

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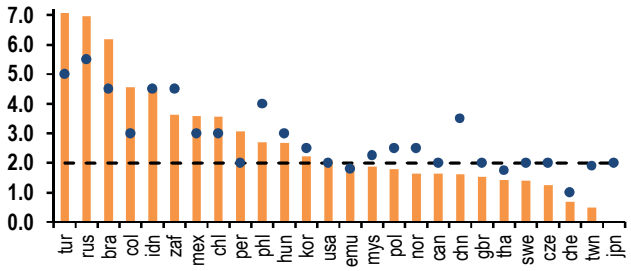
The results of this model, estimated over the sample 1Q00 to 1Q17, confirm the existence of a statistically significant and positive Phillips curve slope ($\beta > 0$). The estimated models for our regional aggregates are reported in Table 1 above, though we also estimate the models across all countries. Globally, a 1%-pt move up in the output gap translates to a 0.12%-pt rise in core inflation. Also, at least over this sample, long-run inflation expectations are stable in that lagged core inflation is statistically insignificant from zero and is anchored at 2.0% (=1.86/ (1-0.07)). By region, the DM Phillips curve is slightly less positively sloped at 0.09, while the EM slope is a touch steeper at 0.21. However, the EM slope masks a much steeper curve within the regions: EM Asia (0.34) and EM Europe (0.36), while the slope is statistically flat in Latin America. At the same time, Latin America is the only region where inflation expectations are unanchored with a statistically significant impact of lagged core inflation.

Notwithstanding the relative instability in Latin America, long-run inflation expectations align well with central bank targets (Figure 5). Not surprisingly, expectations are the highest (and above target) in Turkey, Russia, and Brazil—three countries whose central banks have hiked significantly in the recent past, but this is also where central bank inflation targets are the most elevated.

Figure 5: Phillips curve implied inflation expectations

% ann rate, estimated 1Q00 to 2Q18; Dots show central bank target/mid-point



Source: J.P. Morgan

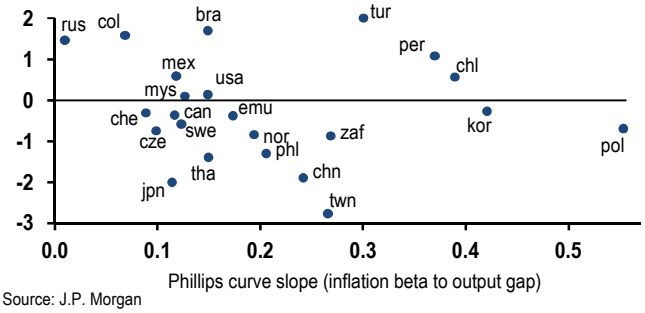
As with Brazil, much of Latin America has higher long-run expectations, including Mexico, Chile, and Colombia. Implied long-run expectations are much closer to the 2% targets in the U.S. and EMU, while expectations in China are more depressed relative to their target. Also not surprisingly, the most depressed long-run inflation expectations are found in Japan, with Switzerland a close third.

The relationship between the slope of the Phillips curve and inflation expectations has important implications for central banks. A flat Phillips curve is likely a welcome development for central banks with inflation near target, while a curse for central banks that are failing on their inflation mandates. The Phillips curve estimates thus provide a useful guide to assessing the challenges faced by central banks.

Figure 6 shows the slope of the Phillips curve and the gap between long-run inflation expectations and target. Russia, Colombia, and Brazil face the challenge of lowering elevated inflation and inflation expectations with a relatively flat Phillips curve. Turkey also faces elevated inflation and inflation expectations, but its steeper Phillips curve should quicken the correction as growth slows.

Figure 6: Phillips curve implied inflation expectations

%pt gap (Phillips curve inflation expectations less target)

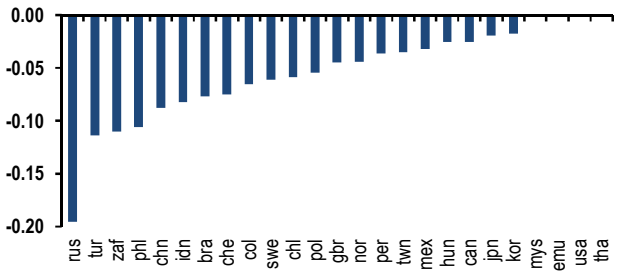


Source: J.P. Morgan

Japan faces this problem from the opposite direction as expectations and inflation are exceptionally low and Japan faces a very flat Phillips curve. Countries like China, Taiwan, and South Africa, which have depressed expectations but with relatively steeper Phillips curves, should see faster success in reflating these expectations.

Figure 7: Phillips curve implied NEER impact on core inflation

%pt impact on core inflation (%oya) given a 1% move in the NEER



Source: J.P. Morgan; Values cut off above zero (not statistically significant

Currencies add a wrinkle to the task of some central bankers. As growth underperforms, this should damp inflation and warrant rate cuts, but if this also damps the currency, then this boosts inflation. The Phillips curve allows for these shifts, but the estimated impact varies considerably across countries (Figure 7). By far, the largest currency impact on core inflation is seen in Russia and South Africa. However, Turkey, China, and Brazil also

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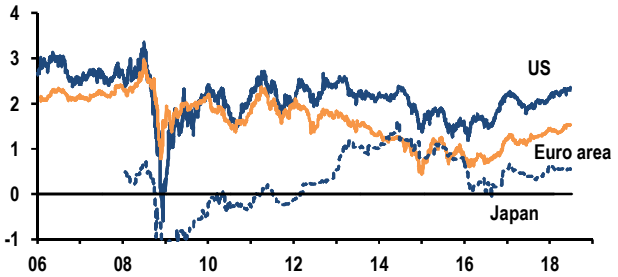
stand out. By contrast (and not surprisingly), the currency impact is negligible in the major developed economies.

Stable expectations not assured

The stability of inflation expectations is critical to the outlook. With headline inflation depressed for such an extended period of time following the GFC, there is a risk that expectations deteriorate. Such a dynamic took hold in Japan in the 1990s and 2000s and has wreaked havoc with central bank policy ever since. The shift toward Abenomics in 2013 was partly a recognition of this problem, and it placed the BoJ on an explicit path to raise Japanese inflation expectations.

Figure 8: 5 year infllation swap

% pa



Source: J.P. Morgan

Market measures of inflation expectations did move down after the financial crisis and generally only partially recovered these declines (Figure 8). It is not clear, however, whether the shift in market pricing reflects a shift in inflation expectations or a reduction in inflation risk premia due to the persistent stickiness observed during the past decades. In Japan, the message from market- and survey-based measures of inflation expectations suggests that the BoJ has had very limited success in lifting expectations over the past five years. Indeed, a persistent undershoot of its forecast, combined with a zero interest rate constraint, looks to have eroded credibility in recent years.

In general, the slide in long-run inflation expectations since the GFC is stark evidence that counters the fears that QE would drive inflation higher and destabilize expectations to the upside. Far from it, expectations appear to have been more influenced by the sluggishness of the recovery and concerns over secular stagnation. Indeed, it is not hard to argue that had QE not been conducted, expectations would have deteriorated significantly.

In this regard, the more aggressive Fed did a better job at anchoring expectations than the ECB did. Only when the ECB began to forcefully use its balance sheet was it able to arrest the slide in expectations. Most concerning is that the BoJ appears to have lost its way in committing to reflation, and this is evident in the slip in expectations.

Core inflation edging higher

The outlook calls for a modest rise in global core inflation this year and next. Specifically, we see global core inflation rising from 1.9%oya as of 4Q17 to 2.2% by 4Q19. This rise is projected against the backdrop of a roughly 1%pt rise in the output gap. Indeed, by the end of this year, we expect the global output gap to move decisively positive to 0.9% (suggesting tight overall resource utilization) and then rise further to 1.2% by end 2019.

Table 2: Core inflation forecast

%chg over 4 quarters; CPI

	4Q17		4Q18		4Q19	
	JPM	Model	JPM	Model	JPM	Model
Dev. Mkt	1.3	1.5	1.8	1.8	2.0	1.8
USA	1.7	2.0	2.4	2.3	2.5	2.5
Euro area	0.9	1.2	1.3	1.5	1.6	1.7
Japan*	0.0	-0.2	0.7	0.0	1.3	0.2

Source: J.P. Morgan; * Japan 4Q19 excludes VAT hike (adds 1.9%pt)

This move owes almost entirely to a projected 1.3%-pt, closing of the DM gap while the EM gap (which is roughly neutral) just edges higher a bit. Based on the Fprojected tightening in resource utilization rates, core inflation in the DM is forecasted to move up 0.7%-pts to reach 2%oya by year-end 2019, while EM core inflation is projected to slip to 2.7%. These moves could be a correction back to the Phillips curve model.

DM forecasts align with our Phillips curve model estimates in the U.S. and the Euro area, where inflation expectations are projected to remain stable (Table 2). The Japan forecast diverges from our model estimates, in large part because Japan inflation expectations are projected to move higher in the coming year.

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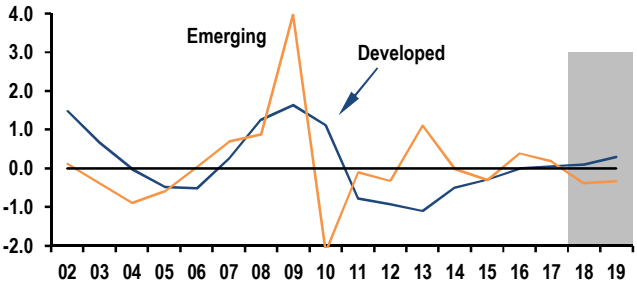
Global fiscal policy in a time of crisis and recovery

- **Fiscal policy was a crucial support during the GFC but quickly turned restrictive.**
- **Yet fiscal deficits remain elevated despite output gaps being closed, suggesting structural imbalance.**
- **The legacy cost of the GFC has been a 41%-point surge in DM public sector debt as a share of GDP.**
- **Falling potential growth, rising interest rates, looming entitlement costs, higher levels of debt, and still-elevated deficits raise sustainability concerns.**

Any retrospective of the global financial crisis must give some credit to the unprecedented government action in support of aggregate demand as a key ingredient to preventing a far worse outcome. In the DM, discretionary fiscal stimulus packages alone amounted to 4% of GDP between 2008 and 2010, or about 1.3% per year for three years (Figure 1). At the same time, the EM enacted nearly 5% of GDP worth of the stimulus in 2008 and 2009. Combined with significant automatic stabilizers, the public sector provided a huge support to aggregate demand in the face of widespread deleveraging in the private sector.

Figure 1: Fiscal thrust impact on real GDP growth

%-pt impact on GDP growth

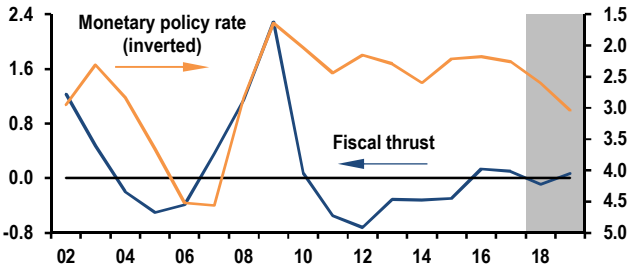


Source: J.P. Morgan, IMF; Defined as change in structural deficit with some adjustments

Although the rapid public sector injection of demand during the crisis was crucial, the subsequent steps to quickly rebuild fiscal balances in the early stages of the expansion were arguably a significant policy mistake given the ongoing headwinds from private sector deleveraging. To be sure, the European sovereign credit crisis severely limited fiscal options, a result of the deeper original sin inherent to the Euro area experiment: a monetary union absent a fiscal union. Regardless, monetary policy was (and continues to be) the only source of policy support for much of the early expansion (Figure 2). With the private sector more inclined to delever, the use of monetary over fiscal policy would seem all the more mistaken.

Figure 2: Global fiscal and monetary policy

%pt impact on real GDP growth from active fiscal policy changes %p.a.



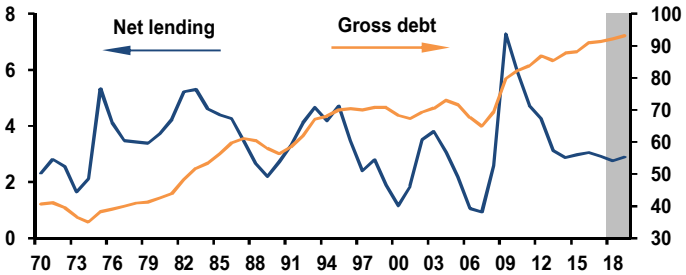
Source: J.P. Morgan, IMF

Even with the ill-advised early fiscal consolidation, the short-lived support during the crisis came with a significant cost, and the pace of consolidation since then has been unusually slow, all the while adding to the cost. As the economic recession spread around the world, fiscal revenues in the DM fell outright between 2007 and 2009 as outlays jumped. On net, the fiscal lending position of the DM as a share of GDP fell sharply by more than 8%-points to a post–World War II low of nearly -9% in 2009.

Since then, fiscal balances have improved as deficits came down, but the moves have been slow and arguably exacerbated by the too-early move to consolidate—damping the recovery and the potential for improved fiscal revenues. The global expansion that began in mid-2009 is now in its 10th year, and the legacy cost of the financial crisis is still very visible in the form of higher debt. Gross debt of the global public sector surged from 65% of GDP in 2007 to 86% just five years later in 2012 and now stands at 92% (Figure 3). For the DM, gross debt skyrocketed nearly 40%-points.

Figure 3: Global fiscal net lending and debt

% pf GDP, both scales



Source: J.P. Morgan

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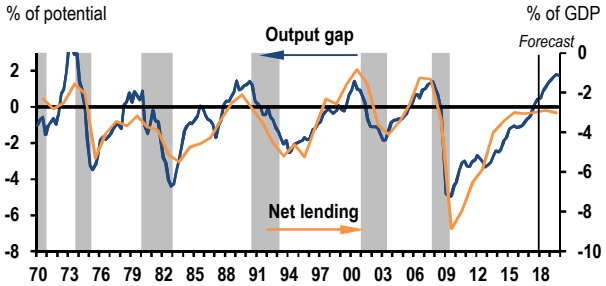
With public sector debt significantly higher and interest rates on the rise, fiscal sustainability is coming into question. These concerns are exacerbated by the decline in long-run potential growth as well as the increasing outlays projected for entitlement spending as populations are aging. For now, at least, the pressure on sustainability is surprisingly limited. Although the global economy has undergone a marked slowing in potential growth, it has also benefited from what has been a remarkable secular decline in interest rates. Even as rates increase, current expectations are that they remain below the rate of economic growth. Such an outcome, if correct, bodes well for fiscal sustainability. Of course, markets can change rapidly, and the much higher levels of debt, looming entitlement costs, and incomplete cyclical corrections in net lending positions all pose increased leverage to the risk of a sharp increase in interest rates should markets turn sour on sovereign debt.

Fiscal policy loses cyclical link

Just as the global financial crisis was unique in its magnitude, the expansion has been unique in its relationship to fiscal dynamics. Despite a substantial decline from its 7.3% peak in 2009, the global fiscal deficit remains elevated at 2.9% of GDP. Typically, sustained growth and the closing of output gaps deliver the needed normalization in fiscal positions. However, the dynamics linking the business cycle and fiscal positions have proved unusual in the current expansion, particularly in the DM. One of the more remarkable developments of the expansion is that, despite being in its 10th year, government net lending as a share of GDP has not kept pace with economic healing (Figure 4). Moreover, even with strong projected growth through 2019, global government net lending is set to deteriorate. The apparent disconnect and still-elevated deficits raise the question of vulnerabilities in the event of the next global recession.

Figure 4: Output gap and fiscal net lending, Developed Markets

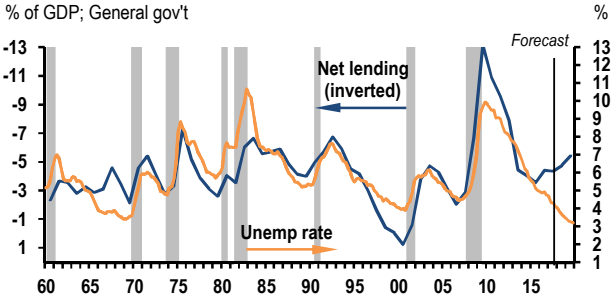


Source: J.P. Morgan; DM recession bars defined by J.P. Morgan

The disconnect between DM net lending from the economic cycle reflects two separate dynamics. The first is the unusually large fiscal tightening that occurred in the Euro area in 2011-2013, though the U.S. was also tightening over this period as well. Consequently, net lending actually recovered more quickly than the cycle suggested. However, the stalled improvement in DM fiscal net lending since 2013 is a puzzle that is almost entirely attributable to the U.S., where a significant reduction in slack has failed to generate any improvement in the fiscal lending position. The U.S. was actually tightening policy slightly in 2014-15, and while we expect fiscal easing in 2018-19, it does not come close to explaining the gap that exists relative to the cycle.

For the U.S., the only historical precedent that comes close in the post–World War II era is in the late 1960s (Figure 5). During this period, fiscal spending was ramping up in response to President Johnson's Great Society initiatives and the Vietnam War, while revenues were slipping in response to slowing productivity growth weighing on GDP. The productivity slowdown similarly was contributing to the tightening in resource use with the decline in the unemployment rate.

Figure 5: US fiscal net lending and unemployment rate



Source: J.P. Morgan; Recession bars in grey, forecast after dashed black line

There are different possible explanations for the failure of DM (largely U.S.) net lending to recover in line with the improving cycle. One is that slack has been persistently larger than our measure. This would suggest fiscal healing eventually could be completed as the expansion could last longer, supported in part by a more gradual removal of monetary accommodation. Alternatively, there could have been more fiscal thrust than we estimate, which is negative as it implies weaker underlying growth. A third possibility—that is incorporated in our U.S. forecast—is that fiscal multipliers translating deficits into growth have declined. The implication is also negative and suggests the latest round of U.S. fiscal stimulus is coming at a steep price with less bang for the buck than if implemented earlier in the cycle.

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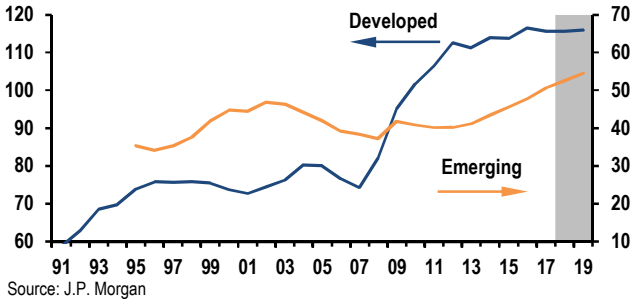
Cross-currents buffet fiscal path ahead

The fiscal cushion to aggregate demand through the global financial crisis and subsequent sluggish recovery came with a material cost. Global sovereign debt has ballooned by 26%-points of GDP since 2007. The bulk of the rise is found in the DM, where debt has surged roughly 41%-points of the GDP—compared to a 12%-point rise in the EM (Figure 6). With net lending positions still relatively elevated, there is no sign that the debt levels will be declining in the foreseeable future.

Figure 6: Gross debt, general government

% of GDP



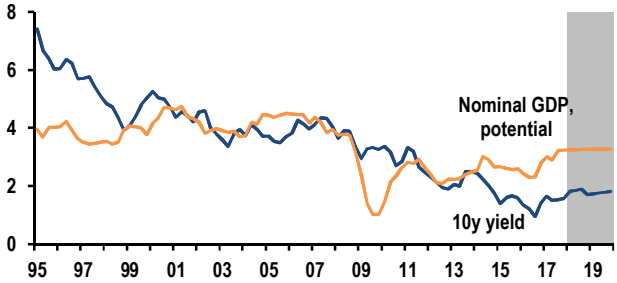
Source: J.P. Morgan

Two key drivers of fiscal dynamics—potential growth and interest rates—will pose increasing challenges in the years to come. With potential growth having fallen considerably, the ability of governments to generate revenues has deteriorated. At the same time, as interest rates eventually normalize, debt service burdens will increase—amplified by much higher levels of debt. However, not all is negative. Outside of a handful of problem countries (including the U.S.), primary balances have improved markedly over the past decade. Moreover, although interest rates are rising, the levels are projected to remain low for many years. For the DM as a whole, forward rates are projected to run below potential growth rates for the indefinite future. Such an outcome has not been seen in many decades and greatly improves fiscal sustainability (Figure 7).

Despite the mixed fundamentals that have, on net, improved fiscal sustainability in recent years for many countries, a number of key countries have seen a net deterioration. Foremost is the U.S., where we estimate the primary balance projected for 2019 is 2.2%-points below the level needed just to stabilize net debt at an already high level. Moreover, the risk for a sharper increase in borrowing costs along with that of the end of the current economic expansion (now going on a record 10 years) will pose challenges for any country that is still running elevated deficits. These challenges will be amplified should holders of sovereign debt begin to demand higher returns than currently priced in the face of growing fiscal stress.

Figure 7: Fiscal fundamentals, Developed Markets

%pa (yield) and %ar (growth); Yield fcst is forward curve



Source: J.P. Morgan

A framework for fiscal sustainability

To assess how these shifting fiscal fundamentals will impact country-level sustainability, we turn to the dynamic budget constraint faced by all sovereigns. Our analysis focuses on net debt as a share of GDP, which subtracts out any financial assets. Because this analysis requires a decomposition of net lending into interest payments and the primary balance, our focus shifts to the subset of OECD countries—we also break the Euro area into its country members. The ability to maintain a fiscal position that stabilizes the level of debt relative to GDP is one metric used to assess debt sustainability. To evaluate the degree to which a stable debt-to-GDP ratio is achievable, we turn to the dynamic budget constraint of the government:

$$D_t = (1 + i)D_{t-1} - P_t,$$

where D is net fiscal debt, P is the primary balance (net lending less interest payments), and i is the average interest on debt. As a share of GDP, this can be rewritten as:

$$d_t = (1 + i - g)d_{t-1} - p_t,$$

where lower case values are ratios to nominal GDP and g is the growth rate of potential nominal GDP (our estimate of real potential plus the inflation target). As is clear from the above equation, the difference between the average interest rate on debt and nominal GDP growth is an important determinant of debt dynamics, and thus fiscal sustainability. Higher interest rates increase the burden of interest payments on debt, while faster growth generates greater revenue. It is also straightforward from this equation to develop the most basic of fiscal sustainability metrics—the level of the primary balance (as a share of GDP) required to at least stabilize the current level of debt as a share of GDP:

$$p_t = (i - g)d_{t-1}.$$

Consequently, fiscal sustainability is a function of the gap between the interest rate on debt and long-run, potential

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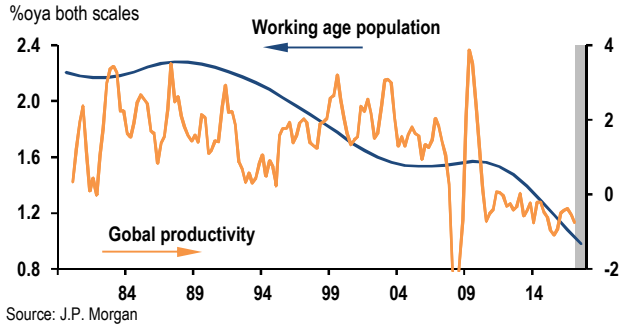
growth, the level of debt, and the level of the primary balance.

The decline in long-run potential growth rates along with rising interest rates will be a headwind to fiscal sustainability. Structural factors have led us to mark down potential growth estimates across the world. Our current estimate for global real potential GDP growth is 2.7%, down from 3.0% in the previous expansion. In addition, inflation is not expected to break central bank targets; therefore, estimates of nominal potential growth are also low. To be sure, last year was one of the strongest years of growth in this expansion, and we expect 2018 will be another year of strong growth. However, these above-trend growth rates are not expected to sustain over time.

Over the long term, structural factors like slower productivity growth will be an obstacle to debt sustainability as governments' ability to generate enough revenues to pay off existing debt will be more constrained. Demographics in developed countries will also be a headwind as the old-age population as a share of the working age population is expected to rise notably in the coming years (Figure 8).

Figure 8: Global working age population and productivity



Source: J.P. Morgan

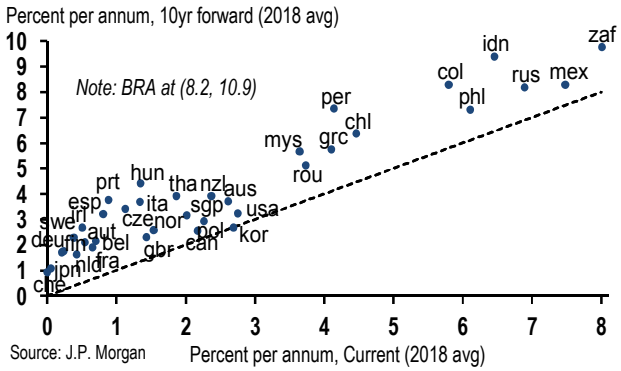
Borrowing costs on the rise

Alongside constrained growth, borrowing costs are expected to rise in coming years, albeit gradually. As growth and inflation have normalized, central banks in advanced economies have moved to lift rates from their depressed levels. This is seen most outright in the U.S. where the Fed has raised rates 150bp since December 2015 and another 150bp of tightening is expected by the end of 2019. Outside the U.S., we also expect that Canada and the U.K. will continue tightening, and the ECB should hike rates for the first time by September 2019.

The forecast for EM policy rates is more nuanced. While in aggregate the policy rate is projected to rise only 30bp through 2019, this masks country-level divergences. We expect a little over half of our EM sample to tighten monetary policy in 2018, but these moves are offset by China and Brazil, which are expected to be on hold, and Russia and Argentina, which are expected to ease in 2018.

Over time, interest paid on liabilities adds to debt. Thus, the projected rise in borrowing costs will make servicing debt more difficult. While there is always uncertainty about the future path of rates, we can use forward rates as a guide to where they are headed. Figure 9 plots the current yield on sovereign debt at the average tenor of each country's debt outstanding against the 10-year forward rate of that same tenor (note that China and India are excluded from this analysis). While the mix of maturing bonds will change over time, in general rates are expected to be higher in the future than they are today. On average, 10-year forward rates are about 150bp higher than current yields, with little variation in the increase across current starting yields.

Figure 9: Yield on sovereign debt at average tenor



Source: J.P. Morgan

In general, fiscal fundamentals vary considerably across countries (Figure 10). Along with Greece, Japan, Italy, and Portugal are the worst positioned with very high levels of debt. However, the gap between the interest rate and nominal potential growth has become slightly more favorable since earlier this decade. The U.S. has a considerably high level of debt, and growth is not expected to be high enough to draw down debt easily. A number of EM economies face very high interest rates with Brazil, South Africa, and Mexico standing out in this regard, but the low levels of debt relative to the DM make these fundamentals less concerning. Those best positioned to reduce net debt levels include Korea, the Scandes, Canada, Germany, and Poland.

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Figure 10: Fundamentals of fiscal sustainability, long run assumptions

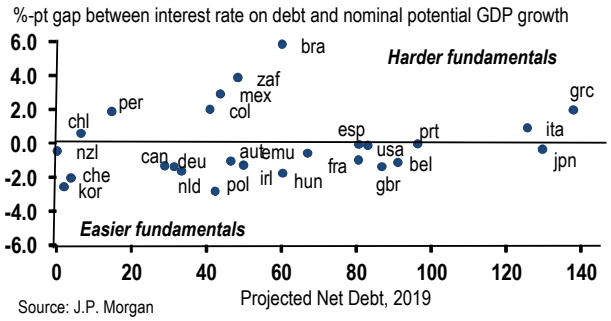
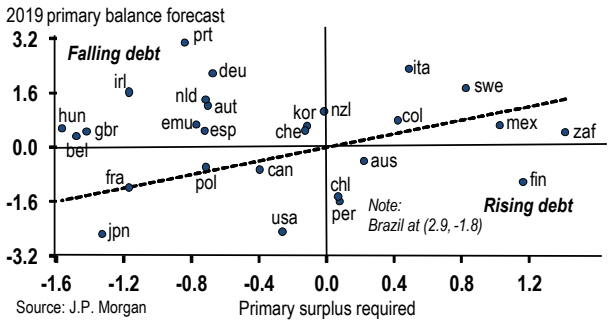


Figure 11: Primary surplus needed to stabilize net debt-GDP ratio



Adjustments needed for sustainability

Debt dynamics are not only determined by the differential between borrowing costs and growth in conjunction with the level of debt but also the fiscal positon (i.e., the primary balance). With potential growth constrained and interest rates set to rise, debt sustainability is unlikely to be achieved absent fiscal consolidation. As a whole, the DM requires a primary balance of -0.7% to hold the debt ratio constant by 2019. By contrast, our forecast calls for the primary balance to widen slightly between 2017 and 2019 to -1.4%.

The degree of consolidation required is mixed by country. Figure 11 shows the required primary surplus to simply stabilize debt (x-axis) graphed against the projected primary balance (y-axis) for 2019. Countries below the dashed line still have debt that is projected to rise. Much of the expected widening of the deficit in the DM is driven by the U.S., where fiscal stimulus is being implemented. As noted above, while the fundamentals do not appear too unfavorable (the gap between interest rates and nominal GDP growth is small), debt levels are already high and the primary deficit is expected to remain elevated such that the U.S. will fall short of achieving debt sustainability by 2019. We expect the primary deficit to widen 0.6%-pt to 2.5% of GDP in 2019, while a -0.3%-pt balance is required to maintain a stable net debt ratio. This implies the U.S. would need a large 2.2%-pts of consolidation to achieve sustainability as defined in this exercise.

Elsewhere in the DM, Japan requires less fiscal consolidation than the U.S., but more austerity is needed than is already penciled in for the next two years. With inflation expected to run below the central bank's target in the medium term and already very high levels of debt, debt sustainability remains a high hurdle.

The Euro area as a whole is in a more favorable position. At the country level, most in the region are expected to have fiscal surpluses with the notable exception of France. The post-crisis fiscal austerity imposed on some Euro area countries has helped the region improve its fiscal stance, with net debt as a share of GDP in Italy, Spain, and Portugal expected to decline slightly through 2019. However, it is worth noting the level of debt in GDP terms is still worryingly high in these countries, while the most recent turmoil in Italy is a reminder that rates can quickly shift the calculus on debt sustainability (the analysis here abstracts from the recent turmoil, implicitly assuming a benign resolution). The U.K. is expected to tighten policy enough to maintain stable debt. Commodity producers Australia and Canada meanwhile require slightly more consolidation than is expected.

The EM faces lower debt levels in GDP terms than the DM in part because EM governments have generally been wary of large debt burdens following the crises in the late 1990s. Fiscal issues have become more of a concern, especially for commodity-producing countries following the collapse in prices of raw materials over 2014-2015. These economies are expected to fall short of achieving debt sustainability. Brazil, Chile, Mexico, Peru, and South Africa all require primary surpluses in order to maintain a stable debt ratio. Unsurprisingly, Brazil is the worst positioned with a 2.9% surplus required, but a projected deficit of 1.8% for 2019. Colombia, Peru, and South Africa need to show greater fiscal discipline than is expected to achieve sustainability. By contrast, Korea, Hungary, and Poland are all projected to achieve sustainability to varying degrees.

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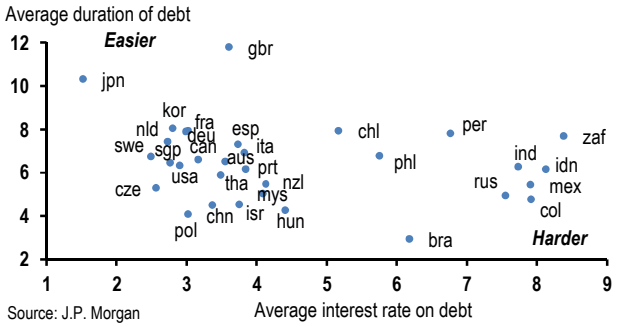
Fiscal sensitivities to rate shocks

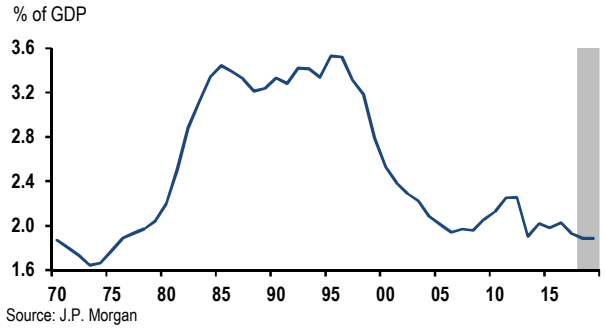
Global fiscal balance sheets remain vulnerable to a number of risks, one of which is that interest rates will rise more than expected, resulting in higher debt servicing costs. To be sure, the duration of debt is skewed toward long-term bonds and interest rates are generally low across the world (Figure 12). In addition, interest payments in GDP terms are low by historical standards. Indeed, for the DM, net interest payments are about 2% of GDP, the lowest since the late 1970s (Figure 13). Nevertheless, tighter financial conditions would stress government balance sheets, already burdened with very high levels of liabilities in GDP terms.

Figure 12: Ease of servicing debt



Source: J.P. Morgan

Figure 13: Net interest payments, Developed markets



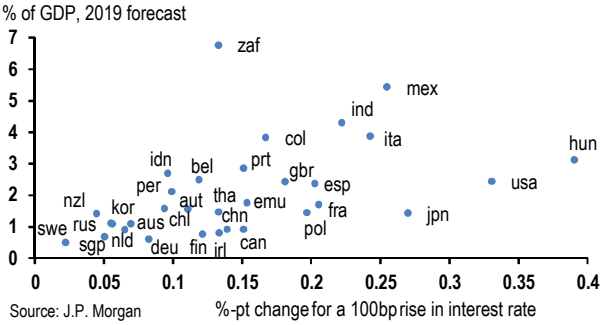
Source: J.P. Morgan

We conduct a sensitivity analysis to show how interest payments as a share of GDP would evolve given a 100bp increase in interest rates (Figure 14 and 15) across debt at different maturities. Within developed markets, the U.S. and Japan are most vulnerable. Both already have high levels of debt, but interest payments as a share of GDP are relatively low, which is a product of the low interest rate environment. Interest payments for the Euro area as a whole would increase nominally given an unexpected 100bp increase in borrowing costs, with Italy the most exposed to a sudden rise in rates (a risk that is currently being tested with the recent surge in rates). A handful of emerging markets are more at risk to an unexpected tightening in financial conditions, including Brazil (not shown), South Africa, India, and Mexico. These economies' interest payments are also high in GDP terms.

The interaction between the level of debt and interest rates raises further risks. It is natural to assume that as the level of debt as a share of GDP increases, the risks associated with the ability to service that debt increase and act to push interest rates higher—exacerbating the ability to pay. This is not always the case as Japan is a strong counterexample with exceptionally high debt and very low interest rates. While Japan is aided by a current account surplus, the U.S. is a testament to elevated debt, fiscal and external imbalances, and slow potential growth, but with still depressed interest rates. Of course, the U.S. is a likely exception that could prove the rule.

In one study, it has been argued that the level of fiscal debt could even depress long-run growth, with levels of 60% of GDP dampening growth by as much as 2%-points and 90% cutting growth in half (C. Reinhart, K. Rogoff, "Growth in a Time of Debt," American Economic Review, 2010). However, this non-peer reviewed study has since been called into question, and follow-up studies have shown a more modest (though still notable) impact.

Figure 14: Interest payments on government debt



Source: J.P. Morgan

An additional risk for emerging markets is a stronger U.S. dollar, should U.S. monetary policy tighten faster than expected. While currency depreciation would lead to higher inflation, the positive impacts from this would likely be offset by valuation effects—debt that has been issued in USD would be more difficult to pay down. Many governments in emerging markets serve as backstops or implicitly back private sector liabilities, which would further compound negative impacts from currency depreciation.

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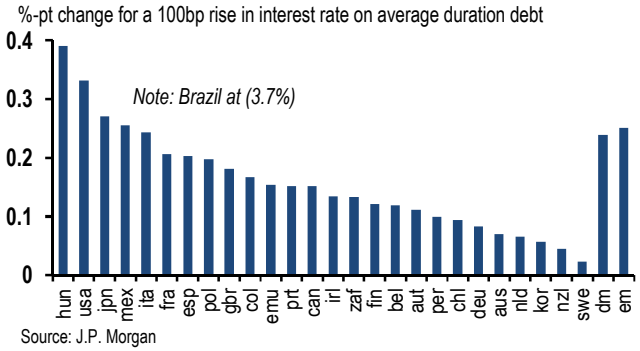
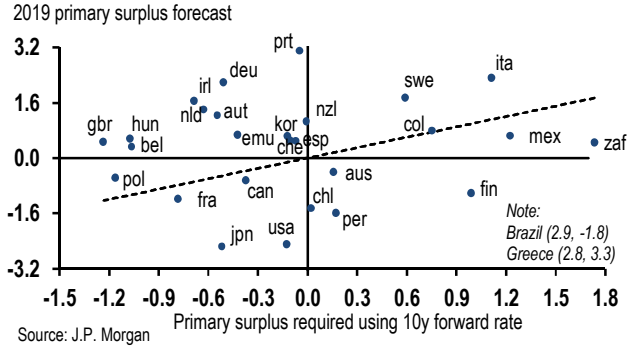
Figure 15: Interest payments as a share of GDP, 2019



Source: J.P. Morgan

We can test the sensitivity of debt sustainability by replotting Figure 16 by swapping the four-year forward rate with the 10-year forward interest rate. The economies most sensitive include Japan, Mexico, and South Africa, where interest rates are projected to be higher by on average nearly 120bp (Figure 16). Portugal and Italy are also exposed but are projected to have primary surpluses above that required to stabilize net debt even when assuming a higher interest rate by more than 200bp. Brazil does not change much as the biggest increase in interest rates is expected over the next few years with less movement expected in the longer term.

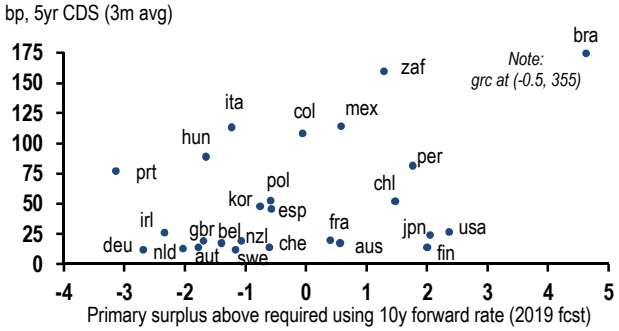
Figure 16: Primary surplus needed to stabilize net debt-GDP ratio



Source: J.P. Morgan

The perceived risk of sovereign default remains low for the developed economies even though some face a high hurdle to debt sustainability, notably the U.S. and Japan (Figure 17). While Italy and Portugal are expected to continue drawing down net debt levels and spreads with German bunds have narrowed since 2011, both are still perceived to be more susceptible to default relative to other countries in the Euro area. EM economies that require more fiscal discipline also have high CDS spreads (Brazil, South Africa, and Mexico).

Figure 17: Fiscal sustainability and credit risk



Source: J.P. Morgan

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Global Emerging Markets Research
J.P. Morgan Perspectives
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End of Washington Consensus and G-20 policy coordination?

- **The ideological hold of neoliberal policies (Washington Consensus) has been challenged post-GFC on rising inequality and political populism.**
- **A new consensus is yet to be fully articulated, but addressing inequality is likely to be central to it.**
- **The unprecedented G-20 policy coordination in the wake of the GFC has virtually disappeared.**
- **EM economies have gone back to self-insurance via reserves accumulation.**

As the global expansion enters its 10th year, it is also at a crossroads. Signs of firming economic activity contrast with the rising risk of a trade war. Importantly, stronger growth has also failed to relieve frustrations about rising inequality and economic insecurity that have rocked the political establishments of many countries.

The implicit assumption behind the standard growth model of recent decades has been that a rising tide of GDP promoted by supply-side reforms, increased incentives for private capital investment, and export-oriented production will ultimately lift all boats. But recent political developments around the world suggest that in many countries most citizens lack confidence in this. Ever since the GFC political leaders have called repeatedly, in G-20 communiques and UN declarations, for new and more deliberate efforts to make growth more socially inclusive.

Despite this new consensus that broad socioeconomic progress should be prioritized higher, GDP growth remains the primary form of tracking national economic performance. Since what gets measured tends to get managed, the focus on GDP data tends to reinforce the imbalance of attention and resources on the level of economic activity relative to the breadth of social participation in the process of growth.[1]

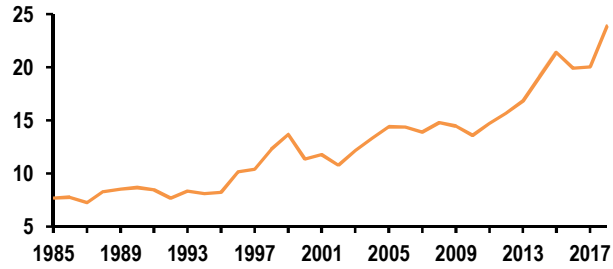
[1] World Economic Forum," A new way to measure economic growth and progress," January 2018

Rising populism, worsening inequality

The support for populist or extreme parties globally has recently surged, reaching the highest levels since the early 1930s. This wave has already swept several populists to power, mainly in Europe and the U.S. The recent populist surge is not a sudden phenomenon and has been building for some time. Votes for populists began to rise in Europe back in the 1980s, and almost a quarter of the European electorate now votes for a left-wing or right-wing populist party[2] (Figure 1). Authoritarian parties were rarely part of governments in the 1980s, but today they hold power in over a quarter of EU member states.

Figure 1: Support for populist* parties in Europe

% of total votes in elections, 4-year moving average



Source: ParlGov. * Includes both left and right-wing exterme parties.

In the U.S., which essentially has a two-party system, the rise in political polarization paints a similar picture. It started to lift off around 35 years ago and culminated in the election of President Trump. However, not all populist movements have been successful. Several high-profile movements experienced pushback in 2017-18. Dutch, French, and German voters all opted for mainstream governments. This pushback does not imply that populist parties are in retreat. Indeed, populist candidates made important gains in all three countries.

The key to understanding the rise in political populism, we believe, lies in rising income and wealth inequality. Income inequality is rising in most countries, albeit with large variations in magnitude. Although gains in the Gini coefficient[3] have been modest since the mid-1990s, the top 10% income share, which more adequately captures the shifts happening at extremes of the income distributions—exactly

[2] TIMBRO Authoritarian Populism Index 2017

[3] The Gini coefficient is the most common measure of inequality. It ranges from 0, when everyone has exactly the same income, to 1 (or 100) when a single individual receives all the income of a society.

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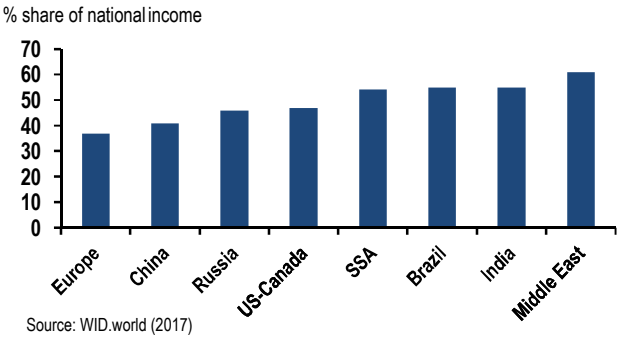
where the most evolution has taken place over the past decade—have continued to increase over the past decade.

Figure 2: Top 10% income share across the world



Source: WID.world (2017)

The rise since the 1990s has been moderate in Europe but increased rapidly in China, India, and North America to 45-50% of total income in 2017. In the Middle East, Africa, and Latin America, income inequality has remained relatively stable, albeit at extremely high levels (Figure 2). Traditionally, there has been less evidence of inequality in the distribution of household wealth than in incomes, but this has changed rapidly in the past five years. OECD data show that wealth inequality is much larger than income inequality. Wealth inequality has also risen more sharply as asset price appreciation boosted wealth concentration—a trend that was not reversed by the GFC.

End of the Washington Consensus

Three interrelated factors have likely contributed to growing income inequality: technological progress (e.g., the rise of automation), globalization, and **financial markets deregulation.** All three trends have generated winners and losers and have weighed on middle-class incomes and jobs, especially those who, because of their age, lack of skills, or education, were not able to adjust. In Europe, the ongoing refugee crisis has likely also helped authoritarian-populist parties establish themselves as a permanent threat to liberal democracies. Observing these long-run trends, there are no signs that support for antiestablishment parties will decrease in the short run. Populism could thus remain a political force for a considerable time.

The shift in the political mood in favor of populism is not entirely surprising. As argued by Harvard economist Dani Rodrik, societies cannot pursue globalization, strong nation states, and democratic rights at the same time.[4] One objective usually has to give. This explains why the pendulum may be swinging away from deep economic integration toward stronger individual nation states. The pro-globalization mind-set of the previous era favored global trade agreements, used the WTO to settle trade disputes, and favored economic and monetary unions. Domestic policies were driven by neoliberalism that pushed market liberalization, with modest taxes and social safety nets as a grand bargain. This was the Washington Consensus, which remained the basis of most policies and reforms globally despite being challenged first by the Asian Tigers and then by China. However, none of these countries challenged the international trading and financial system. In recent years the opposite trend has emerged, with the cancellation of international agreements, withdrawal from economic unions (e.g., Brexit, U.S. withdrawal from the Trans-Pacific Partnership), and increased barriers to trade. What the new consensus will be is now being contested across the world. Ironically, Washington itself is leading these changes.

GFC prompts unprecedented G-20 policy coordination

In the initial days of the GFC, policies tended to be reactive and countries acted independently to expand lender of last resort facilities, increase protection of creditors and depositors, and recapitalize banks with public funds. It quickly became evident that a coordinated response was needed for systemic risks posed by large cross-border financial conglomerates and capital flows.The lack of coordination was destabilizing in the short term with large cross-border shifts in deposits in some countries. As the ripples of the financial crisis spread globally, the need for coordinated response became increasingly clear.

With economic conditions deteriorating fast, the G-20 Leaders at their Washington Summit on November 15, 2008, agreed that "a broader policy response is needed, based on closer macroeconomic cooperation, to restore growth, avoid negative spillovers and support emerging market economies and developing countries." This was unprecedented in that EM was seen as an important stakeholder in the global effort, and EM countries were sought out to play an important role. At the following year's summit in Pittsburgh, the efforts were formalized in what came to be known as the "Framework for Strong, Sustainable, and Balanced Growth."

The coordination was envisaged to cover both monetary and fiscal policies, along with coordinated changes to the international financial architecture and stability by establishing new global institutions such as the Financial

[4] Dani Rodrik, "Death by Finance" Project Syndicate, February 2014

Stability Board. The G-20 also trebled funding to the IMF to US$750 billion. The G-20 led efforts to improve international economic and financial coordination, which were welcomed by policy makers and the market and helped to restore stability to the global economy.

On monetary policy *per se*, much of the coordination was informal, and the traditional view of domestically-oriented monetary policy was reinforced as the optimal one (St. Petersburg summit in September 2013). However, major central banks on more than one occasion cut policy rates at the same time, and on the liquidity provision front, the U.S. Fed authorized FX swap lines with several different monetary authorities, which later spread to similar arrangments among other central banks in both DM and EM.

On fiscal policy, the need for coordinated actions became all the more clear given that stimulus measures are typically less effective in open economies as there are large spillovers to other countries through trade. Although not formally coordinated, this prompted countries to deliver a global fiscal stimulus of 2 percent of GDP in 2009, which was followed by more in 2010.

More formal coordination has been achieved under the various global working groups such as the Financial Stability Board on cross-border financial sector supervision and regulation and enhanced information sharing.

Then came the Taper Tantrum and the end of the policy coordination

However, as different DM economies began to recover at different paces, an exit from uncoventional policies became increasingly difficult to coordinate. In mid-2013, remarks by the Fed on the need to start winding down QE sparked a global tightening in financial conditions, and several of the current-account deficit EM economies were caught in the crosshairs. Driven by large capital outflows, their FX plummeted and domestic interest rates were forced to be raised to defend the depreciation that ended up slowing growth and raising inflationary pressures. In turn, this prompted some EM central bankers to call for coordinated exit. The then Governor of the Reserve Bank of India, Raghuram Rajan, in a series of speeches argued that international monetary policy coordination had broken down and needed to be restored.[5] The view was controversial, and most DM central bankers reiterated that monetary policy needed to be focused on domestic conditions and not driven by spillover concerns and that it was naïve of EM policy makers to expect DM economies to adjust their economic policies in response to economic conditions elsewhere.

Since then there has been less discussion about monetary or fiscal policy coordination. Instead, the focus has been on global regulatory and supervisory frameworks, although the progress seen in the first few years of the GFC has slowed. EM economies have gone back to self-insurance via FX reserves accumulation and relied on increased FX flexibility to adjust to external shocks, such as the sudden rise in U.S. dollar strength this year. As an IMF blog notes "International policy coordination is like the Loch Ness monster—much discussed, but rarely seen."[6]

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[5] "Competitive Monetary Easing: Is It Yesterday Once More?" Brookings Institution, Washington DC, 2014

[6] Policy Coordination: The Loch Ness Monster", Blanchard, Olivier, Jonathan Ostry and Atish Ghosh, "International IMF Direct – the IMF Blog, December 2013.

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1990s' lessons helped EM avoid GFC crisis

- **Lessons from 1990s' crises helped EM be better prepared for 2008.**
- **EM did adjust but through a more gradual 2010-2015 slowdown.**
- **Self-insurance (high FX reserves) and FX flexibility were bigger buffers than improved institutions.**
- **2013 Taper Tantrum showed EM is never too far from a crisis, but this EM sell-off was relatively small in the context of other crises.**

In thinking through the lessons learned from the EM financial crises of the 1990s, the underlying presumption is that starting conditions matter and strong balance sheets are better able to withstand growth shocks without morphing into financial crisis. Thus, we adopt a stylized framework that focuses on the role of balance sheet vulnerabilities as initial starting conditions for financial crises (see Dornbusch, R., 2001, "A Primer on Emerging Market Crises," NBER Working Paper 8326). Set in that context, the Emerging Market crises of the 1990s—the Mexican Tequila Crisis of 1994, the Asian Financial Crisis of 1997, and the Brazilian and Russian Crisis of 1998—provide helpful comparative insights and the lessons that can be gleaned from them.

For much of the 1990s, EM economies experienced boom-bust cycles. Average growth in EM economies in the 1990s was only 2.6% compared to 4.9% for developed economies. Inflation was still high in many parts of EM, averaging 55%. EM economies still wrestled with high public debt burdens, averaging nearly 70% of GDP, with countries like Argentina (150%), Bulgaria (160%), and Lebanon (180%) in the triple digits, and high fiscal deficits, averaging 4.3% of GDP. Currency regimes were often pegged and unsustainable, at the same time that foreign exchange reserves were virtually nonexistent.

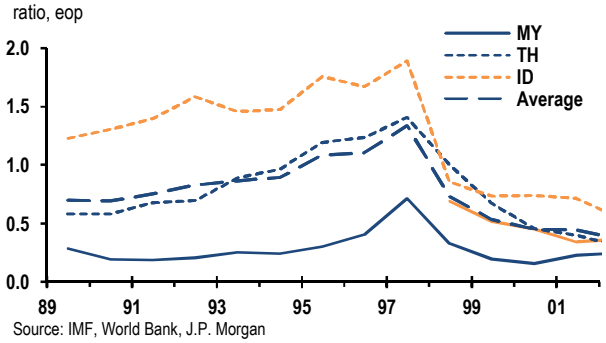
The Asia and Russia crises of 1998 prompted a decade of reforms that gave a broad and diverse range of EM countries the scope to undertake countercyclical policies and implement fiscal stimulus measures in response to the 2008 GFC. In the decade preceding the 2008 GFC, EM policy makers abandoned fixed exchange rates, adopted inflation targeting, increased foreign exchange reserves, and dramatically reduced external debt levels.

China led the fiscal stimulus, with the equivalent of 7% of GDP of stimulus measures funded partly by the private sector. Although the magnitude of the fiscal stimulus was much more modest in the rest of EM, collectively at less than 1% of GDP, the fact that many EM countries were able to adopt counter-cyclical fiscal policies at a time of external shocks and recession was in itself unprecedented. EM central banks also eased monetary policy as aggressively as DM central banks, reducing rates by an average of 300bp during 2008 and 2009. The EMEA EM and Latin America regions reduced rates by nearly 400bp, exceeding the rate cuts undertaken by the Fed (188bp) and the ECB (325bp).

Asia

In the case of Asia, the genesis of the crisis started in the early 1990s when export-led development drove expectations of strong growth, fueling rising domestic investment, which also manifested in current account deficits. The prospect of strong growth and high returns in turn prompted capital inflows into the region, helping fund the deficits. Amid willing global creditors, domestic banks and companies were willing borrowers attracted by lower interest rates on foreign capital (largely denominated in USD) relative to domestic capital and facilitated also by semi-fixed exchange rate regimes. The FX regimes in turn provided implicit guarantees of stability against currency fluctuations. Moreover, the revenues of these domestic debtors came in local currency even as their foreign liabilities tended to be short term. Thus, external debt rose notably, as did domestic credit (Figures 1 and 2).

Figure 1: ST external Debt to Gross FX reserves



Source: IMF, World Bank, J.P. Morgan

Balance sheet vulnerabilities accumulated across several dimensions: maturity and currency mismatches between assets and liabilities, and the implicit belief that the extant currency regimes would remain in place. The onset of the crisis occurred in 1996/1997 when the 1996 export slowdown called into question Asia's growth prospects even as Fed Funds rates rose. Foreign investors subsequently withdrew capital from the region, triggering

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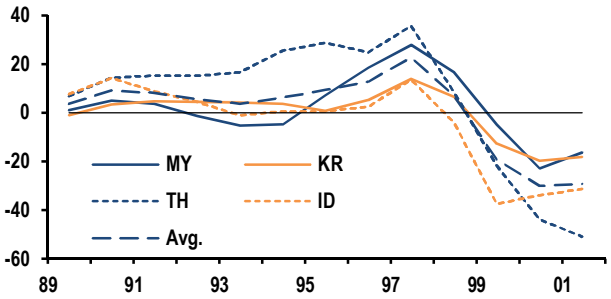
substantial capital outflows leading to the dismantling of currency regimes, starting with the Thai baht in July 1997, and spreading contagion through the region.

Figure 2: EM Asia Credit-to-GDP Gap

% of GDP, Actual less HP filtered trend



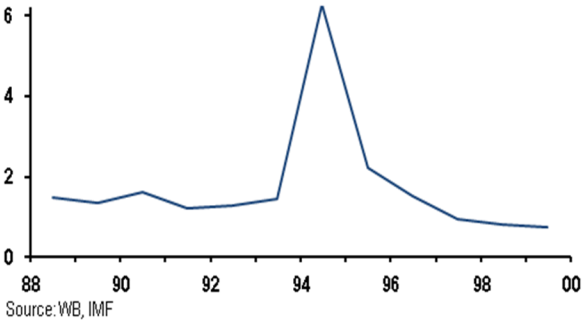
Source: BIS, J.P. Morgan

Mexico and Brazil

In Latin America, the Mexican tequila crisis (1994) was in a way an appetizer to the Asian financial crisis, with some of the same fundamental underpinnings as drivers—namely, the tension between external imbalances, foreign currency borrowing, and rigid overvalued FX regimes, with Fed tightening prompting the unraveling of the unsustainable prior equilibrium (Figure 3). As with the dynamics in Asia that followed later, growth expectations from export-led development—in Mexico's case the signing of NAFTA in 1993, accompanied by fiscal restructuring alongside the Brady Plan, privatizations and reduction of trade barriers—led to large capital inflows, which were reflected in a widening current account deficit, a trend exacerbated by peso overvaluation.

Figure 3: Short-term FX debt as ratio of FX reserves in Mexico

ratio

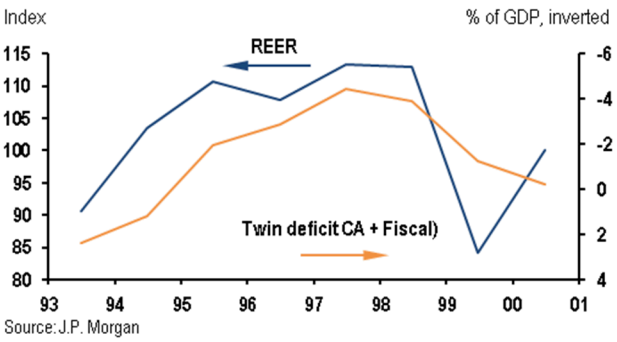


Source: WB, IMF

Moreover, despite the NAFTA enthusiasm, Mexico's current account deficit (CAD) was mainly funded by portfolio investment. Much of this went into short-term public sector debt, essentially carry trade vehicles, which became increasingly dollarized as financial stress started to build (Fed hikes and local political shocks). In the end, after a sharp drain on reserves, the government was forced to abandon the peg and devalue (eventually floating) the peso, which laid bare the currency mismatches confronting the public sector. Full resolution to the financial crisis only prevailed with strong contraction in domestic absorption to correct the CAD and a combined U.S. Treasury and IMF bailout.

Brazil was tested in the Asian financial crisis, but its own crisis only fully manifested following contagion from Russia's default. Brazil in confronting the hyperinflationary legacy of the 1980s was successfully able to slow inflation with the 1994 Real Plan, but the policy framework relied excessively on an overly rigid and increasingly overvalued exchange rate regime and did too little to address public sector deficits. Unlike the Asia experience, in the case of Brazil it was largely the public sector savings/investment gap that drove a widening current account deficit. Asian contagion was contained initially by an aggressive monetary policy tightening and pledges of fiscal consolidation. Eventually after the Russia crisis, an IMF package was enlisted and even more tightening enacted, aiming at attracting capital inflows, while the public sector imbalance was gradually corrected. Nonetheless, it took the abandonment of the peg and a floating of the *real* in January 1999 to restore the external equilibrium in the wake of accumulated overvaluation (Figure 4).

Figure 4: Brazil's macroeconomic imbalances



Source: J.P. Morgan

Russia

The main ingredients of Russia's 1998 financial crisis were similar to those of the others—unsustainable fiscal path, rigid exchange rate regime, reliance on foreign capital, and maturity and currency mismatches. Russia's transition from a command to market economy was difficult, with GDP declining almost 40% between 1990 and 1997 (in other words, the country

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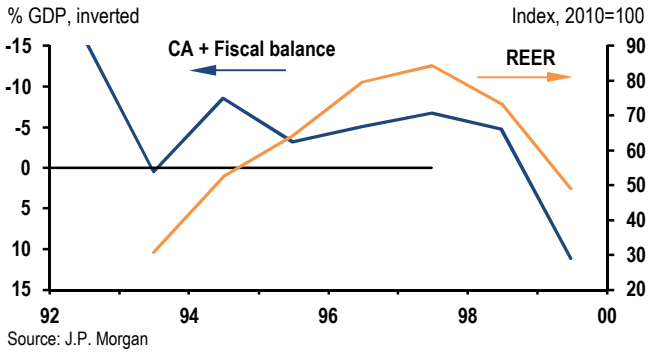
experienced its own Great Depression). Fiscal gaps accumulated along the way and were accentuated by a system of non-payments in a cash-starved economy. IMF financing covered only part of the shortfalls, and the government had to resort to debt markets, with the short-maturity debt stock building up quickly. Attracted by high local currency yields amid a pegged FX regime, foreign capital flew in to finance external and fiscal deficits.

Figure 5: Russia twin deficit vs. REER



Source: J.P. Morgan

At the same time, the pegged FX regime—part of standard stabilization programs at the time—led to overvaluation of the ruble, which only worsened when oil prices collapsed to $12/bbl by mid-1998 (Figure 5). Maintaining the overvalued currency had only been possible until the shock waves of the Asian crisis and the oil price decline led to a rapid meltdown of FX reserves. In August 1998, Russia defaulted on the sovereign local currency debt and on the London Club foreign currency debt, introduced a moratorium on banks' external debt payments, and let the exchange rate adjust.

Lessons: Be flexible, be disciplined

In the immediate aftermath, the lessons from the 1990s crises loomed large for EM policy makers[1] and helped guide most of the larger countries toward macroeconomic frameworks that proved to be more resilient by the time the global financial crisis hit a decade later. Currency regimes became much more flexible (Table 1) and in many cases were anchored by newly introduced inflation targeting frameworks (Figure 6). FX reserves were built up as self-insurance against external pressures. In addition, many EMs introduced rules to enhance the credibility and discipline of fiscal policy. We review the structural changes and lessons learned below:

[1] See Kawai, M; Newfarmer, R; Schmukler, S. "Crisis and contagion in East Asia : nine lessons." World Bank Policy Research Working Paper 2610 and Hale, G. "Could We Have Learned from the Asian Financial Crisis of 1997-1998?" FRBSF Economic Letter 2011-06
Pinto, B; Gurvich, E; Ulatov, S. "Lessons from Russian Crisis of 1998 and Recovery," February 2004

1) Move away from fixed exchange rate regimes

The introduction of policies to end hyperinflation in the early 1990s was followed by decisions to move away from fixed exchange rate regimes in the aftermath of the 1997 Asian crisis and the 1998 Russia default, with only a handful of countries moving in the other direction (i.e., Bulgaria, Ecuador, and Venezuela). The main policy tools for stabilizing the macro economy since then have included moving to a floating FX regime across most of Latin America and to a managed float in EM Asia, accumulating large primary surpluses in debt-laden countries, and introducing macro stabilization funds in commodity-exporting countries.

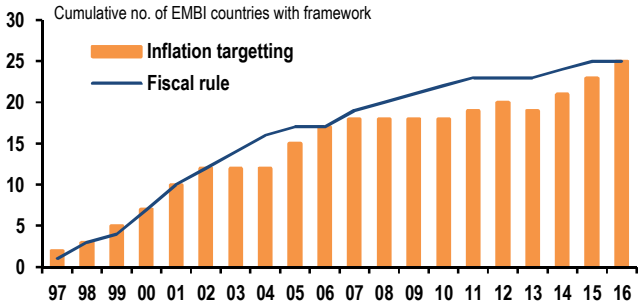
Table 1: Exchange Rate Arrangements

% of IMF members

	1990	1995	2000	2010	2015
Hard peg	15.7	16.2	24.7	13.2	12.6
Soft peg	64.2	49.2	33.9	39.7	47.1
Floating and free floating	15.1	24.9	33.9	36.0	35.1
Other managed arrangements	5.0	9.7	7.5	11.1	5.2

Source: IMF AREARER. Note: Methodology changes after 2000

Figure 6: Adoption of IT and fiscal rules in EMBI countries



Source: IMF and J.P.Morgan; samply only includes 65 EMBI credits

2) Adoption of inflation-targeting regimes

Inflation has also fallen dramatically in EM countries as many of them have adopted inflation targeting regimes. In the decade before the 2008 GFC, EM inflation dropped by 4.5%-pts to 6.5% from 1998 to 2008. Inflation targeting has had the strongest benefits in those EM economies where currencies have been floated and exchange rate bands discarded that previously served as nominal anchors. EM inflation levels remain well above developed country levels in large part because food and commodities comprise a large share of the consumer basket.

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3) Accumulation of external surpluses and foreign exchange reserves

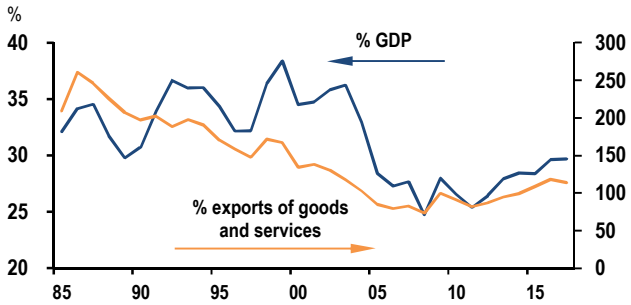
After taking the difficult decision to devalue during the 1997-1998 Asian and Russian crises, many EM countries moved to current account surplus positions. These surpluses reached peak levels in 2006 and 2007 on the back of favorable global liquidity conditions and the strength of commodity prices. Some of these trends are now being reversed, and the current account deficit has widened this year in countries like Indonesia, India, and Turkey. As surpluses were sustained, EM foreign exchange reserves have increased close to eight-fold in the past decade to reach over US$5.6 trillion. The strength of commodity prices since the mid-2000s has also contributed to the dramatic increase in foreign exchange reserves. EM FX reserves have more than doubled since end 2006 to reach US$7.0 trillion and are now significantly higher than that of DM economies (US$4.8 trillion from US$2.3 trillion at end-2006).

4) Reduction of external debt levels

In the decade prior to the GFC, most EM countries experienced a sharp decline in external debt levels, in tandem with the rise in FX reserves and in stark contrast to the surge in public indebtedness of developed countries. Nearly the entire stock of Brady bonds, which peaked in 1994 at US$150 billion, was retired by 2006 as policy makers adopted aggressive liability management strategies and decreased external debt issuance in favor of local currency financing. EM debt ratios have risen over the past decade but are still only half the level of developed countries. J.P. Morgan's global economics team estimates that the fiscal net debt of developed countries surged by more than 41%-pts of GDP in 2008-2009 compared to a 24%-pts rise in the 25 years prior to the recent financial crisis.

Public sector debt indebtedness moved away from the "original sin" of foreign currency borrowing (Figure 7). At the same time, local capital markets were developed, enabling countries to self-fund from domestic sources and reduce the FX exposure of their public debt. Financial sector and capital market regulations were strengthened and lessons of currency and duration mismatches were generally learned to preempt private sector indebtedness from creating a problem for public sector balance sheets.

Figure 7: EM external debt



Source: IMF, Haver

While policy frameworks were important in the pre-2008 period, external tailwinds such as booming terms of trade, particularly for commodity exporters, helped ensure that fiscal and external accounts that were generally in good standing and had sturdy sovereign balance sheets, especially in Latin America and Russia, in the lead up to the GFC.

Buffers cushion, but do not shield, from a growth shock

A combination of self-insurance via FX accumulation and flexible FX regimes allowed many EM countries to deploy counter-cyclical monetary and fiscal responses to the 2008 global crisis—a policy reaction nearly unimaginable prior to the crisis. This counter-cyclical response helped many EM countries limit the impact of the GFC, even as economies' overheating heading into 2008 led to fairly deep, but brief recessions in select countries. However, the improved policy frameworks alone, though generally effective in preventing unforced errors from morphing into largescale financial crises, were not enough to underwrite growth when external conditions in the immediate aftermath of the 2009 recovery—QE, weak USD, strong commodity recovery—started to fade. Weaker DM demand, a slowdown in global trade growth, and the end of the commodity super cycle likely all played a role in the EM slowdown.

As a general observation, EM GDP growth is intricately linked to industrial output, which tends also to move sympathetically with exports. External demand plays a key role in influencing the cyclical contours in EM (Figure 8). Thus, the decline in global trade following the 2008-2009 GFC likely played a large role in slowing EM growth, which eased to 5.6%oya during 2011-2014 from 7.3%oya between 2004 and 2007.

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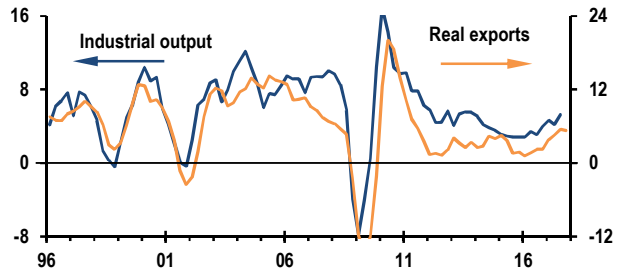
Figure 8: EM IP and exports

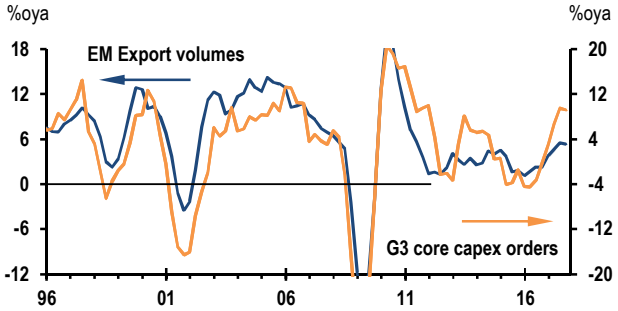
%oya, both scales



Source: CPB and J.P. Morgan

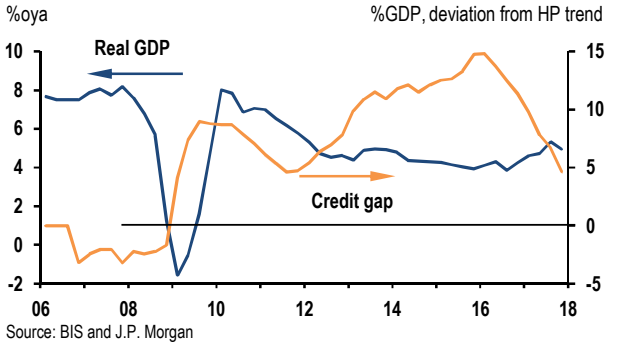
Importantly, EM export volumes are highly correlated with G3 core capital goods orders (Figure 9). By that token, the residual impact of the GFC was still being felt in EM, via the slower ebb and flow of trade. Even against the backdrop of slower global trade flows, the EM credit gap rose, implying that credit conditions were a positive, not a negative, impulse during 2011-2014 (Figure 10).

Figure 9: EM exports and G3 core capital goods orders



Source: CPB and CENSUS

Figure 10: EM real GDP and credit gap



Source: BIS and J.P. Morgan

2013 taper tantrum: EM is never too far from a crisis

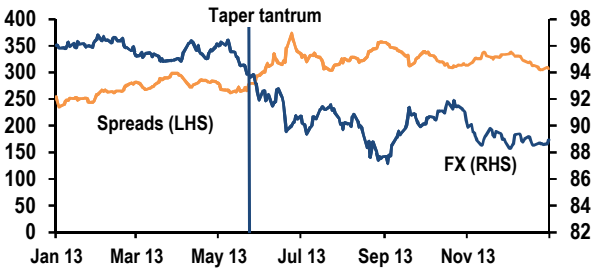
The 2013 taper tantrum and the end of the commodities super cycle in 2014 were a reminder that EM is never too far from a crisis. This period has corresponded with generally sluggish EM growth, in part as fiscal accounts of commodity exporters have needed to adjust to new, lower income realities, and in part as external accounts have had to react to terms of trade.

There are a number of explanations for why the 2013 taper tantrum failed to spark a financial crisis in a region that was previously crisis prone. One reason is that the abundance of liquidity from QE dampened the market response and any subsequent economic impact. Another is that the taper tantrum was not a shock to the real economy but more to investor sentiment. Moreover, soon after Fed chairman Ben Bernanke's comments of a "step down" in QE disrupted markets in May 2013, the Fed quickly reversed this language in July 2013 to alleviate investor concerns.

Another crucial difference between the taper tantrum and some of the 1990s' crises is the absence of currency pegs for large players, and/or the willingness of EM central banks in the affected economies to allow their currency to float more freely. Increasing exchange rate flexibility has allowed emerging markets to better navigate external shocks and partly explains the lack of EM-specific crises over the last two decades.

EM avoided a full-scale crisis following the 2008 global recession, but concerns resurfaced in May 2013 as the Fed began to talk about tapering QE. Taper talk caught market participants by surprise and forced them to reassess their expectations for the timing of liquidity withdrawal and U.S. policy rate hikes. The immediate market reaction was sharp and relatively indiscriminate for EM asset prices. In the three months following the taper tantrum, an index of EM currencies fell 6.5% and sovereign bond spreads widened 75bp (Figure 11).

Figure 11: EM FX and rates response to taper tantrum



Source: Bloomberg, J.P. Morgan

However, in the context of other crises, the taper tantrum EM sell-off was relatively small; the 1994 Mexican currency crisis saw the peso depreciate by more than 43%, compared to only 5% post taper tantrum. Likewise, the ruble sold off just 5% in the taper tantrum but 66% following the 1998 sovereign default. To draw on a more

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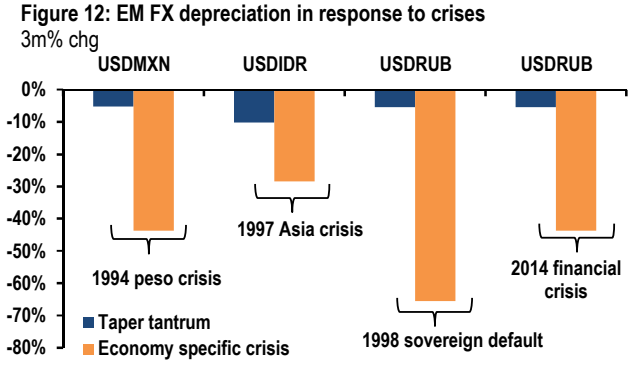
recent episode, Russia's 2014 financial crisis—a consequence of lower oil prices and Western sanctions—saw the ruble sell-off 44% in the first three months of the stress (Figure 12).

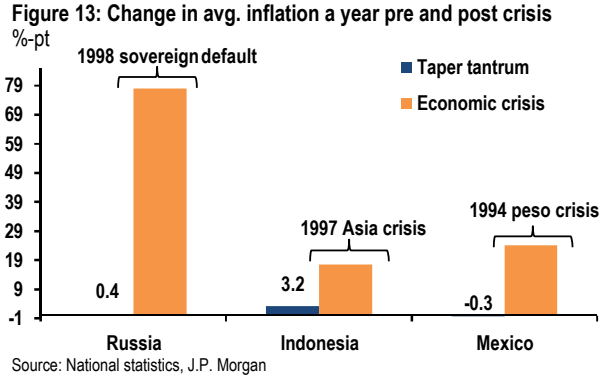
Figure 12: EM FX depreciation in response to crises



Source: **Bloomberg,** J.P. Morgan.

Moreover, there was limited inflationary impact from the taper tantrum because the EM FX depreciation was relatively minor and FX pass-through has come down post-GFC.[2] The change in average EM inflation from one year before to one year after the taper tantrum was less than 1%-pt (Figure 13). This is markedly different from the inflationary impact of the 1990s' crises; average inflation in Russia rose 78%-pts in the year following the 1998 default.

Figure 13: Change in avg. inflation a year pre and post crisis



Source: National statistics, J.P. Morgan

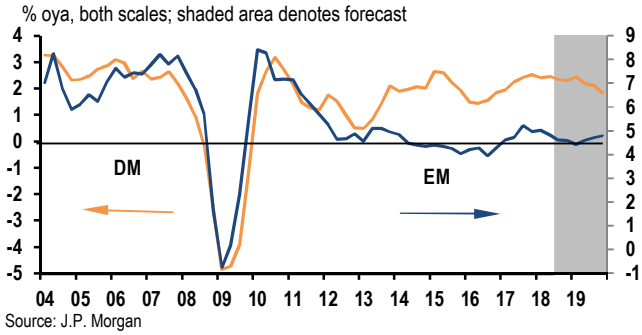
With inflation more subdued during the taper tantrum compared to previous EM crises, the need to tighten monetary policy was minimized. To give some context, EM policy rates tightened 6.3%-pts during the 1997 Asian crisis but only 0.3%-pts after the taper tantrum (Table 2). With weak FX and limited policy rate increases, GDP growth was left relatively unscathed. The period preceding the taper tantrum was characterized by buoyant EM growth, with the EM-DM growth differential over 2009-2012 averaging 5%-pts. Real GDP in EM averaged 4.7% in the four quarters ahead of the taper tantrum and 5% following. In the years after taper tantrum, EM growth did not return to the heady highs of the QE period (with a peak of 8.4% in 1Q10), but neither did it collapse; EM growth simply returned to more sustainable rates (Figure 14).

Table 2: Policy rates during crises

%	EM	Fragile 5	EM Asia
Asia crisis (1997):			
Jul-97	16.4	23.1	10.4
end-1997	22.7	32.3	14.8
Change (%-pt)	**6.3**	**9.2**	**4.4**
Taper tantrum:			
May-13	5.4	6.8	5.4
end-2013	5.7	8.3	5.6
Change (%-pt)	**0.3**	**1.5**	**0.2**

Source: J.P. Morgan

Figure 14: EM-DM growth



Source: J.P. Morgan

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[2] Special report on "EM Inflation: Falling short of expectations," Szentivanyi and Wong, October 2017

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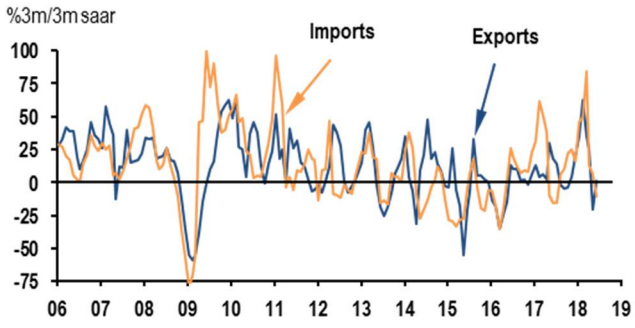
J.P.Morgan

China's underappreciated role in the GFC

- **China role in helping to limit the global spillover from the GFC is underappreciated.**
- **China shouldered much of the FX appreciation when much of rest of the world depreciated.**
- **It buoyed global demand via substantial fiscal and credit stimulus that boosted import growth.**
- **The collateral damage has been significant: chronically high debt and low investment efficiency as a legacy of the post-GFC stimulus.**

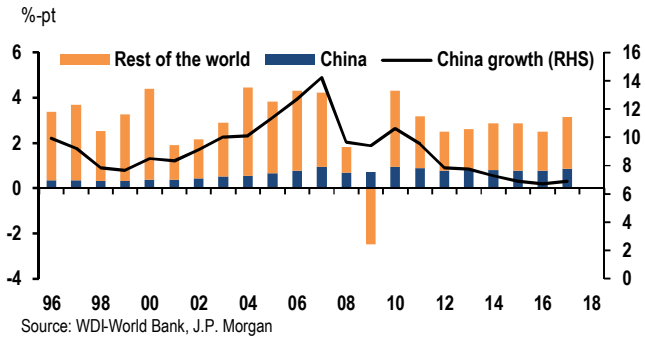
In both the Asian financial crisis and GFC, China played a stabilizing role for the global economy. The negative impact of each crisis, in both cases, has been reflected in a deceleration in China's export growth and by extension in overall economic activity. During the crises, export growth dropped significantly from high double digits to negative double digits (Figure 1), and GDP growth slowed materially. However, severe crisis symptoms observed in other countries, such as large currency devaluation and debt crisis, were prevented. While at the onset of the GFC both exports and imports stumbled, imports rebounded quickly and strongly in 2009 and remained solid in subsequent years, helping the global economy recover. Despite the domestic economic slowdown, China still contributed about a third of global growth in 2008 (Figure 2), China's contribution remained positive through 2009 when the rest of world fell into recession.

Figure 1: Merchandise exports and imports



Source: General Administration of China Customs, J.P. Morgan

Figure 2: Contribution to world growth

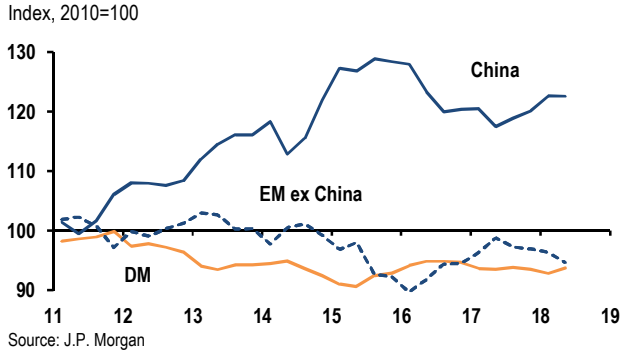


Source: WDI-World Bank, J.P. Morgan

Policy response: shouldering the burden of global FX adjustment

The Chinese government's policy responses in the face of the GFC were critical in containing the damage. First and foremost, as in the case of the Asian crisis, China did not engage in competitive devaluation. During the Asian crisis, it resisted huge depreciation pressures as other regional currencies stumbled. However, China kept the peg to the dollar in place, and this turned out to be critical in containing further spillover in the region. During the GFC, when DM central banks first eased monetary policy and then turned to QE, one of the main channels of adjusting to the shock was through substantial depreciation of their currencies. Exchange rates are a relative price, so if DM currencies were to depreciate, EM currencies had to appreciate to absorb the adjustment. Most of the EM adjustment was born by Asian currencies and in particular CNY. Between the start of the second round of QE in late 2010 and the beginning of U.S. Fed normalization in 2016, DM real exchange rate depreciated around 8%. EM real exchange rates, excluding China, had also depreciated 6%. In contrast, China's real exchange rate appreciated 25% to shoulder the bulk of this global adjustment (Figure 3).

Figure 3: Global real exchange rates



Source: J.P. Morgan

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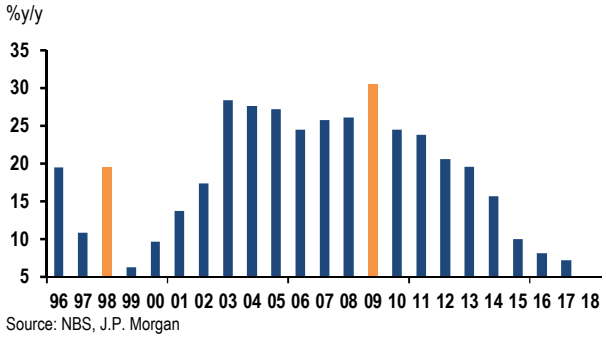
Policy response II: unprecedented policy easing to support domestic demand

In response to the GFC, China implemented the so-called "4-trillion" stimulus package that led to a strong rebound in fixed investment (Figure 4), which played a central role to in supporting China's growth as well as global demand via the rise in imports. Within domestic sectors, investment is the most import-intensive is and the key driver for commodity imports. Along with the policy-induced investment boom, China's imports of commodities surged (Figure 5), supporting global commodity exports when the demand from the rest of the world collapsed (Figure 6).

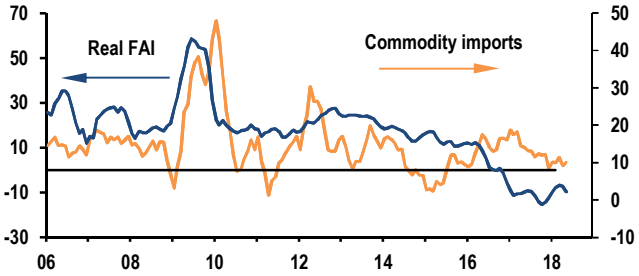
Figure 4: Fixed asset investment growth



Source: NBS, J.P. Morgan

Figure 5: Fixed asset investment and commodity imports

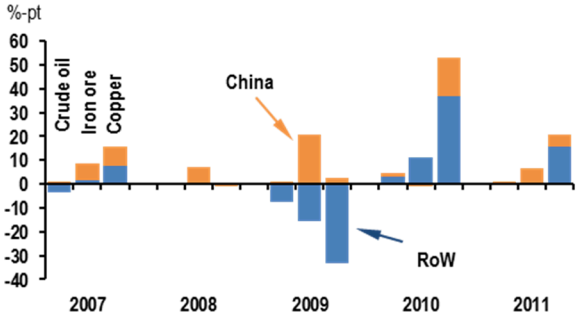
2004 = 100, volume,%oya, 3mma, both scales



Source: China Customs, NBS, J.P. Morgan

Several factors shaped China's policy response. First, China's currency was not fully convertible, the capital account was not fully liberalized, and the exchange rate was managed. Second, China had large FX reserves (US$140 billion in 1997 and US$1.5 trillion in 2007), a large currency account surplus (3.8% of GDP in 1997 and 9.9% of GDP in 2007), and relatively low foreign debt (about 11% of GDP in 2007). Third, most foreign investment in China was direct investment rather than portfolio investment, which was more stable during the crisis period. Fourth, the banking system was tightly controlled by the central government, which limited the pro-cyclicality problem that often compounds economic slowdown in many other countries. The banking sector reform in 2000-2007 (disposal of NPL, recapitalization, transition to commercial banks and IPOs) also strengthened China's financial sector.

Figure 6: Contribution to world commodity import growth



Source: UNComtrade, J.P. Morgan

The response came at a high cost

The policy responses that helped China weather the GFC came at a high cost. First, given that China chose not to devalue the currency, it added pressure on China's export sector, along with higher labor costs (China's working age population peaked in 2011), higher land and environmental costs, and rising competition from other labor-intensive export economies. CNY appreciated in real terms (more than 25%), the current account surplus fell from 9.9% of GDP in 2007 to 1.3% of GDP in 2017(Figure 7), and currency depreciation expectations started to build up. While the equity market correction in late 2014 is often deemed as the proximate cause, the steep rise in the real exchange rate is perhaps the more fundamental reason behind the depreciation pressures that ultimately led to more than US$1.5 trillion in capital outflows in the past three to four years and around US$1 trillion in reserves losses (Figure 8).

The fiscal and credit stimulus in the aftermath of the GFC was perhaps overdone. The extraordinary investment boom since 2009 was much bigger than initially planned, leading to overcapacity in a number of sectors (e.g., steel, coal, solar PV, plated glass, cement, aluminum, etc.). The excessive investment led to significant deterioration in productivity, one of the biggest structural problems that need to be addressed in China's economic reform.

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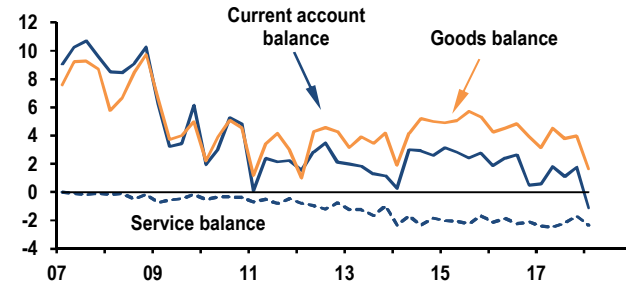
Figure 7: China current account balances

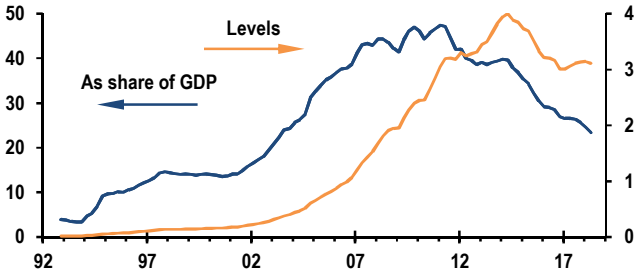
% of GDP, quarterly



Source: SAFE, CEIC, J.P. Morgan

Figure 8: China FX reserves

% of GDP | USD trillion



Source: PBOC, CEIC, J.P. Morgan

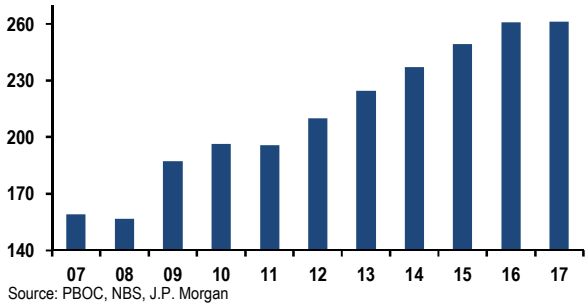
A related issue is the buildup of debt as a legacy from the 2008-2010 credit expansion. Since 2009, China's credit growth has continued to outpace nominal GDP growth notably, and total debt in the non-financial sector rose from 157% of GDP in 2008 to 261% in 2017 (Figure 9). In particular, corporate debt (especially state-owned enterprise (SOE) debt) and local government debt (explicit and implicit debt) rose rapidly and became the key vulnerabilities for China's financial sector. SOEs have assumed the responsibility to stabilize growth and employment and thus have leveraged up significantly after the GFC. The financial liberalization in 2008-2016, especially explosive growth of shadow banking activity (e.g., trust loans, wealthy management products, asset management products, internet finance, etc.), brought new forms of financial fragility. The deleveraging effort since late 2016 has made encouraging progress to stabilize the leverage in the economy, although in recent months it has raised some growth concerns.

As its economy changes, so will China's role in the next crisis

China's influence in the global economy and trade is likely to continue to increase even if GDP growth slows in the coming years. At the same time, as its population ages, China's high saving rate will decline (which it has already begun to do) and with that the current account surplus will shrink and, as the economy shifts more decisively toward services, it could turn into a deficit. The accumulated savings of the past have been largely invested in domestic assets, and there is a natural portfolio diversification toward increased investments offshore. All this will likely accelerate as China slowly, but surely, opens up to both inward and outward capital flows. Importantly, its policy choices will increasingly begin to matter for other countries, both in the DM and EM.

Figure 9: Total social debt

% of GDP



Source: PBOC, NBS, J.P. Morgan

In the next crisis, China's role and contribution might not be the same as in the Asian crisis or the GFC. The structural shifts in China's economy, demographics, and financial markets will mean that China's role will likely be different next time. Looking toward China for large policy-driven support for global manufacturing and commodities would likely end in disappointment. Instead, it could well be policy-driven changes that alter the capital flow dynamics from and to China that might matter more.

Lastly, although much of the leverage in China is domestic and is owned within the broader public sector, it is a key source of vulnerability. The authorities have made progress in stabilizing its growth in recent years. However, given the size of the economy and of the debt burden, and the extensive cross-border financial connections, a disruptive debt event in China could quickly spread to other parts of the globe. That is, China could well be the epicenter of the next crisis.

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Regulation: The arsenal of financial stability

- **In the aftermath of the financial crisis, international standard setters introduced bank regulatory frameworks that incorporated a macro-prudential policy approach.**
- **Banks became subject to higher risk-based capital, leverage capital, and liquidity requirements, and new tools for resolution were created to protect taxpayers.**
- **Many of these standards were implemented with a stricter calibration in the U.S., and stress testing became an important part of domestic reforms.**
- **Market regulators increased the transparency and resiliency of the derivatives market, and the MMF landscape has been transformed.**
- **We review the impacts these reforms have had on various financial markets.**

The arsenal of financial stability

What might prevent the next Global Financial Crisis? How could the GFC have been avoided? Even as the crisis still raged, central bankers, political leaders, and other policy makers across the globe wrestled with these questions. To a great degree the answers lay in the chaos surrounding them and in the causes of the GFC.

While the crisis emanated from the U.S. mortgage market, its origins proved much more than just a credit crisis. From 2004-06 the Fed moved to tighten credit using its primary traditional policy tools: the Fed funds target rate and the primary credit rate. During this period the FOMC hiked the funds target 25bp for 17 consecutive meetings (425bp in total), raising the cost of credit and inverting the yield curve along the way. But rather than curbing credit creation, Fed data show from the beginning of the hiking cycle in mid-2004 through the end of 2007, mortgage credit on U.S. household balance sheets grew nearly 45% and non-mortgage consumer credit grew 23%.[1]

In retrospect, the ineffectiveness of monetary policy in curbing credit growth was a sign that markets had evolved in ways that were numb to the bite of traditional policy tools. The same can be said of financial regulatory policy.

Some of the key prudential regulations of the Basel I and Basel II accords constructed by the Basel Committee on Bank Supervision (BCBS) proved inadequate. Indeed, the ratings-focused, risked-based capital requirements flowing from Basel II promoted credit and maturity transformation in ways that ultimately deepened the crisis. To those officials responding to the unfolding GFC, it rapidly became clear that the existing tools of monetary and prudential policy were overmatched by the challenges presented by these evolved capital markets. Policy makers needed more powerful weapons to avoid and combat future crises.

In 1940, President Franklin Roosevelt, faced with the increasing likelihood of an unprepared U.S. being pulled into war, spoke of building an "arsenal of democracy" to prepare for the war that might come. Likewise, in the wake of the GFC, policy makers could see they needed their own arsenal of more and better tools to promote financial stability and to forestall and resolve future financial crises. In this way, the GFC sparked something like a regulatory arms race. While the U.S. and other nations quickly began to develop individual national responses, the need for international coordination became clear. Following the G-20 summit in November 2008, consensus emerged among the members of the need for coordination on financial stability. The following April, the Financial Stability Board (FSB) was constituted as a mechanism for coordinating strong regulatory, supervisory, and other policies in the interest of financial stability. Similarly motivated, the BCBS began work on upgrading and expanding its supervisory principles, ultimately leading to the release of Basel III in 2010.

Post-crisis global regulatory response

The significant deterioration of capital experienced by banks globally through the GFC exposed the flaws of the regulatory capital frameworks that prevailed before 2008. In the U.S., for example, banks were still operating under the Basel I standards, which prescribed only a minimum total capital requirement, based on risk exposures calculated from a simple, standardized classification system. The finalized international Basel III framework increased the quantity and quality of capital that banks must hold, with a greater emphasis on Common Equity Tier 1 (CET1). In addition to heightened micro-prudential requirements, the framework adds macro-prudential elements, including a counter-cyclicality capital buffer, intended to lean against the build-up phase of the credit cycle, and a capital buffer for global systemically important banks (G-SIBs). The revised standardized frameworks for assessing market risk, credit risk, and

[1] https://www.federalreserve.gov/releases/z1/current/

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Table 1: The evolution of the Basel capital framework

	Basel I	Basel II	Basel II.5	Basel III
International Agreement	1988	2004	2009	2011-present
Capital requirement	Total capital / Credit risk RWA + Market risk RWA	Total capital / Credit risk RWA + Market risk RWA + Operational risk RWA		Tier 1 common capital / Credit risk RWA + Market risk RWA + Operational risk RWA
Notes:	Credit risk RWA based on simple, standardized, 5-category asset classification system. Market risk calculation amended in 1996 applying VaR methodology to trading book.	Three pillar approach that adds supervisory oversight and market discipline through public disclosures. Credit risk calculated through both standardized and internal ratings-based approaches, increasing risk sensitivity.	Applies changes to market risk and securitization rules, and revises VaR methodology for trading book.	More restrictive definition of capital, higher minimum requirements and added buffers (e.g., capital conservation buffer, G-SIB capital surcharge). Market risk capital requirement (FRTB) based on 12mos of market stress. Output floor means RWA based on internal models cannot fall below 72.5% of RWA computed by standardized approaches.
Leverage				Introduces international leverage standard for the first time, calibrated at 3% of total assets (including on- and off-balance sheet items).*
Liquidity				Establishes Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR)

* The U.S. previously had an existing leverage standard though only for on-balance sheet assets.

Source: J.P. Morgan

operational risk, as well as the creation of a risk-weighted assets (RWA) output floor based on the standardized approach, achieve greater consistency and comparability in capital calculations, reducing the risk of variability in capital levels based on internal risk models (Table 1).

Basel III also introduced a leverage ratio minimum, originally meant to serve as a backstop to risk-based capital requirements, since it became apparent in the crisis that RWA-based capital requirements could not protect against margin spirals when firms were highly leveraged, as was the case with Northern Rock in the U.K.[2] While the U.S. previously had an existing Tier 1 leverage standard, it applied only to on-balance-sheet assets. As with the G-SIB risk-based capital surcharge, the Basel III leverage ratio rule, revised last December, applies a higher minimum to large banks, with the buffer calibrated based on a firm's G-SIB score.

Lastly, the Basel III framework introduced minimum liquidity standards for mitigating excessive liquidity risk and maturity transformation. The Liquidity Coverage Ratio (LCR) requires firms to hold enough high-quality liquid assets to withstand a 30-day stress period, while the Net Stable Funding Ratio (NSFR) ensures firms maintain a stable funding profile relative to the liquidity of their assets. The events of the crisis proved that runs on financial institutions could cause a sudden erosion of bank liquidity and capital resources. The introduction of Basel III liquidity standards created a needed buffer to protect bank solvency, and these standards are a critical component of the post crisis regulatory framework.

Another important area of change to the international bank regulatory standards relates to resolution planning. Lehman's Chapter 11 bankruptcy filing on September 15, 2008, exposed the inefficiencies of bankruptcy for resolving a financial institution (especially a G-SIB), the lack of planning, and the problems with cross-border coordination. In 2011, the FSB released *Key Attributes of Effective Resolution Regimes for Financial Institutions*, outlining 12 essential features that would allow authorities to resolve financial institutions without taxpayer exposure to losses, while maintaining continuity of vital economic functions. Some important elements include making sure that all G-SIFIs have in place a recovery and resolution plan, and jurisdictions have authorities in place to exercise resolution powers over in-scope firms, including the ability to impose temporary stays on the exercise of early termination rights and to

[2] See "Reflections on Northern Rock: The Bank Run That Heralded the Global Financial Crisis." Shin, 2009.

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invoke bail-in in a manner that respects the hierarchy of claims. Four years later, the Financial Stability Board issued a final Total Loss-Absorbing Capacity (TLAC) standard, designed to ensure that a failing G-SIB would have sufficient loss-absorbing capacity available in order to implement an internal recapitalization of bank subsidiaries, while critical operations continue uninterrupted.

Away from bank capital and liquidity, following the crisis, G-20 leaders agreed to a series of measures to reform the **OTC derivatives** market in order to reduce systemic risks, including a movement toward trading on electronic platforms, mandatory clearing for most of the swaps market, and higher margin requirements for non-cleared derivatives (see Box 2). Moving to central clearing has improved financial stability by reducing the complexities of bank exposures and overall interconnectedness in the financial markets. However, given the shifts in the derivatives market structure, the FSB, CPMI, IOSCO, and BCBS have increased their focus on the potential emerging risks now concentrated at CCPs and have introduced new frameworks to increase the resiliency, recovery, and resolution planning of these systemically important institutions.

U.S. implementation of reforms

In the U.S., post-crisis regulatory reform kicked off with the passage of the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010. Among its many provisions, the legislation required the banking agencies to revise capital requirements to remove references to credit ratings and applied enhanced prudential standards for U.S. bank holding companies (BHCs) based on asset thresholds. Title I of Dodd-Frank requires robust resolution planning under bankruptcy, and Title II creates an alternative resolution mechanism, the **Orderly Liquidation Authority** (OLA), which expands the reach of the FDIC, in the case that a SIFI's failure was determined to be a significant financial stability risk. Under OLA, the FDIC can mitigate the risk of a run by counterparties of qualified financial contracts (QFCs) as a firm goes through resolution by imposing a stay on the exercise of cross-default and early termination rights. Additionally, the enhanced prudential standards applying to large foreign banking organizations (FBOs) effectively ring-fences U.S. operations by requiring the establishment of a separately capitalized U.S. IHC to sit on top of U.S. subsidiaries, which should help address cross-border coordination problems in resolution.

Importantly, the U.S. banking agencies released a number of regulations to implement the Basel III Accord and the FSB international standards,[3] though in many cases, the calibration and frameworks of the U.S. rules imposed more stringent requirements than those applying to the international landscape. For example, while the Basel **G-SIB capital surcharge** calculates a firm's total G-SIB score based on size, interconnectedness, substitutability, cross-jurisdictional activity, and complexity, the U.S. framework requires firms to calculate their scores based on the higher of two methodologies: the first uses the Basel calculation, while the second replaces the substitutability category with the firm's reliance on short-term wholesale funding and multiplies the total score by two. For all U.S. G-SIBs, the second methodology results in a higher score and produces surcharge CET1 capital requirements from 1.0-4.5% of RWA.

The Supplementary Leverage Ratio (SLR), which implemented the Basel III leverage ratio in the U.S., applies a 3% leverage capital minimum for "Advanced Approaches" institutions,[4] consistent with the international calibration, but also applies a 2% buffer on top for all U.S. G-SIBs through the enhanced SLR (eSLR). However, earlier this spring, following a revision to the international standard, the Fed proposed recalibrating this framework so that the leverage buffer for G-SIBs would be calculated as 50% of a firm's risk-based capital surcharge, providing some capital relief for the G-SIBs in aggregate (see Overview, *US Fixed Income Markets Weekly*, Alex Roever, 13 Apr 18 and "New Capital Proposal," Kabir Caprihan, 13 Apr 18).

The U.S. implementation of the FSB's TLAC standard also included more stringent calibrations. While the FSB minimum external TLAC standard is set at the greater of 18% of RWA and 6.75% of leverage exposure, the U.S. rule requires the greater of 18% of RWA and 9.5% of leverage exposure. Additionally, compared to FSB guidance that 33% of TLAC be in the form of long-term debt, the U.S. rule includes a minimum long-term debt requirement equal to the higher of (a) 6% plus the U.S. Method 2 G-SIB buffer as a percentage of RWA and (b) 4.5% of leverage exposure. In addition, the calculation applies a 50% haircut to debt with between one and two years of remaining maturity.

[3] This process is ongoing as NSFR, FRTB, and the framework for SFT haircuts are all at various stages of implementation.
[4] These are banking organizations that have at least US$250bn in consolidated assets or at least US$10bn of on-balance sheet foreign exposures or have received approval to use the advanced approaches to calculated RWA.

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Away from the major pieces of the international bank reform frameworks—capital, liquidity, and resolution—**stress testing requirements** have become a crucial fourth pillar of prudential regulation in the U.S. The success of the Supervisory Capital Assessment Program (SCAP) in restoring confidence in the banking system in May 2009 drove legislators to incorporate ongoing stress testing requirements into Dodd-Frank (DFAST) and regulators to use it as a tool for assessing capital adequacy and capital planning processes—through the Comprehensive Capital Analysis and Review (CCAR). Importantly, the Fed proposed a revamp of the way the CCAR framework is implemented earlier this spring: the proposal introduces a Stress Capital Buffer (SCB) and a new leverage buffer requirement each sized based on the results of a firm's annual supervisory stress test, thus integrating the forward-looking stress test results with the Board's ongoing, non-stress requirements (see "US Fixed Income Overview," Alex Roever, 13 April 18 and "Large Cap Banks: New Capital Proposal," Vivek Juneja, 11 April 18).

Lastly, it is worth mentioning that the Volcker Rule, written into Title VI of Dodd-Frank, also had the effect of materially shifting bank business models and behavior within the U.S. The rule restricts depository institutions from engaging in proprietary trading activities, except in Treasuries and some non-U.S. government securities and except when it is for the purpose of market-making or hedging. Sponsoring, or holding, ownership interests in covered funds is also prohibited (except if certain conditions are met). This rule is also likely to see near-term changes as the regulatory agencies released a proposal for revisions last June, with the intent of clarifying and simplifying its requirements, as well as reducing administrative compliance costs (see "Large Cap Banks: Volcker Rule Reform Proposal," Vivek Juneja, 4 June 18).

Away from the swath of banking regulations, reform of the money market fund (MMF) industry in the U.S. has been an important step in reducing financial stability risks by addressing a primary channel through which short-term credit disruptions in 2008 were fed through to the wider economy. Within the U.S., the growth of the MMF industry pre-crisis contributed to the build-up of systemic risks, as the providers of short-term funding (i.e., prime MMFs) promised to maintain a fixed NAV, leading to first-mover advantage and making the system susceptible to classic runs. Prime MMFs experienced US$300 billion of outflows when the failure of Lehman led the Reserve Primary Fund to break the buck. In 2014, the SEC finalized a package of reforms implementing significant changes on the US$2.6 trillion of assets held by domestic MMFs, which took effect in October 2016. While government MMFs are exempt, the rule requires institutional prime and municipal MMFs to convert to floating NAVs and adopt liquidity gates and fees. For a review of the post-reform changes to the money markets, see the US Money Markets chapter in this report.

Box 1: Glossary of Terms

BCBS	Basel Committee for Banking Standards
BHC	Bank Holding Company
CCAR	Capital adequacy and capital planning processes
CCP	Central counterparty
CET1	Common equity tier 1
CFTC	Commodity Futures Trading Commission
CPMI	Committee on Payments and Market Infrastructures
eSLR	Enhanced Supplementary Leverage Ratio
FBO	Foreign Bank Organization
FDIC	Federal Deposit Insurance Corporation
FSB	Financial Stability Board
G-SIB	Global systemically important bank
G-SIFI	Global systemically important financial institution
HQLA	High-quality liquid assets
IHC	Intermediate Holding Company
IOSCO	International Organization of Securities Commission
LCR	Liquidity Coverage Ratio
MMF	Money market fund
NAV	Net Asset Value
NSFR	Net Stable Funding Ratio
OLA	Orderly Liquidation Authority
OTC	Over-the-counter
RWA	Risk-weighted assets
SCAP	Supervisory Capital Assessment Program
SCB	Stress Capital Buffer
SEC	Securities and Exchange Commission
SLR	Supplementary Leverage Ratio
TLAC	Total Loss-Absorbing Capacity

For more details on post-crisis regulations and their impacts on US fixed income markets, see our latest US Fixed Income Regulatory Update publication.

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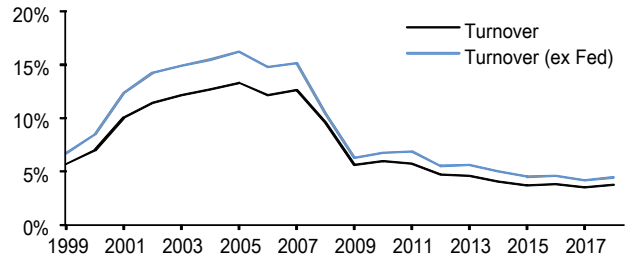
Consequences for markets

As the rules have transformed the banking industry, the structure of the global fixed income markets has also undergone shifts of its own. In recent years, with the leverage requirements acting as the binding constraint for many large U.S. banks, either on an ongoing basis or under stress,[5] banks have needed to reduce exposures to even very low-risk asset classes. Combined with a U.S. G-SIB capital buffer requirement that increases based on bank size, reliance on short-term wholesale funding, and various other factors, these constraints contributed to lower repo activity among U.S. banks and lower Treasury market liquidity, especially in off-the-run, more balance-sheet-intensive securities (Figure 2). (For a review of the evolution of G-SIB balance sheets and repo activity across regions, see "Update on the repo market in Euro area ahead of QE tapering," Fabio Bassi, 21 Sept 17). We think these factors also contributed to the narrowing in swap spreads over the past few years (see "Dogs and cats living together," Josh Younger, 6 Nov 15).

However, repo balances have increased more recently—particularly following the onset of U.S. MMF reforms—primarily driven by activity from French, Canadian, and Japanese banks, contributing to a rebound in liquidity and a widening in swap spreads.[6] Most large non-U.S. banks are not constrained by leverage requirements, and currently the European rules only require this ratio to be met on month-ends, as an average over the reporting quarter, giving them additional room to increase repo balances intra-month and shrink them at month-end/quarter-end. As Figure 3 shows, U.S. banks now represent only about 27% of the repo market as of June.

Figure 2: Liquidity in the U.S. Treasury market

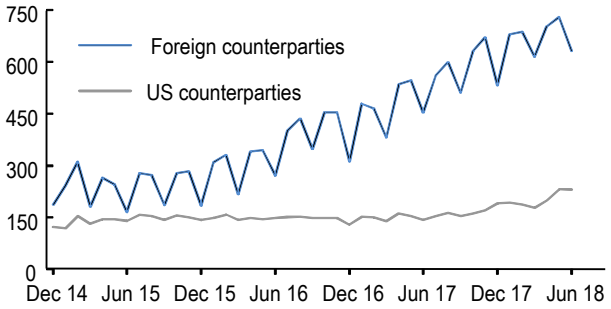
Daily U.S. Treasury market turnover*, including and excluding Fed holdings; %



* Average daily trading volumes divided by amount outstanding
Source: U.S. Treasury, Federal Reserve Bank of NY, J.P. Morgan

Figure 3: Repo exposures to domestic and foreign banks

MMF exposures to foreign and U.S. bank repo counterparties; US$bn



Source: Cranes

Moreover, if the U.S. revisions to **eSLR** are finalized as proposed, lowering leverage requirements for G-SIBs, these institutions should be able to expand balance sheets and increase repo balances on margin. However, the size of the repo market has already returned to the highest level since 2013. Thus, while these changes to the regulatory framework are likely to increase the availability of repo on margin and are directionally a swap spread widener, we expect the magnitude of the effects to be modest.

Additionally, if the revisions are finalized, we expect that **minimum risk-based capital ratios would be the new constraint,** especially for many G-SIBs. On margin, this should increase the importance of fluctuations in a firm's G-SIB capital surcharge, which we believe depressed market liquidity in late 2017. As constructed, the G-SIB surcharge has a number of issues—from a market perspective, two of the most important are its reliance on spot dates for some measurement categories and a scoring system where surcharge levels step up in 50bp increments from an initial surcharge of 100bp. As a consequence, a small change in a G-SIB's systemic score can lead to large increases in the cost of its balance sheet. G-SIBs near a breakpoint are incentivized to reduce balance sheet size ahead of measurement dates, similar to what several European banks do on a quarterly basis in the repo markets (see "Making sense of Libor's mysterious rise," Alex Roever, 14 Dec 17).

The **short-term fixed income** markets have also been materially affected by the Basel III liquidity requirements (LCR and NSFR) as well as the short-term wholesale funding component in the G-SIB capital surcharge. Given these constraints, banks drastically reduced their reliance on short-term wholesale funding. As a result, Libor fixings came to reflect other transactions, including FX forwards and repo, exposing the flaws in the benchmark and accelerating the Libor reform process discussed in more

[5] Dodd-Frank Act Stress Test 2018, Federal Reserve Board, June 2018

[6] With the onset of reform, over US$1tn of assets shifted from prime to government funds. Faced with reduced demand for unsecured debt from prime MMF, many banks increased activity in the repurchase agreement market, giving the banks expanded access to funding from government MMF.

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detail below (see "There is no 'i' in Libor," Alex Roever, 28 July 17).

The finalization of TLAC in the U.S. contributed to a substantial pickup in **bank issuance of long-term debt.** Notably, bonds with voluntary issuer calls are explicitly eligible for TLAC in the final rule, and calls have become nearly ubiquitous in benchmark bank issuance. At this stage, we estimate that all U.S. G-SIBs are more than compliant with the rule ahead of the 2019 deadline. Outside of the U.S., we do not expect affected issuers in other jurisdictions to be constrained by their own local version of these rules (whether they be final or in draft form; see Interest rate derivatives, *US Fixed Income Markets Weekly*, Josh Younger, 13 Oct 17).

Other market reforms

Given the growth of the securitization market in the years leading up to the financial crisis and its role in amplifying the effects of a housing market downturn through the financial markets and real economy, many parts of the post-crisis regulatory framework have focused on the capital framework for securitization positions, risk retention requirements, and improved loan disclosure rules. The finalized Basel III methodology for calculating securitization capital against banking book exposures outlines a waterfall of alternative approaches, but which generally require banking institutions to derive a risk weight based on a set of prescriptive factors under the simplified supervisory formula approach (SSFA) and generally results in an increase in required capital versus the previous methodology. In 2016, Basel also finalized a framework for calculating minimum capital required against trading book exposures, known as the Fundamental Review of the Trading Book (FRTB). We expect that this rule could reduce market participation in various securitization markets, particularly ABS, and notably the 2018 FRTB consultation did nothing to address this issue (see "Final FRTB Ruling Raises Capital for ABS, CMBS, and Non-agency MBS," John Sim, et.al., 14 Jan 16), and in its report on Capital Markets released last October, the Treasury has recommended that U.S. regulators carefully consider the impacts this rule would have on secondary market activity if implemented in the U.S. in its current form.

Box 2. FSB recommendations for OTC derivatives market reforms (as outlined in October 2010)

The financial crisis exposed weaknesses in derivatives markets, including the potential for contagion arising from the interconnectedness of OTC derivatives market participants and the limited transparency of overall counterparty credit risk exposures. In September 2009, G-20 Leaders agreed that "All standardized OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end-2012 at the latest. OTC derivative contracts should be reported to trade repositories. Non-centrally cleared contracts should be subject to higher capital requirements." The following year, the G-20 leaders added the commitment to impose margin requirements for non-centrally cleared derivatives and also committed to accelerate the implementation of strong measures to improve transparency and regulatory oversight in an internationally consistent way.

Summary of recommendations

Increasing standardization: Authorities should work with market participants to increase standardization of OTC derivatives products' contractual terms and increase the proportion of the OTC derivatives markets that use standardized operational processes and straight-through-processing.

Moving to central clearing: All standardized derivatives contracts should be cleared through CCPs by YE 2012 at the latest. Non-centrally cleared contracts should be subject to higher capital requirements. Authorities should address conflicts between insolvency laws that may arise in cross-border contexts. CCPs should be subject to robust supervision and oversight. Authorities should apply strong bilateral risk management standards and should secure ambitious commitments from major dealers for extensions of trade compression, dispute resolution, and portfolio reconciliation.

Promoting trading on exchanges or electronic trading platforms: All standardized derivatives contracts should be traded on exchanges or electronic trading platforms, where appropriate. Authorities should explore the benefits and costs of increasing exchange or electronic platform trading and the benefits and costs of requiring public price and volume transparency.

Reporting to trade repositories: Trade repositories should be established to collect, maintain, and report (publicly and to regulators) comprehensive data for all derivative transactions regardless of whether they are centrally cleared. Authorities should develop minimum data reporting requirements and standardized formats.

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A second pillar of reform for the securitization markets was the imposition of securitizer or sponsor risk retention requirements under Section 941 of Dodd-Frank, requiring sponsors to retain at least 5% of the aggregate credit risk of the assets collateralizing an issuance of ABS, in order to encourage the alignment of interest between sponsors and investors. Importantly, Agency RMBS are exempt, and securitizations collateralized with qualified mortgages (QM), qualified commercial loans (QCL), and qualified auto loans (QAL) are also exempt. Lastly, due in part to the lack of transparency regarding the collateral quality of ABS during the financial crisis, the SEC introduced additional disclosure requirements, referred to as Reg AB II, in the aftermath of the crisis. Treasury has recommended a number of revisions to this rule in order to reduce the cost and compliance burden associated with the issuance of new public securitizations. Overall, given the combination of origination, servicing, and capital standards imposed on lenders, our mortgage strategists estimate that the regulatory environment has played a key role in reducing lenders' willingness to extend mortgage credit post-crisis (see "The cost of post-crisis regulation on mortgage lending," Matthew Jozoff, 31 Mar 17).

Alongside the growth of the securitization market in the years leading up to the crisis, the **OTC derivatives market** was also expanding rapidly. According to a report from the Financial Crisis Inquiry Commission in 2011, the notional amount of OTC derivatives outstanding globally grew more than sevenfold from YE 2000 to the peak of the market in June 2008, to US$672 trillion.[7] The lack of transparency into market activity made the web of interconnections opaque and increased systemic risk created by large swap dealers—as exhibited by the complexity of the Lehman Brothers bankruptcy proceedings and the impacts on the broader financial markets. In the aftermath of the crisis, Title VII of Dodd-Frank mandated the central clearing of standardized OTC derivatives transactions, trading of standardized derivatives on exchanges or electronic trading platforms, regular data reporting, and posting of margin for uncleared derivatives.[8] With these reforms, the system is arguably safer and less interconnected.

Based on a recent ISDA analysis of SDR data, Dodd-Frank's clearing requirement initially encompassed roughly 73% of the interest rate derivatives market, rising to 85% as in 2017; over the same period, trading volumes were up nearly 35%, while gross notional outstanding declined 10%.[9] Netting efficiencies offered by central clearing most likely enabled this compression in notionals even as volumes rose. In addition to greater regulatory transparency and uniform margin requirements and standards, the realized experience of the past few years suggests that though CCPs are a clear and present source of potential systemic risk, they are significantly—and, more importantly, sufficiently—over-collateralized relative to MTM exposures (see *The law of one price versus the law of unintended consequences*, J. Younger et al., 20 May 2016).

Additionally, a significant subset of derivatives not subject to the clearing mandate, previously governed by bilateral CSAs, is in scope for uncleared margin requirements. These new rules are being phased in over time based on gross notional exposure: initially those over US$3 trillion, encompassing mostly the dealer community, and subsequently lower thresholds including US$1.5 trillion this year. Given this, we believe the majority of uncleared exposures at this point are also subject to margin requirements—including 50-70% for IM and a materially larger fraction for VM (see Interest Rate Derivatives, *US Fixed Income Markets Weekly*, Josh Younger, 3 Aug 18). Combined with the concentration of risk on CCPs, this leaves the OTC interest rate derivatives market considerably better collateralized than in the pre-crisis era.

Benchmark reform

Investigations into benchmark manipulation revealed structural weakness in the calculation of reference rates; Libor may cease to exist after 2021. Somewhat separate from the post-crisis banking and market structure reforms outlined above, investigations and enforcement actions regarding the manipulation of major interest rate benchmarks revealed a structural weakness in the calculation of reference rates that play a crucial role in various financial markets. In the wake of these investigations, IOSCO produced a set of principles to address the conflicts of interest inherent in basing benchmarks on expert judgment and the need for improvements in the governance, quality, and accountability of benchmark submissions. In 2014, FSB published a set of recommendations to develop two sets of benchmarks—alternative nearly risk-free-rates (RFRs) and "Libor+" rates based on actual transaction levels of short-term unsecured bank debt. The most recent progress report released by the FSB concludes that IBOR administrators

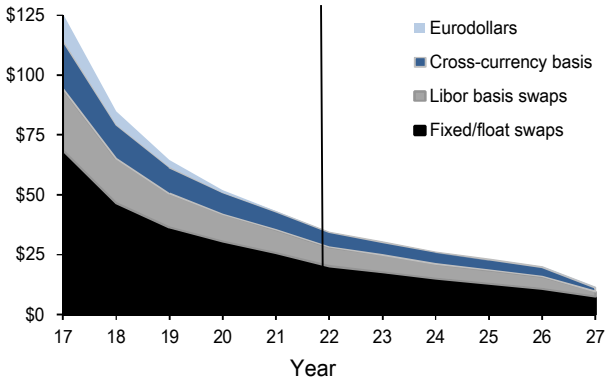
[7] "The Financial Crisis Inquiry Report," The Financial Crisis Inquiry Commission, January 2011.
[8] Treasury's report on capital markets provides an overview of each of these principle elements.

[9] ISDA, *Actual Cleared Volumes vs. Mandated Cleared Volumes*, July 2, 2018.

have taken important steps to implement the 2014 recommendations. Importantly, however, Libor may cease to exist after 2021 when the current set of panel banks will no longer be compelled to participate by regulators.[10] As Fed Governor Jerome Powell has stated, "Libor may remain viable well past 2021, but we do not think that market participants can safely assume that it will."[11]

Figure 4: Estimated rollover of notional derivatives amounts

Gross notional balance of USD-denominated OTC interest rate derivatives split into fixed/float, basis, and cross-currency basis swaps as of a given year assuming no new trades going forward; US$tn



Note: Restricted to swaps with at least one leg referencing any tenor of Libor. Based on J.P. Morgan estimates of the maturity profile for fixed/float, Libor basis, and cross-currency basis swaps and sized to the gross notional balance of each product using BIS Semiannual Derivatives Statistics as of H2 2016 (available on the website here: http://stats.bis.org/statx/srs/table/d7 and here: http://stats.bis.org/statx/srs/table/d6). Eurodollars from open interest data provided by Reuters. As of year-end 2016.

Source: J.P. Morgan, BIS, Reuters.

In the U.S., the Alternative Reference Rate Committee (ARRC) identified the Secured Overnight Funding Rate (SOFR), based on transactions in the GC, GCF, and cleared bilateral repo markets, as its preferred alternative to USD Libor, and the Fed began publishing daily SOFR rates in April 2018. In May, CME launched monthly and quarterly SOFR futures, the first tradeable product with exposure to the new reference rate, but there remains a long road ahead toward the replacement of Libor and the existence of a liquid SOFR swaps market. We estimate that even if the USD rate derivatives market were to stop originating new Libor-linked products today, there would still be approximately US$30 trillion of notional outstanding by year-end 2021 (Figure 4).

Meanwhile, we do not expect to see a liquid SOFR swaps market for several years. In the meantime, the flaws in the calculation of Libor will likely contribute to continued volatility in the benchmark, affecting various fixed income markets.

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[10] https://www.fca.org.uk/news/speeches/the-future-of-libor
[11] Board of Governors of the Federal Reserve System: https://www.federalreserve.gov/newsevents/speech/files/powell20171102a.pdf

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Has the GFC changed asset allocation and flows?

- **The elevated role of bonds in global portfolios is one of the most important changes after the financial crisis.**
- **Higher bond holdings reflect greater caution among investors, a greater focus on diversification, regulatory changes, and demographic trends.**
- **QE-ing central banks have forced non-banks into structural overweights of credit.**
- **Low volatility has boosted demand for carry/short vol trades as well as low volatility equities.**
- **Lower market liquidity can discourage investors from trading as transaction costs increase and act as an amplifier of volatility in the event of a shock.**

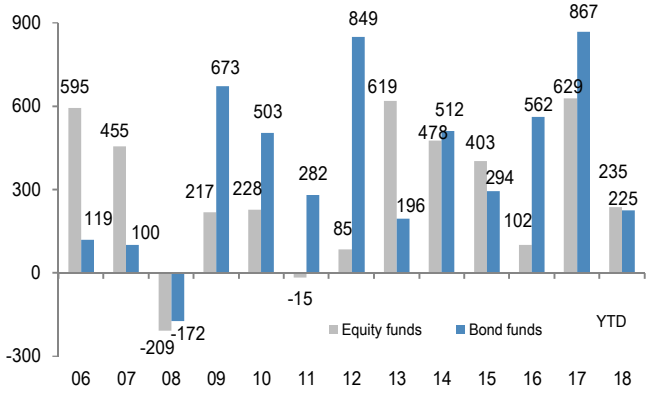
In this section, we investigate how asset allocation and investment flows have changed after the GFC. Specifically, we look at the increased role of bonds in investor portfolios; the causes for this structural rise; the structural overweights in credit among non-banks; the diminishing equity allocation peaks; how low volatility boosts demand for carry/short vol trades and low vol equities; and how lower market liquidity reduces the propensity of investors to change positions.

Increased role of bonds in investor portfolios

When we think about the changes that the financial crisis of 2008 brought to asset allocation, the elevated role of bonds in global investor portfolios is clearly one of the most important changes. We can see this in the structural increase in the inflows into bond funds by retail investors. Figure 1 shows bond buying has exceeded equity fund buying among retail investors in eight of the last 10 years. By contrast, before the financial crisis, bond fund buying was more muted than equity fund buying.

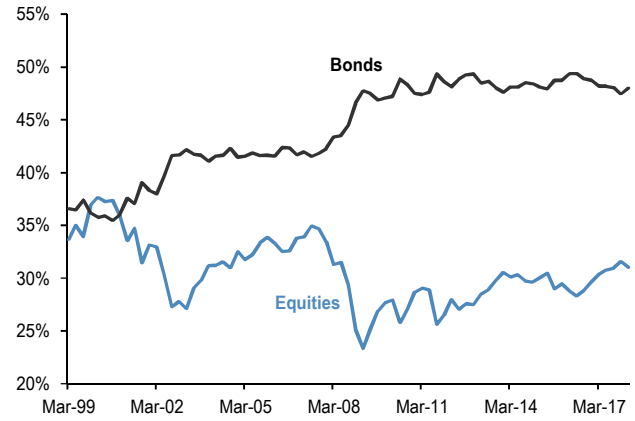
We can also see this in the bond allocations of pension funds and insurance companies. Figure 2 depicts the allocations to bonds and equities for G-4 pension funds and insurers and shows a structural shift higher in bond allocations following the financial crisis.

Figure 1: Global equity and bond flows
US$bn per year of Net Sales, i.e., includes net new sales + reinvested dividends for MF and ETFs. Flows are from ICI (worldwide data up to Q1'18). Data since then are a combination of monthly and weekly data from ICI, EFAMA and ETF flows from Bloomberg.



Source: Bloomberg, ICI, EFAMA, J.P. Morgan.

Figure 2: G-4 pension funds and insurance companies' equity and bond share of total assets
Equities and bonds as % of total assets by quarter. G-4 includes the U.S., Euro area, Japan and the U.K.. Last observation is 1Q18.



Source: ECB, BoJ, BoE, Federal Reserve flow of funds.

This increase in bond allocations also applies more broadly to non-bank investors. Figure 3 shows the implied bond allocations of global non-bank investors, measured as the share of bonds as a % of total holdings of equities/bonds/cash (cash measured as global M2). It shows there has been a structural shift higher in the post-Lehman environment, even as more recently they have moved somewhat underweight bonds relative to their post-crisis averages.

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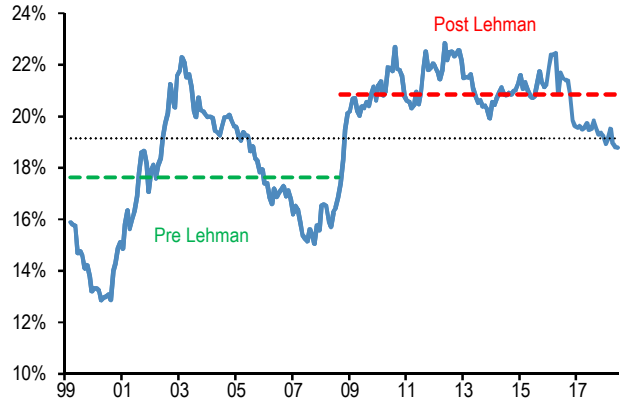
Figure 3: Implied bond allocation of global non-bank investors
Global bonds held by non-bank investors as % total holdings of equities/bonds/M2 by non-bank investors. Dotted lines are averages.

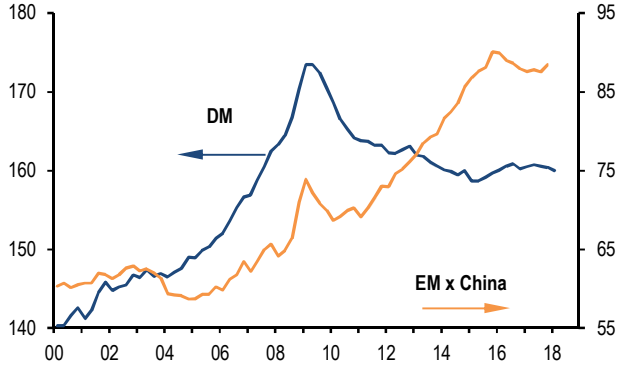


Source: J.P. Morgan.

Causes for the structural rise in bond allocations

A number of factors are likely behind this structural shift to higher bond demand. A key structural factor has been an increased caution and associated risk reduction among investors after two episodes of more than 50% declines in global equities in the space of a decade followed by the Euro area sovereign crisis. This risk reduction manifested itself both on the asset and liability sides of balance sheets. On the liability side, DM private sector leverage had risen sharply leading up to the financial crisis, requiring balance sheets to be repaired. Indeed, as Figure 4 shows, DM private non-financial credit as a share of GDP peaked in 2009 and declined steadily for the following six years as leverage was reduced.

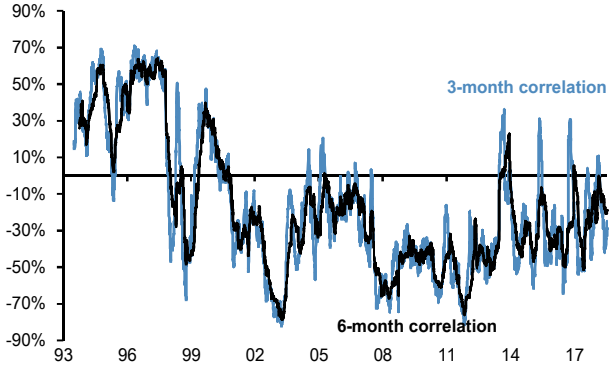
Figure 4: Broad private non-financial credit
% of GDP



Source: J.P. Morgan.

On the asset side, this risk reduction manifested itself in increased bond allocations among asset allocators. For asset allocators, bonds are a positively carrying and effective way to diversify risk from equity holdings given the negative correlation between bonds and equities. In addition, the post-crisis environment has seen greater interest in the risk-parity approach, which effectively focuses on equal risk contributions to overall portfolio risk. It implies higher bond weights than in traditional benchmarks (e.g., the 60/40 equity/bond portfolio) given the lower volatility and correlation of bonds versus equities and commodities. Indeed, as Figure 5 shows, the bond-equity correlation, which in the five years preceding the crisis was negative but close to zero, shifted further into negative territory for the subsequent five years. Since the taper tantrum of May 2013, there have been a number of spikes in this correlation to positive territory, typically during episodes where both equity and bond markets have sold off, which has raised questions over de-risking by multi-asset investors as the diversification benefit has been eroded during these episodes. That said, thus far at least there seems to be little evidence that these shorter term spikes in correlation have caused a shift in behavior by multi-asset investors such as balanced mutual funds or risk-parity funds.

Figure 5: Bond-equity correlation
3- and 6-month rolling correlation between daily returns of MSCI World Local vs. GBI Global hedged into USD indices.



Source: Bloomberg, J.P. Morgan.

A second shift following the GFC is a number of regulatory changes that have tended to increase bond demand. For example, liquidity requirements under Basel III for banks, requiring them to hold high-quality liquid assets in order to meet short-term obligations, increased demand for bonds (see Regulation: The arsenal of financial stability). And solvency regulations (e.g., Solvency II) and fair value accounting standards encourage pension funds and insurance companies to reduce their allocations to riskier assets such as equities via higher capital charges, while low capital charges on

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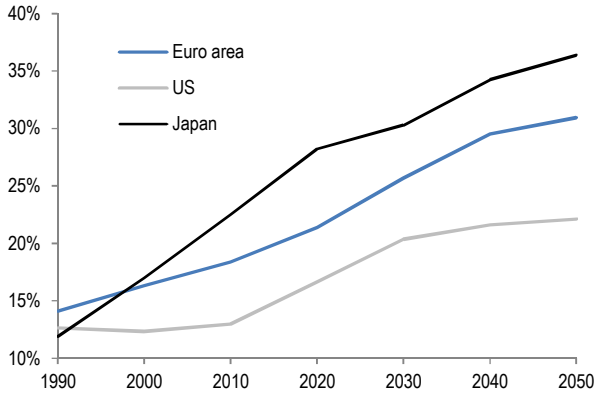
assets such as government bonds encourage them to increase allocations to better match the duration of their assets and liabilities.

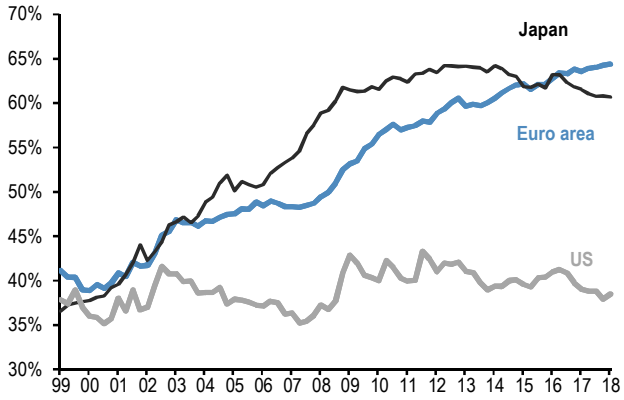
A third factor is demographic trends, which are likely to exert upward pressure on bond allocations. For example, old age dependency ratios, i.e., the proportion of the population aged 65 years and over as a percentage of the population aged 15-64 years, are rising steadily, with Japan and Europe aging more rapidly than the U.S. (Figure 6). Generally, an aging population means that allocations are likely to shift toward relatively safer instruments as the ability to recover from large drawdowns on capital diminishes as individuals age. And the effect of these demographic trends is likely a factor in the much higher share of total assets held in bonds by Japanese and European pension funds than U.S. pension funds (Figure 7).

Figure 6: Old age dependency ratios
Population aged 65 years and over divided by population aged 15-64 years; %



Source: United Nations, J.P. Morgan.

Figure 7: Bond weights of G3 pension funds and insurance companies
% of total assets

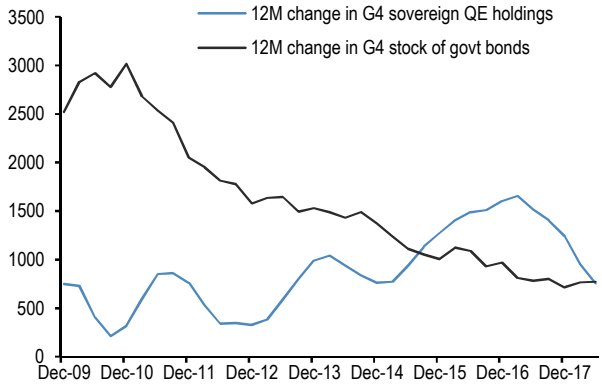


Source: Federal Reserve, ECB, BoJ, J.P. Morgan.

These demographic trends have been further exacerbated by the low-rate and the low-yield environment. Zero to negative rates on cash have surely induced some savers to buy short-duration bonds as substitutes for cash.

In addition, low yields could easily have had the perverse impact of inducing more saving in the form of bonds as the low yields would no longer allow savers to reach their future wealth targets. For example, the yield on the J.P. Morgan Global Agg Investment Grade Index is currently around 2.3% compared to an average in the expansion preceding the financial crisis of around 4%. In addition to the effect of deleveraging after the financial crisis and the Euro area sovereign crisis, QE has likely played a role in pushing down long-term yields, particularly the QE programs of the BoJ and ECB, which have seen net issuance of government bonds outside of the public sector balance sheet turn negative, not just in their domestic economies but for the G-4 on aggregate (Figure 8). These low yields in turn depress the income that investors receive from bonds, inducing them to save even more.

Figure 8: Changes in the stock of sovereign QE holdings and the stock of outstanding government bonds in G-4 countries
US$bn



Source: Federal Reserve, ECB, BoJ, BoE, JSDA, UK DMO, J.P. Morgan

Structural credit OWs among non-banks

Within fixed income markets, non-bank investors have become increasingly overweight credit since the financial crisis, induced by central banks' QE programs. The various QE programs by G-4 central banks have absorbed predominantly government-related bonds, and combined with FX reserve managers currently own around US$22 trillion or 38% of the tradable global bond universe. In addition, commercial banks are large holders of bonds, bringing the total holdings of banks to around US$30 trillion, or more than 50% of US$57 trillion global bond universe. The evolution of the share of central

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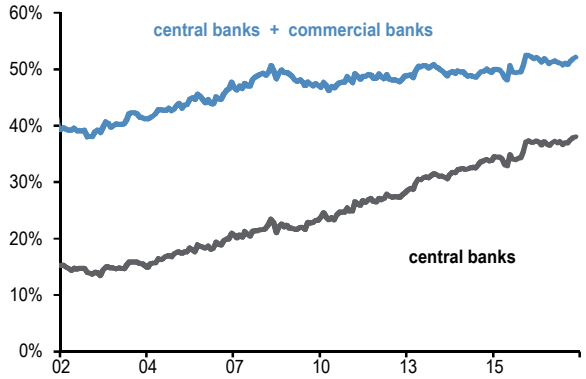
banks (including FX reserve managers) and commercial banks is shown in Figure 9.

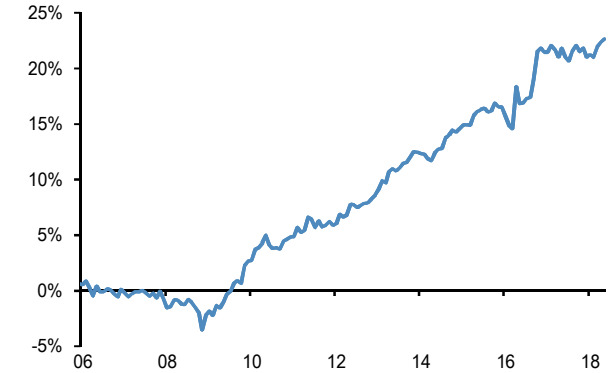
Figure 9: Proportion of the global bond universe held by central banks (including reserve managers) and commercial banks
Global bond universe is proxied by the US$57tr market value of Bloomberg's Multiverse Bond Index augmented by Munis and Inflation linked bonds. Central banks include G-4 central banks and FX reserve managers. Commercial banks include G-4 commercial banks only



Source: Fed, BoJ, BoE, ECB, IMF, Bloomberg, J.P. Morgan

In order to quantify the credit overweight, we calculate the percentage of non-government-related bonds in non-bank investors' bond portfolios less the percentage of non-government-related bonds in the tradable bond universe as captured by the Bloomberg Multiverse index augmented by municipal and inflation-linked bonds. Figure 10 shows that these credit OWs have steadily grown since 2009 and are rather elevated.

Figure 10: Credit overweight of non-bank entities globally
Percentage of non-government bonds in non-bank investors' bond portfolios minus percentage of non-government bonds in the tradable bond universe of the Barcap Multiverse index augmented by Munis and Inflation linked bonds

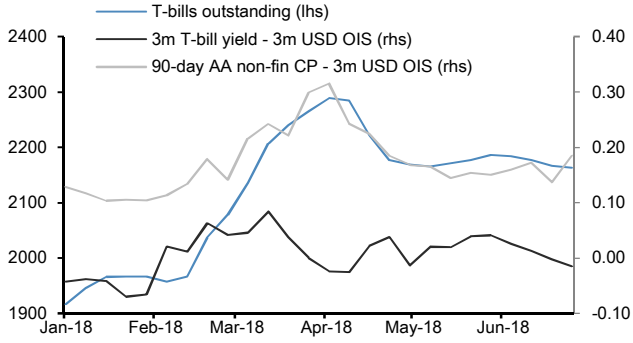


Source: Fed, BoJ, BoE, ECB, IMF, Bloomberg, J.P .Morgan

With G-4 central banks approaching a point where their duration absorption turns negative on aggregate, these OWs are at risk of being unwound as G-4 central banks on aggregate are shifting to reduce QE programs next year and government-related bonds held by central banks need to be re-absorbed by private markets (*Flows & Liquidity*, 27 July 2018).

In principle, an unwind of QE increases the relative supply of government bonds to corporate bonds in the market, which should put upward pressure on government bond yields and downward pressure on corporate bond spreads. However, the experience earlier in 2018 when T-bill issuance rose sharply suggests that there could be widening pressure on corporate bond spreads. Between mid-February and late March/early April, the outstanding stock of T-bills rose by just over US$300 billion, or more than 15%. But as Figure 11 shows, while the spread of T-bill yields over OIS rates rose ahead of increased issuance, spreads of AA-rated non-financial Commercial Paper over OIS rates increased sharply during the period when T-bill issuance increased despite the fact that the stock of commercial paper outstanding declined by nearly US$50 billion over the same period. While other factors may have played a role, this suggests there could be some pent-up demand for holding government rather than corporate bonds, particularly where central banks' QE purchases have exceeded sovereign net issuance, which could reduce demand for corporate bonds and push spreads wider even as QE holdings are unwound.

Figure 11: Outstanding T-bills and spreads of 3m T-bills and AA-rated non-financial CP over OIS rates
Stock of outstanding T-bills in $bn, spreads of 3m T-bills and 90-day AA non-financial CP over 3m OIS rates in bp



Source: J.P. Morgan.

Diminishing peaks in equity allocations

In addition to structural credit OWs, the fact that bank investors now hold more than half of the tradable bond universe has also seen a gradual increase in equity weights among non-banks. Non-bank investors' holdings of equities now stand at their highest level since the Lehman crisis, at 45%, as non-banks have largely corrected position imbalances that existed for an extended period of time after the Lehman crisis (Figure 12).

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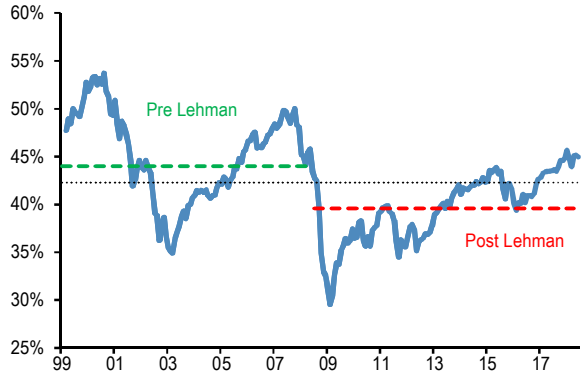
Figure 12: Implied equity allocation of global non-bank investors
Global equities held by non-bank investors as % total holdings of equities/bonds/M2 by non-bank investors. Dotted lines are averages.



Source: J.P. Morgan.

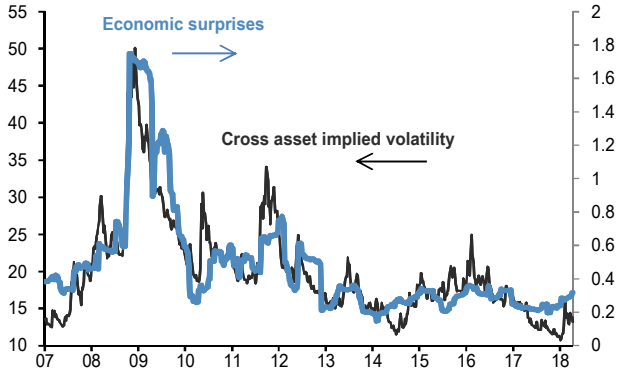
In principle, equity allocations could approach their previous cyclical extremes. But the cyclical peak in equity allocations has already been declining during the previous two cycles. The approaching unwind of QE on aggregate by G-4 central banks means that non-banks likely have to absorb more bonds, constraining the degree to which bond allocations can decline and equity allocations rise.

Low vol boosts demand for carry/short vol trades as well as low volatility equities

The low-volatility environment in recent years has also played a role in fueling demand for strategies focusing on earning carry such as vol-selling strategies, as well as low-volatility stocks. What has caused this decline in volatility? In previous work (*Volatility, Leverage and Returns*, Loeys and Panigirtzoglou, 2005), we have outlined a framework where market volatility can be thought of as the product of the supply of surprises (news) and the vulnerability of markets to these surprises (leverage).

According to this framework, the current level of low volatility should be the result of a low supply of surprises and/or low financial leverage. On leverage, as we show in Figure 4 above, leverage in DM economies has declined significantly since the financial crisis (see *Flows & Liquidity*, Jun 2, 2017, and *Ultra-low rates and FX vol*, Jun 9, 2017, for further detail). On surprises, one way to look at it is to look at changes in our economists' growth forecasts, which should largely reflect macroeconomic surprises. The J.P. Morgan Forecast Revision Index for global real GDP growth shows the %-point revision to growth forecasts on a rolling four-quarter window. We calculate the standard deviation of weekly changes in the global FRI, shown in Figure 13, over six-month rolling windows. This proxy for economic surprises also reached very high levels immediately after the Lehman crisis but started normalizing quickly after that. Since then, the supply of economic surprises also rose during the euro debt crisis of 2011/2012 and the oil price shock of 2014/2015, and the periods of increased delivered surprises correlates well with periods of elevated market volatility.

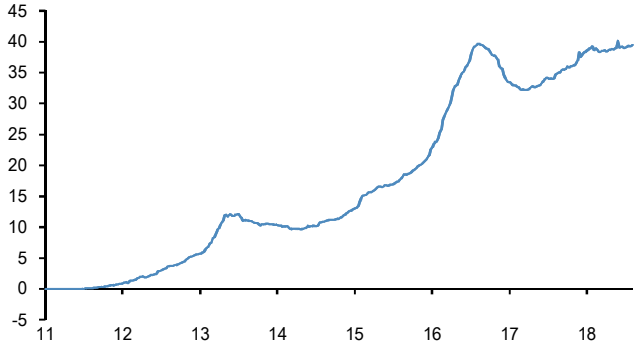
Figure 13: Economic surprises vs. market implied volatility
Economic surprises calculated as the 6-month rolling standard deviation to the JPM Global FRI, and the cross-asset implied volatility proxy is based on a weighted average of 3-month implied volatilities across give asset classes



Source: J.P. Morgan.

This combination of low delivered "news" and a decline in DM leverage in the post-crisis environment are two key factors behind the decline in market volatility. The effect of this lower volatility has been to induce greater demand for carry via fixed income products, boosting bond demand, and bond-like equities, as well as vol selling strategies. Indeed, Figure 14 shows steady inflows into low vol ETFs over the past few years, punctuated by outflows following periods of elevated volatility after the taper tantrum in 2013 as well as the U.K. Brexit vote and the U.S. presidential elections in mid- and late-2016, respectively.

Figure 14: Cumulative inflows into low vol ETFs
$bn



Source: Bloomberg, J.P. Morgan.

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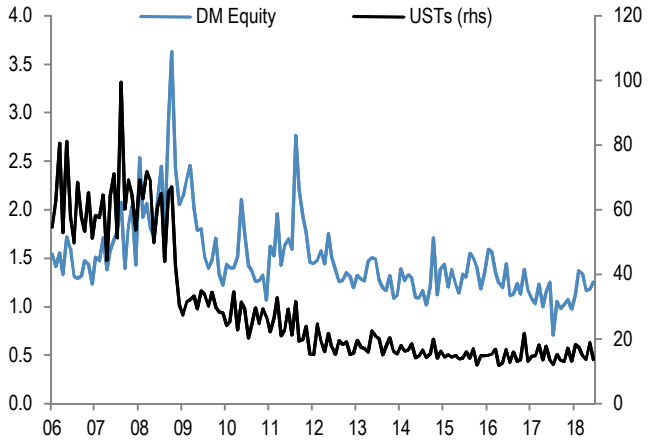
Lower market liquidity reduces the propensity by investors to change positions

Finally, a decline in market liquidity has undoubtedly been another important change in the post-crisis environment. One reflection of this decline is a reduction in market turnover. Indeed, turnover in DM equities and U.S. government bonds has declined after the crisis (Figure 15), partly related to regulatory changes that saw a retreat from principal trading by banks and reduced the ability of market makers to absorb increased selling pressure.

Figure 15: Turnover in DM equities and cash USTs
Monthly trading volume annualized divided by market cap. DM shown in left y-axis. Cash USTs shown in right y-axis.

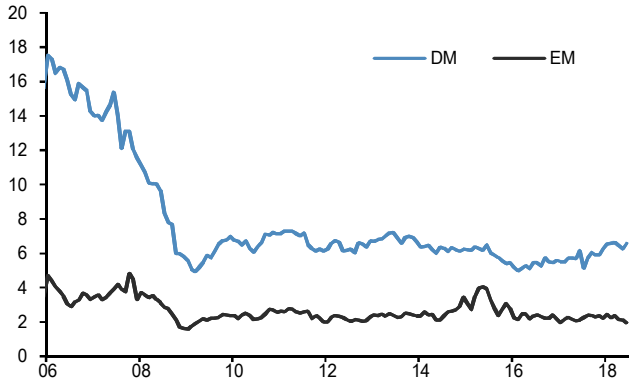


Source: World Federation of Exchanges, J.P. Morgan.

Another way to measure liquidity is to proxy for market depth with average trade sizes, dividing the dollar value of trading by the number of trades. Figure 16 depicts this for DM as well as EM exchanges and shows that the decline in average trade sizes in DM exchanges started already before the financial crisis, but this decline accelerated during the crisis before stabilizing. Since the crisis lows, average trade sizes have only improved modestly.

Less liquid markets can discourage active managers from trading as the transaction costs increase. This reduced propensity to trade in turn can act as an amplifier of market volatility in the event of a shock that forces many investors to change positions at the same time.

Figure 16: Average trade size in equity exchanges
000s of US$. Average trade size is equal to trading volume in US$ divided by the number of trades.



Source: World Federation of Exchanges, J.P. Morgan.

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Global Fixed Income Strategy
J.P. Morgan Perspectives
04 September 2018

Did negative interest rates change markets?

- **The BoJ and European central banks moved to negative policy rates that drove part of their bond markets into negative yields.**
- **At the peak in 2016, 32% of our DM government bond index traded at negative yields, down to 17% today.**
- **Central banks are reluctant to expand NIRP further as they seem to think it may not do much good, and they fear an adverse impact on FI profitability, savings rates, and overall risk taking.**
- **In Japan, NIRP mostly reduced trading volumes and induced foreign bond buying by insurers, but not by banks.**
- **In Europe, it likely boosted the economy, overall risk taking, and super-long issuance; reduced bank profit margins, but not for insurers; and had little impact on market functioning beyond maybe a slight drop in trading volumes.**

In this note, we analyze the phenomenon of negative interest rates that followed monetary easing in the aftermath of the GFC. We conclude that at least for a relatively modest move into negative territory the experience of negative interest rate policy (NIRP) has been overall positive, although with some areas of concern. We discuss: 1) the rationale and potential drawbacks, 2) the implementation of NIRP, and 3) the impact of negative interest rates on the economy and especially financial markets.

Rationale and potential drawbacks

The rationale for negative interest rates is quite simple. Faced with the painful aftermath of the Great Recession, central banks' need to stimulate the economy focused on three options once traditional interest rate tools were exhausted: 1) a move into negative nominal interest rates[1]; 2) quantitative easing; 3) forceful forward guidance on interest rates.

At first glance the upside-down world where borrowers get paid and creditors have to pay seems odd, but central banks hoped that the move to zero and then negative interest rates could be seen as a natural extension of traditional interest rate cuts to stimulate the economy. In addition, the NIRP can also be seen a tool to reduce the attractiveness of domestic investments compared to foreign assets, thus helping to prevent FX appreciation (although central banks' candor on the topic varies).

NIRP is not accepted by everyone in the central bank community. Reluctance to adopt NIRP is justified by a variety of concerns: 1) a perverse increase in the savings rate, 2) the negative impact on bank profitability, 3) disruption to non-bank financial business models, 4) policy ineffectiveness due to a move to physical storage of cash, and 5) excessive risk taking beyond the intended compression of risk premia.

NIRP in practice

Many central banks in the developed world decided to adopt a NIRP as a response to the Great Recession, with the notable exception of the Federal Reserve and the Bank of England (Figure 1). However, even the most eager central banks have shown in action, if not in words, concern about side effects: after the early 2016 rate cuts, the ECB, BoJ, and Riksbank decided to provide additional stimulus to the economy via more rounds of QE and downplayed expectations of further cuts, which were indeed priced out (Figure 2).

Figure 1: Many central banks in the developed world decided to add negative interest rate policy (NIRP) to their toolkit, but no cut has been implemented since early 2016

Selected monetary easing announcements on interest rates and balance sheet expansion

Central Bank	Actions
ECB	Deposit rate cut to -10bp in Jun 2014 Further cuts in Sept 2014, Dec 15, and March 16 to -40bp
BoJ	Policy rate was cut to -10bp in Jan 2016
Riksbank	Policy rate was cut to -10bp in Feb 2015 Further cuts were made in March 2015, July 2015, and Feb 2016 to -50bp
DNB	Certificate of deposit rate was cut to -20bp from 5bp in Jul 2012 Rates temporarily positive (Apr 2014 to Sep 2014) before cut to -75bp in Feb 2015 Rates at -65bp since Jan 2016
SNB	-25bp rate on sight deposit balances above a certain threshold in Dec 2014 Cut -75bp in Jan 2015

Source: ECB, BoJ, Riksbank, DNB, SNB, J.P. Morgan

[1] It is worth highlighting that negative nominal rates are a novelty but negative real rates are more common.

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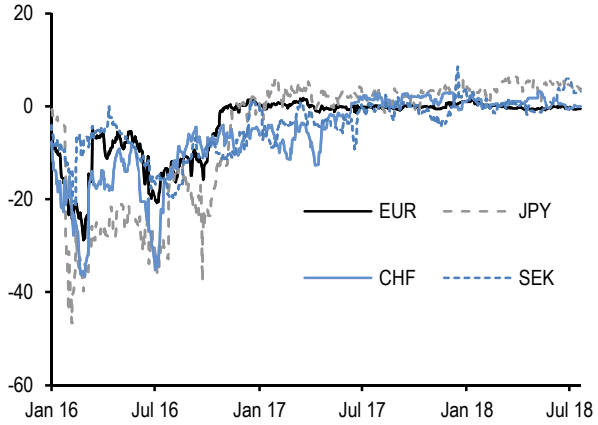
Figure 2: After the early 2016 rate cuts ECB, BoJ and Riksbank decided to provide additional stimulus to the economy via more rounds of QE and downplayed expectations of further cuts, which were indeed priced out

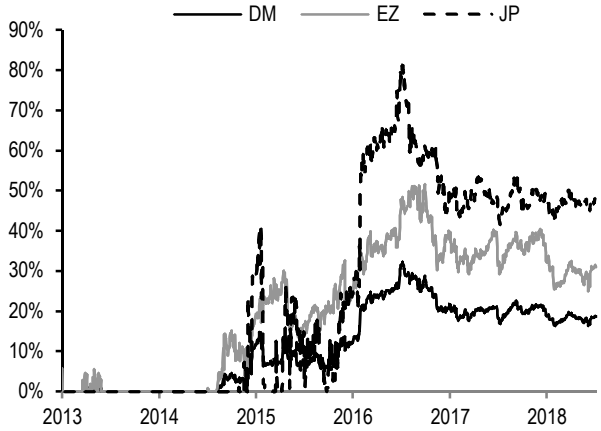
Trough in interest rate expectations in Euro, Japan, Switzerland, and Sweden (first two years of the curve) from January 2016; bp



Source: J.P. Morgan

Figure 3: Almost 1/3rd of the bonds in our Global Bond Developed Market Index traded with negative yield in mid-2016 due to expectations of further rate cuts

Evolution of % of bond universe trading with negative yields in the J.P. Morgan GBI Developed Market and EMU bond indices; % of total outstanding



Source: J.P. Morgan

Negative official interest rates are the main driver of the sharp increase in the proportion of negative yielding T-bills and bonds, but other central bank policies have contributed. For instance, in the Euro area, ECB QE has prompted a significant widening of the spread between repo rates and unsecured rates, and, together with Target Long-Term Refinancing Operations, a collapse of unsecured rates toward the bottom of the ECB refi-depo corridor. Factors beyond central banks' control also have occasionally played a role. For instance, in the summer of 2012, mid-2015, and early 2017, fears of some countries leaving the euro area prompted flight-to-quality flows into German fixed income.

At its peak in the summer of 2016, 32% of the bonds (by volume) in our Global Bond Developed Market Index traded with negative yield due to expectations of further rate cuts (Figure 3). Currently the proportion is ~17%. In the Euro area and in Japan the peaks were 50% and 80%, respectively, and are currently around 30% and 50%, respectively. The move to negative interest rate is not confined to government securities as a decent proportion of the Euro and Japanese credit market is trading with negative yields.

The experiment has been successful but with caveats

J.P. Morgan's economists believe that the empirical experience with NIRP has not validated most of the worries highlighted above, certainly for relatively small moves into negative territory: in the Euro area we found evidence of interest rates cuts into negative territory helping push corporate and retail rates down and a powerful rebound in activity.[2] However, in **practice it is yet to be determined whether in the future central banks will continue to favor QE and forward guidance over NIRP** in the next easing cycle or whether the experience has convinced the Fed and the BoE to use this tool if required.

Market functioning

A macro analysis is beyond the scope of this piece, and we focus on the impact of NIRP[3] on financial markets and financial institutions' business models in the Euro area and in Japan. We conclude that market dislocations have been relatively well contained, but economic agents have been forced to take more risk, and even that has not prevented loss of banks' profitability.

[2] See *Euro area: Monetary transmission at low interest rates*, D. Mackie, 19 August 2016.
[3] We reiterate that in many cases it is difficult to fully disentangle the impact of NIRP from other central bank policies aimed at suppressing risk premia, such as QE and forward guidance on interest rates.

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The positive news is that the move to a negative interest rates world has not affected market functioning from a technical standpoint in any meaningful way. In **cash securities,** the changes have been modest. Bonds are typically issued with coupon rates close to the yield of the instrument, but the concept of negative coupon is very awkward. Even when expected yields on new issues are negative, coupon rates have been floored at zero, thus resulting in issue prices above par. Looking at floaters, the Italian Treasury clarified that a 0% floor on CCT coupon would apply, creating some interesting optionality,[4] but floaters constitute a tiny portion of the government bond universe.

In the derivatives space there has been considerable work to rewrite linear and non-linear pricing models, with temporary dislocation in the case of option markets, but there has not been any negative impact on market functioning so far.

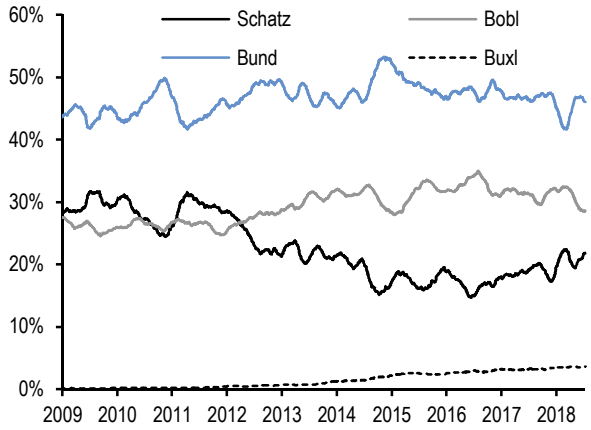
In repo markets, negative interest rates in theory create an incentive to "fail," but in practice the anecdotal evidence points to a manageable situation. Other factors have been driving repo rates functioning in the past few years, and a BIS report on global repo markets[5] ranks NIRP 12th out of 22 drivers considered, with capital and liquidity regulations unsurprisingly taking the top spot.

Market trading volumes

What is the impact of negative interest rates on trading volumes?[6] At first glance, one might be tempted to say that the decline in the relative proportion on Schatz futures trading starting in the middle of 2012, when the deposit rate first moved to 0%, might be linked to NIRP (Figure 4). However, the fall of 5Y German yields below 0% in 2015 did not generate a similar decline in relative volumes, and the fairly tight relationship between Schatz futures trading volumes and realized volatility (Figure 5) suggests that macro developments with subdued volatility in key activity and inflation data and effective forward guidance might instead be blamed for a lack of client interest in short-dated maturities.

Figure 4: The decline in the relative proportion of Schatz futures trading starting in the middle of 2012 was not necessarily linked to NIRP, in our view…

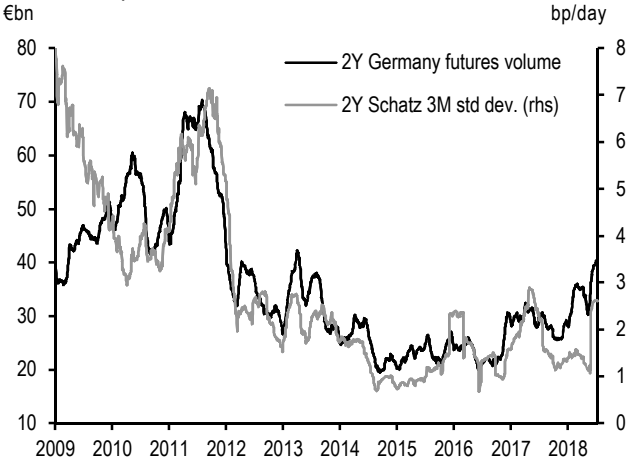
3M moving average of share of Germany futures volumes; %



Source: J.P. Morgan

Figure 5: …but was due to a combination of lower volatility on the back of macro developments and effective forward guidance leading to lower client interest in short-dated maturities

3M moving average of Schatz futures volumes and 3M realized volatility on 2Y Schatz yield;



Source: J.P. Morgan

Behavior of economic agents

Very low interest rates and negative interest rates in particular have had some predictable impact on economic agents.

Most domestic financial agents have reacted to the negative/low interest rates by taking more risk: duration risk (Figure 6), more credit risk (Figure 7),

[4] See *No negative coupon from the lender: Pricing CCTeus with zero floor*, A. Chordia et. al., 6 April 2016.
[5] See https://www.bis.org/publ/cgfs59.pdf
[6] We use futures as data on Euro area securities trading volumes only started in 1Q16, see https://europa.eu/efc/euro-market-activity-report_en

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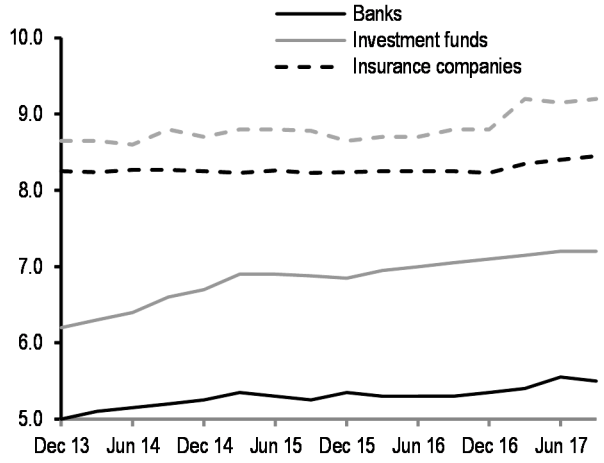
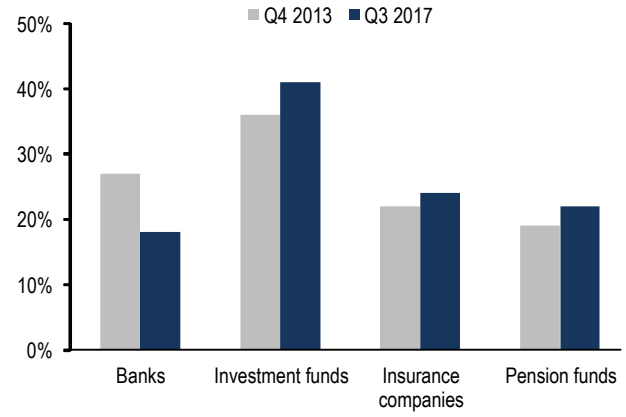
liquidity risk,[7] and an increasing exposure to higher-yielding foreign markets (Figure 8) at a time when international investors turned net sellers. The price to pay for stimulating the economy through risk premia compression is an increase in overall risks, which is hopefully matched by more careful risk management and regulatory supervision.

Figure 6: Most domestic financial agents have reacted to the negative/low interest rates by taking more duration risk…
Euro area financial institutions' debt security holdings average residual maturity; years



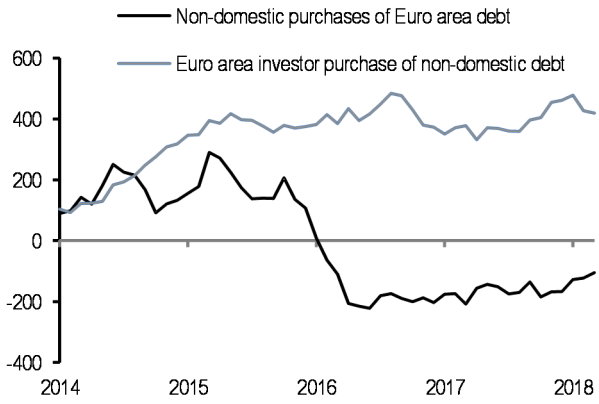
Source: ECB

Figure 7: …by taking more credit risk…
Share of lower-rated financial and non-financial corporate bonds in Euro area financial institutions' bond portfolios; % of total bond portfolio



Source: ECB

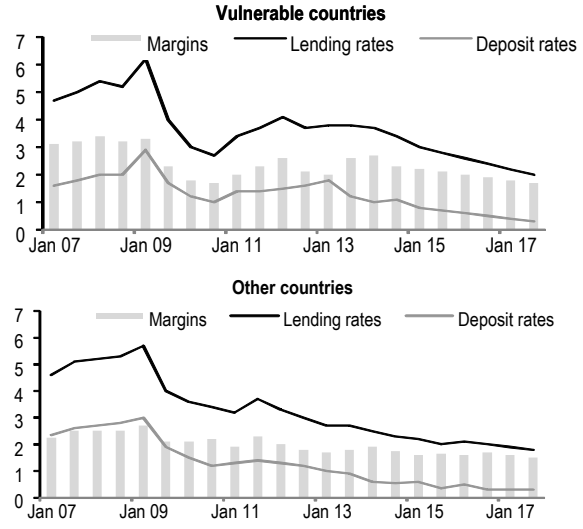
Figure 8: …or increasing exposure to higher yielding foreign markets
Net purchases of Euro area debt securities by non-domestic investors and net purchases of foreign debt securities by Euro area investors; 12-month rolling sum; €bn



Source: ECB

In terms of profitability in the Euro area, the ECB has highlighted margin compression as a constraint on bank profitability[8] (Figure 9) and as per a ECB study, a quarter of the 99 basis point reduction in the median loan-deposit margin over the June 2014-September 2016 period can be attributed to negative interest rates (Figure 10), even though the central bank keeps highlighting that the improving economy has a positive impact on credit quality and loan growth.

Figure 9: Compression of loan-deposit margins has been a constraint on bank profitability
Loan and deposit interest rates and margins on new business; %



Source: ECB and ECB estimates

[7] With direct investment in mortgages, government guaranteed loans for instance.

[8] See Financial Stability Review, November 2016 https://www.ecb.europa.eu/pub/pdf/fsr/financialstabilityreview201611.en.pdf?8049926a9c161942cd9ead8617ec4b63

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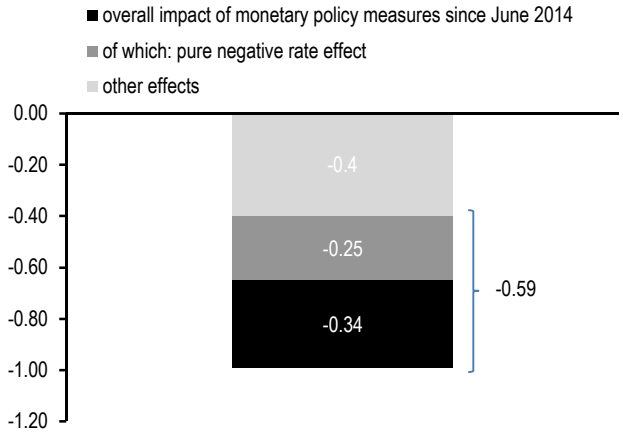
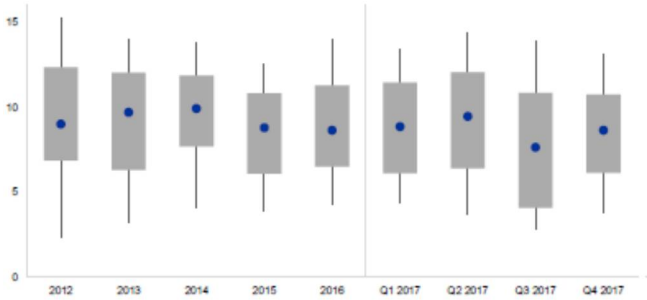
Figure 10: A quarter of the reduction in loan-deposit margins can be attributed to negative rates as per an ECB study
Model-based decomposition of the change in median loan-deposit margin for new business between June 2014 and September 2016



Source: ECB and ECB estimates

Interestingly, as per the ECB the profitability of the insurance sector remains good in aggregate[9] (Figure 11), although this reflects an increase in risk taking and favorable market conditions.

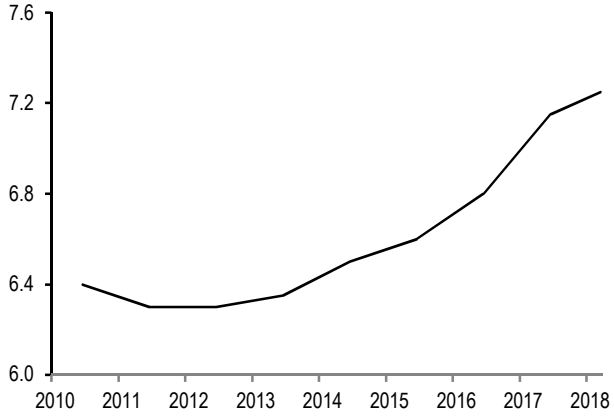
Figure 11: The profitability of the insurance sector remains good in aggregate even during the negative interest rate environment
Return on equity for a sample of large Euro area insurers; 2012 – Q4 2017; 10th and 90th percentiles, interquartile distribution and median; %



Source: ECB financial stability report, May 2017

Finally, on average public sector issuers have taken the opportunity of very low yields (in nominal and real terms) to increase the average maturity of their debt (Figure 12), with 40Y, 50Y, 70Y, and 100Y bonds being issued by some sovereigns.

Figure 12: Public sector issuers have taken the opportunity of very low yields to increase the average maturity of their debt
Residual maturity of Euro area government debt securities; years



Source: ECB

A closer look at the experience of Japan

In the case of Japan, NIRP was introduced in early 2016 as an alternative way to ease monetary policy further. Prior to NIRP, the BoJ had been purchasing almost 90% of Japanese government bonds (JGB) issued, yet inflation momentum was not picking up. In order to dispel growing concern that QQE2 was reaching its limit, the BoJ shifted to using a negative interest rate instead.

As an initial reaction, JGB yields declined aggressively across the curve, especially on the super-long sector, which came down by around 100bp within six months (Figure 13). Not only the actual rate cut, but the expectation of additional easing through future rate cuts, which had been impossible without NIRP, gave a boost to the bull flattening trend.

However, the BoJ decided to conduct a "Comprehensive assessment" of its monetary policy only half a year after it introduced NIRP. As a result, Yield Curve Control (YCC) was introduced from September as a way to buy fewer JGB by switching its commitment to a yield level rather than a purchase amount. In our view, this was a step toward less monetary easing, which led yields to rise from their trough levels.

[9] See Financial Stability Review, May 2018
https://www.ecb.europa.eu/pub/pdf/fsr/ecb.fsr201805.en.pdf?ed91bac6b64b9b4aea7729a513c2f522

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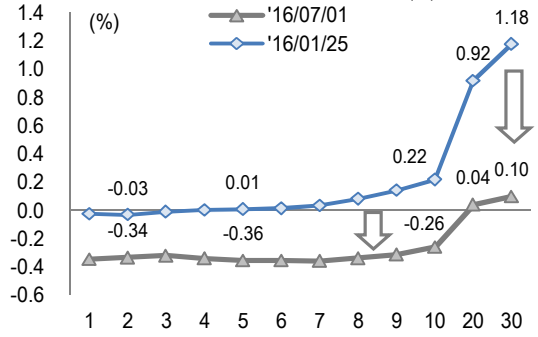
Figure 13: Super-long JGB yield declined aggressively after NIRP
JGB curve before NIRP and 6 months after NIRP (%)



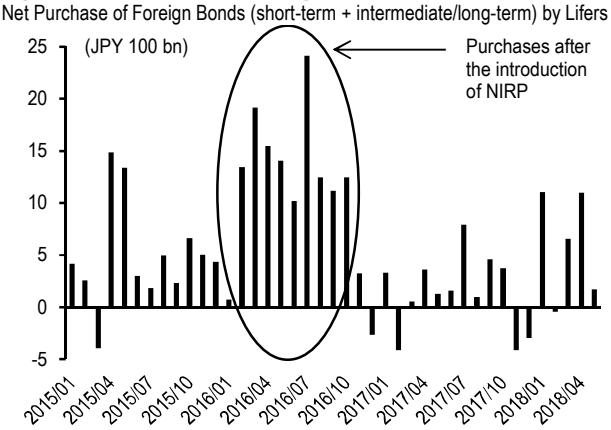
Source: Bloomberg, J.P. Morgan

In Japan, NIRP was introduced rather late in the easing cycle as QQE initially started in April 2013. Furthermore, YCC was introduced only seven months after NIRP and since then took center stage in the JGB market. Therefore, it is difficult to strip out the impact of NIRP alone.

That said, one notable change in investor behavior was that Japanese lifers shifted their investment from JGBs to foreign bonds in search of higher yield since the introduction of NIRP (Figure 14). In fact, they bought JPY13.4 trillion of foreign bonds in 2016, up from JPY5.9tn in 2015. As a result, in combination with tighter capital regulations in the U.S., the USD/JPY cross-currency basis widened to a record level in 2H16.

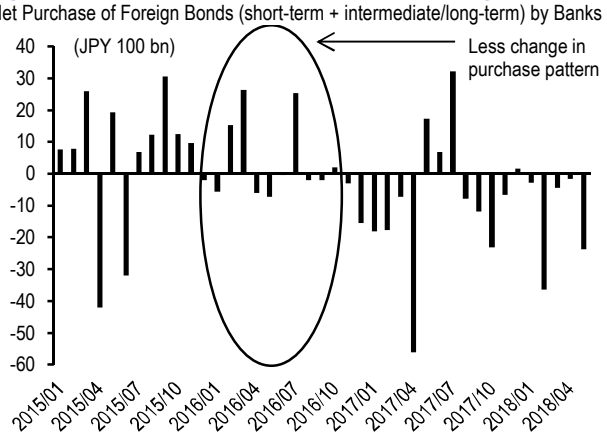
This pattern was less apparent for Japanese banks. Unlike lifers, who always have some money that needs to be allocated, banks tend to increase their positions in foreign bonds only when there is an opportunity for carry and roll-down or capital gains. Data showed little evidence of banks changing their foreign bond investment strategy (Figure 15).

Figure 14: Lifers increased foreign bond investments after NIRP
Net Purchase of Foreign Bonds (short-term + intermediate/long-term) by Lifers



Source: BoJ, J.P. Morgan

Figure 15: On the other hand, banks made little change
Net Purchase of Foreign Bonds (short-term + intermediate/long-term) by Banks



Source: BoJ, J.P. Morgan

As for market functionality, monthly JGB transaction data suggest that the volume of transactions (both inter-dealer and dealer-investor flow) has generally decreased since Kuroda took over in 2013 (Figure 16). Looking at the data for the short and intermediate sector since 2016 (the year YCC and NIRP were introduced), we observe that the volume of transactions has significantly dropped for both the dealer-investor and inter-dealer market. Investors have become less interested in trading the short/intermediate JGB as most JGBs with maturities under 5Y have converged to IOER (-0.10%) with 10Y JGB yield fixed by YCC. As a result, the inter-dealer market has dried up too.

Transactions in the long and super-long JGB are largely unchanged in the dealer-investor market and rose for the super-long sector in the inter-dealer market. Both investors and dealers have turned to trading super-long JGB as it is the only sector allowed to move. That said, **the decline in volatility is so severe that market functionality is far from back to normal.**

At the July 31 MPM, the BoJ decided to increase the trading range of the 10Y JGB to +/-20bp from the previous +/-10bp. It took two years for the fine-tuning of YCC to finally take place after the introduction of YCC. With the forward guidance in place, it may take another two years for the next reform to be implemented. We still have a long road ahead.

As a next step, we expect the BoJ will hike the 10Y JGB target to 25bp in April 2020. The possibility of change in the target from 10Y to 5Y has also been discussed in the markets (Figure 17). Therefore, at this pace, exit from NIRP will only be discussed in the far future (more than five years) in Japan.

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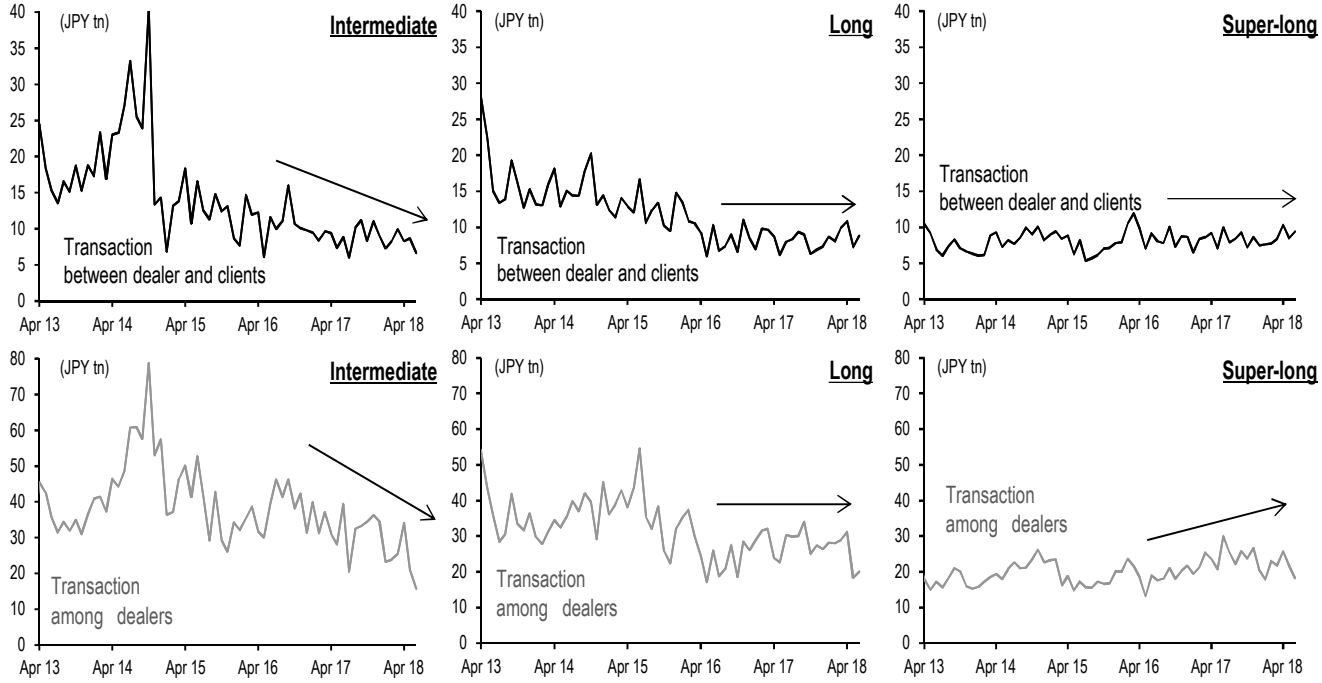
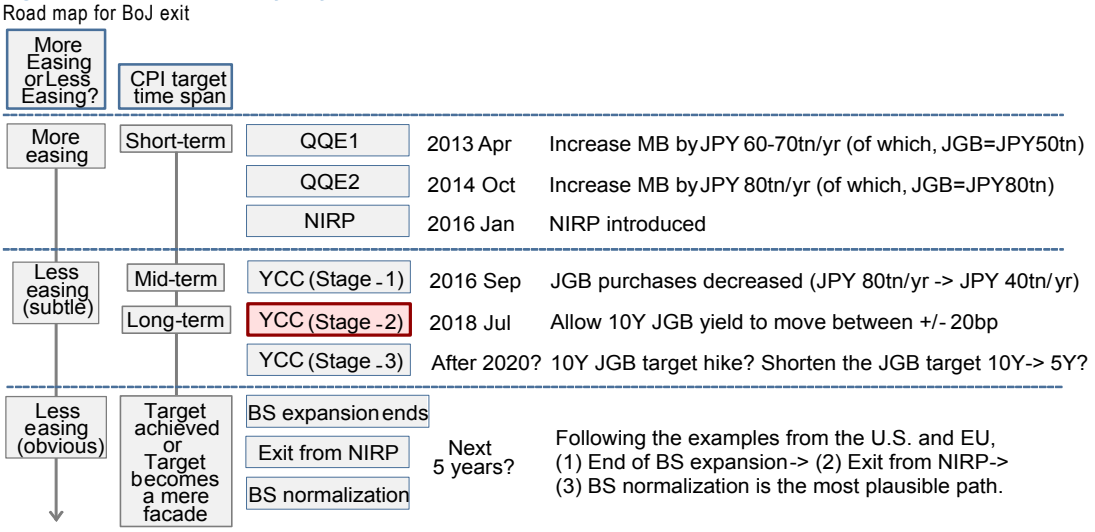
Figure 16: Transaction volume among dealers decreased the most in the intermediate sector amid NIRP and YCC
Monthly JGB transaction volume for intermediate, long, and super-long sector for dealer-investor and inter-dealer market (JPY tn)



Source: JSDA, J.P. Morgan

Figure 17: Exit from NIRP may only be discussed in the far future in Japan?
Road map for BoJ exit



Source: JSDA, J.P. Morgan

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J.P.Morgan

A changed corporate bond market

- **The size and universe of the corporate bond market have grown rapidly, thanks to attractive borrowing costs, investors looking for alternatives to very low sovereign yields, central bank intervention, and less availability of bank funding for some issuers.**
- **Issuers have extended the maturity of their debt issuance post crisis in response to lower yields and less available bank funding.**
- **Average credit ratings have declined, mostly driven by rating agency changes to their frameworks for rating banks, but also due to some lower quality issuance.**
- **Credit market liquidity has declined driven by fewer high-frequency participants as bank proprietary desks have closed and hedge funds are less active in credit markets, as well as greater buy-side concentration.**

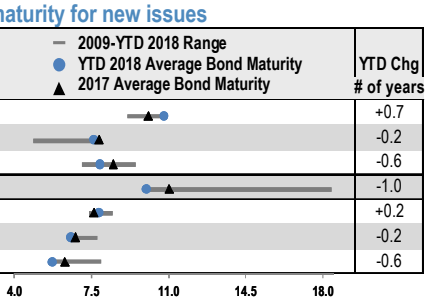
The financial crisis has had a dramatic impact on the global corporate bond market. In this section we look at the two largest markets: dollars and euros. The corporate bond market is much larger now, with more issuers, longer maturities, and more hybrid bonds, but with lower issue sizes, lower ratings, greater buy-side concentration, and lower turnover.

Longer maturity of issuance: One major change to the market over the past five years has been an extension in the average maturity of bonds. Issuers have taken advantage of record low yields to lock in funding for longer. Also, capital rules for banks changed, raising the cost of providing backstop lines of credit, which reduced commercial paper issuance, helping to extend the duration of corporate funding.

The duration of the U.S. investment grade (IG) benchmark has risen from 7.2 years in February 2011 to 8.0 years today. Comparatively, that of euro investment grade climbed from a low of 4 years in 2011 to 5.2 years today, surpassing the pre-crisis levels of 5.1 years. The average maturity of new issues has increased substantially for both U.S. and Euro IG markets. In U.S. IG, non-Financial supply of 20yr and 30yr bonds in 1H18 reached 28% of total issuance, up from 19% in 2012 (Figure 2). Similarly, the majority of bonds in the Euro IG bond market are now coming at 7yr+ (Figure 3).

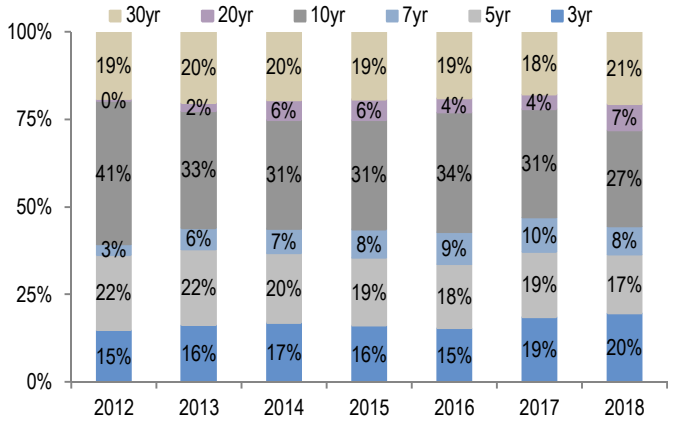
Figure 1: The average bond maturity for new issues

Credit Markets	Bond Maturity (yrs) YTD 2018	2017	2009 - YTD 2018 Min	Max	YTD Chg # of years
US HG	10.8	10.1	9.1	10.8	+0.7
EUR HG	7.6	7.8	4.9	7.8	-0.2
EM HG	7.9	8.5	7.1	9.5	-0.6
Japan	10.0	11.0	10.0	18.4	-1.0
US HY	7.8	7.6	7.4	8.5	+0.2
EUR HY	6.5	6.8	6.5	7.7	-0.2
EM HY	5.7	6.3	5.7	7.9	-0.6



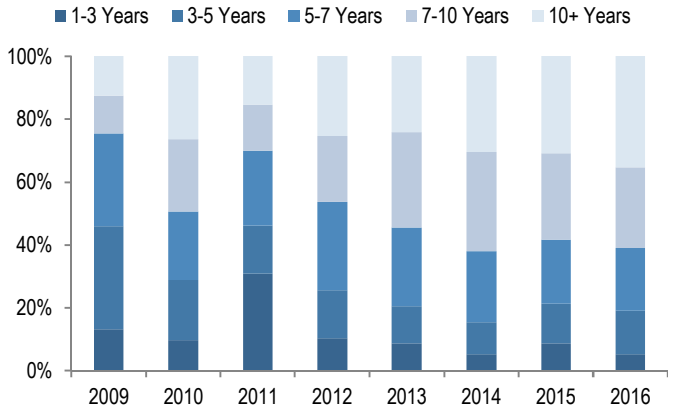
Source: J.P. Morgan, as of 1H18

Figure 2: U.S. Investment Grade (Non-Fins ex EM) Duration of New Issues



Source: J.P. Morgan, Dealogic

Figure 3: Euro Investment Grade Duration of New Issues



Source: J.P. Morgan.

Rating agencies have reviewed their methodologies, and most financial ratings are much lower now than pre-crisis, even with most banks' stronger credit metrics.

With the exception of EM high grade (HG), the global trend has been toward lower quality issuance. In 2017, single-A or better-rated issues accounted for less than 49%

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of U.S. HG issuance, near the low end of its range since the last crisis. This has been driven by the general trend of lower ratings and lower rated M&A supply. In the Euro HG market we have seen a decline of 12% y/y since 2016 to a multi-year low of 31% in supply rated single-A, or better. The growth of the BBB market and the potential increase of the fallen angel risk need monitoring when the next cycle turns.

Figure 4: The average rating for most markets has deteriorated post crisis

Single A or Better as a % of Total HG supply

Credit Markets	Single A Supply % 2017	2016	2008 - 2017 Min	Max	2008-2017 Range / 2017 Single A or better % of HG Supply / 2016 Single A or better % of HG Supply	Y/Y Change
US HG	48.5%	55.5%	48.5%	75.7%		-7%
EUR HG	31.0%	43.0%	31.0%	91.0%		-12%
EM HG	53.1%	48.1%	39.6%	58.6%		5%

25.0% 45.0% 65.0% 85.0%

Single B or Better as a % of Total HY supply

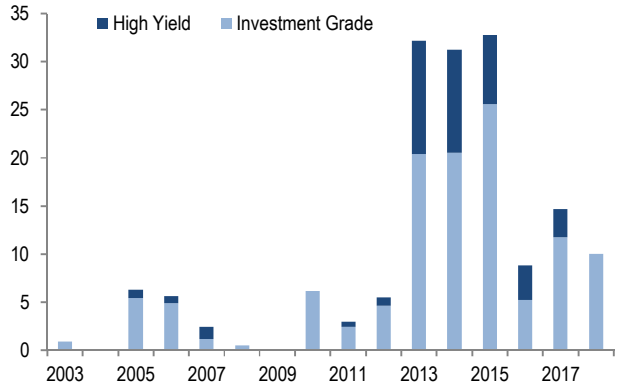
Credit Markets	Single B Supply % 2017	2016	2008 - 2017 Min	Max	2008-2017 Range / 2017 Single B or better % of HY Supply / 2016 Single B or better % of HY Supply	Y/Y Change
US HY	84.8%	89.4%	74.0%	89.4%		-5%
EUR HY	93.1%	95.7%	89.5%	100.0%		-3%
EM HY	75.7%	77.9%	69.2%	95.2%		-2%

60.0% 70.0% 80.0% 90.0% 100.0%

Source: J.P. Morgan

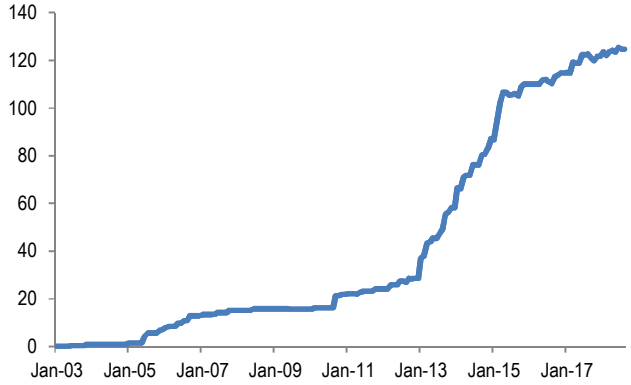
Also worth noting is the rise of the corporate hybrid market, which has grown from around €20 billion before the financial crisis to €80 billion today (Figure 6). This has come alongside the standardization in documentation and greater stability in rating agency treatment of the asset class.

Figure 5: Corporate Hybrid Issuance, €bn



Source: J.P. Morgan.

Figure 6: Corporate Hybrid Amount Outstanding, €bn



Source: J.P. Morgan.

Less bond market turnover

Given the availability of TRACE data, we focus on liquidity in the U.S. high grade (HG) and high yield (HY) markets. The turnover of the U.S. HG market in 2017 was 42% lower than pre-crisis in 2006, and for the U.S. HY market it was 24% lower. While total trading activity in both markets has increased from pre-crisis levels, this has lagged the market growth, resulting in less turnover.

The drivers of lower turnover are varied and debated, but we attribute it to several factors including a reduction in the number and importance of high-frequency credit trading participants post-crisis. This includes the shutting down of U.S. proprietary trading desks, fewer credit hedge funds, and those that remain using less leverage. Also, increased regulation on trading desks including aspects of the Volcker rule, TRACE, higher capital charges, changes in derivative capital rules, etc., have all played a part. Changes to rating agency methodologies for rating structured products and changes to bank capital rules on these products further dampened demand for these instruments and negatively impacted liquidity. Finally, the lessons learned by all market participants as to the potential volatility of credit markets, the importance of counterparty risk in long-term contracts, and the correlation of markets in severe sell-offs all contributed to reduced leverage in credit markets and lower turnover.

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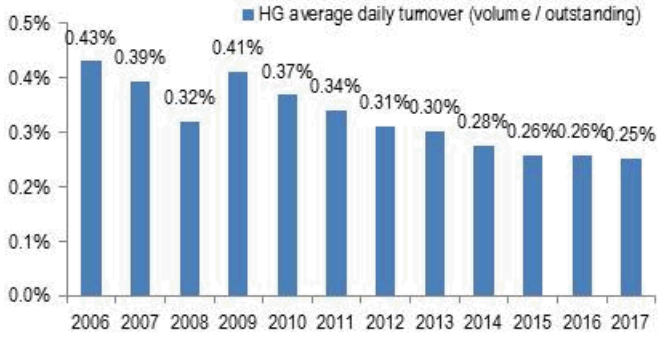
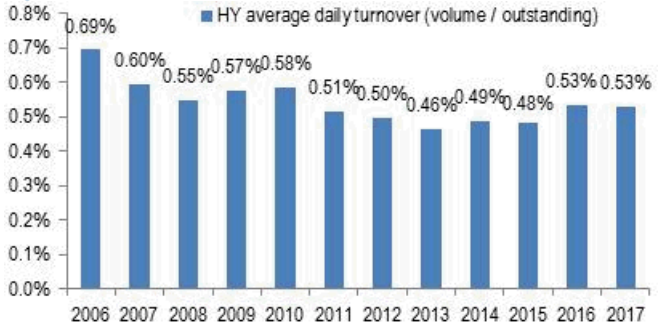
Figure 7: U.S. HG turnover has decreased 42% since 2006



Source: J.P. Morgan.

Figure 8: U.S. HY turnover has decreased 24% since 2006



Source: J.P. Morgan.

Greater investor concentration

The disappearance of bank proprietary trading desks because of regulation and of some hedge funds because of losses during the crisis, combined with the heightened focus on counterparty risk, has led to an increase in investor concentration. Changes have also been driven by the success of asset management firms in growing the AUM of their mutual funds and ETFs. However, these funds tend to move together both in their in/outflows and their trading activity. Therefore, the risk of groupthink and crowded trades has increased, which might translate into gapping markets when the tide turns.

The reduction in bank financing has also led to an increase in the number of bond market issuers. The growth in the number of issuers is a natural outcome of the developments in banks globally as they work toward meeting higher capital and other regulatory requirements. This has impacted their ability to make loans and encouraged some borrowers to move from the bank loan market to the bond market. The U.S. corporate bond markets are the primary funding source for U.S. corporates and also an important source of funding for corporates globally. The markets have functioned well in this regard, offering funding for an increasing number of companies. However, new issuers tend to have fewer, smaller bonds, which trade less, on average. The number of HG USD issuers has roughly doubled since 2009 (excluding Emerging Markets issuers).

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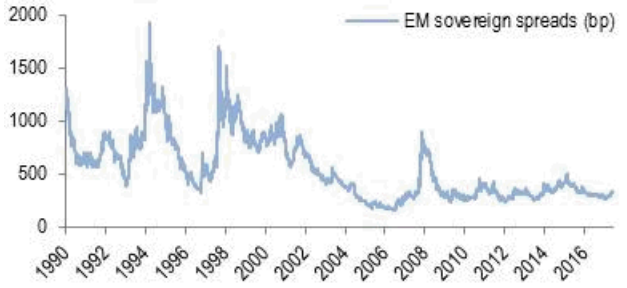
How did EM funding change?

- **EM government funding has shifted increasingly from external to domestic sources.**
- **Stronger local markets have driven a dramatic fall in external funding for sovereigns.**
- **EM corporate bond external debt stock has increased to US$2.1 trillion with about half consisting of quasi-sovereigns, and the market remains closely linked to sovereigns.**
- **Total size of the EM corporate bond market is approaching US$9.9 trillion (US$7.8bn local corporate debt stock and US$2.1 billion external corporate debt stock), with local currency accounting for 78% of the market and Asia local currency accounting for 91% of the entire EM corporate local currency market.**
- **Asia has been the biggest driver of this growth, especially China, which is now the biggest issuer.**
- **We estimate that local investors within EM hold over 50% of EM corporate bonds.**
- **Default rates have been stable in recent years but have yet to be tested against a global shock.**

EM Sovereigns

The lessons of the Asian financial crisis have changed the way EM governments fund themselves, shifting to domestic rather than external funding. The Asian Financial Crisis (AFC) of the late 1990s, rather than the Global Financial Crises (GFC) of the late 2000s, had a major impact on EM funding changes. What was perhaps notable in the GFC is that it did not alter the path of changes that had been progressing for a decade. The period from 1994 to 1999 saw major financial crises, involving large recessions and FX moves, across Mexico, Thailand, Indonesia, Korea, Malaysia, Russia, and Brazil. These in turn affected emerging markets as a whole with credit spread premia and volatility seeing extreme spikes during that period (Figure 1).

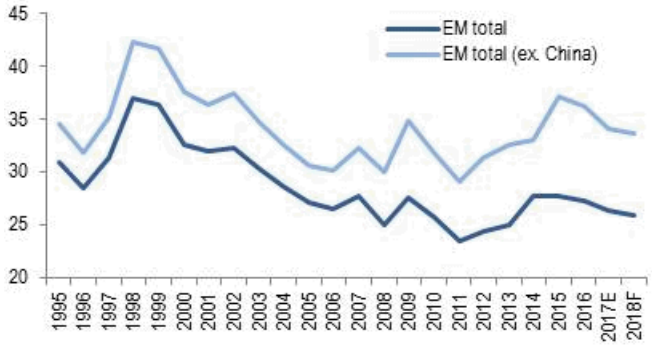
Figure 1: EM sovereign spreads saw massive spikes during the EM financial crises of the 1990s
EMBI until end 2001 and EMBIGD spreads from 2002 (bp)



Source: J.P. Morgan

The "original sin[1]" of excessive government external debt borrowing has generally been avoided by large EM countries in recent years. During the early 1990s, EM governments and corporates took advantage of the ability to raise debt in hard currency by increasing borrowing in external markets. This helped finance large external imbalances in the form of current account deficits, with the additional vulnerability of pegged exchange rates. The buildup of external debt in the economy increased (Figure 2), but as current accounts were unsustainable and inflows stopped, pegged exchange rates eventually saw large devaluations. Given the large foreign currency debt burden, this led to an explosion in EM external debt as a percentage of GDP and subsequent corporate and some sovereign defaults[2] as debt repayments became too onerous. EM countries at the center of these crises saw external debt levels in the 1990s at multiples of current levels (Figure 2).

Figure 2: The EM "original sin" of the 1900s saw a large buildup of external debt
Total external debt (% of GDP)



Source: J.P. Morgan

[1] See *Exchange Rates and Financial Fragility*, Barry Eichengreen and Ricardo Hausmann, August 1999.
[2] See *The International System: Crisis & Reform,* S. Fischer 2001.

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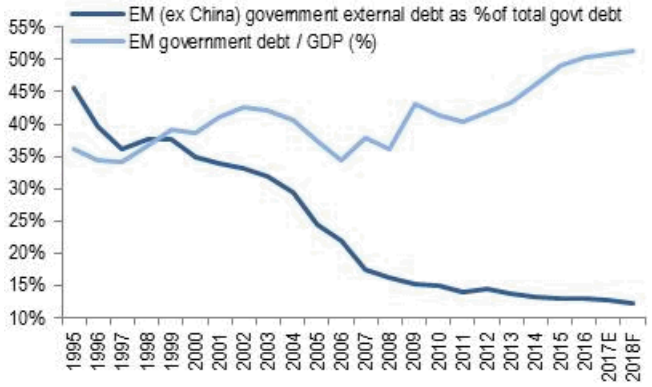
Table 1: External debt levels are now much lower for EM countries involved in the 1990s' financial crises
External debt (% of GDP)

	Peak 1990s*	2018F
Indonesia	148.4	24.0
Thailand	93.9	28.7
Mexico	59.0	40.3
Russia	79.9	34.4

Source: J.P. Morgan, IMF (taken from *The International System: Crisis & Reform, S. Fischer 2001).* Peak years are 1998 for Indonesia and Thailand, 1995 for Mexico, 1999 for Russia.*

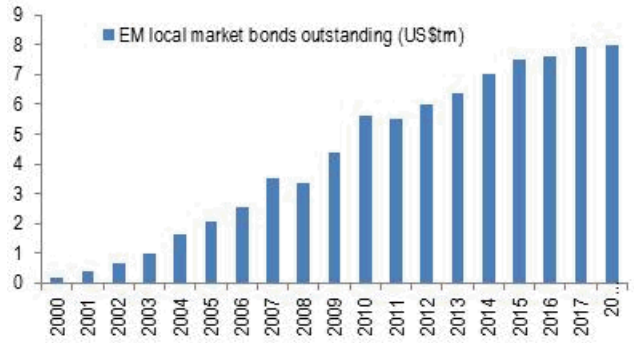
EM governments have since shifted funding increasingly to domestic sources, with a multi-decade fall in government financing from external sources. One of the clear lessons of the Asian Financial Crisis for EM governments has been that large external debt borrowing leaves the countries open to debt repayment problems as currencies depreciate. The continuing development stage of many large EM countries also helped this process as it allowed the emergence of a domestic buyer base in the form of banks, pension funds, and asset managers. As a result, large EM countries have shifted their borrowing to originate from domestic local bond markets even as they have increased their overall government debt levels (Figure 3). This has resulted in the rise of the investable EM local bond market, particularly since the Global Financial Crisis (Figure 4). Foreign investors have responded in turn by increasingly buying local bonds. In 2009 foreign investors owned on average just 10% of local currency bond markets of EM countries, but this has currently risen to 26.5%. GBI-EM Global debt stock (US$1.19 trillion excluding China and India) is now 1.3 times larger than EMBIG (US$919 billion) as EM sovereigns are issuing more in their own currencies and less in external debt.

Figure 3: The aftermath of the Asian Financial Crises has seen a significant fall in government funding through external debt



Source: J.P. Morgan

Figure 4: The EM local bond market has seen strong growth over the past 20 years to reach almost US$8trn currently



Source: J.P. Morgan

EM Corporates

The stock of EM corporate external bonds has expanded significantly since the global financial crisis to reach US$2.1 trillion, but we have not viewed it as a systemic risk factor. The current bond stock is almost four times the US$548 billion outstanding at end 2007, and while part of the growth reflects the expansion in the EM economies, there has also been increased issuance from a wider base of issuers. EM corporate external bond issuance is now nearly three times as large as EM sovereign debt issuance, reaching a record US$482 billion in 2017. It is important to point out that 60% (58% in 2017 and 62% YTD) of the issuance is investment-grade rated. In particular, Asia has been the main driver of growth, accounting for close to US$900 billion of the US$1.6 trillion increase during this period. Within Asia, China stands out, with the bond stock expanding from only US$25 billion in 2010 to US$627 billion to become the largest country segment by far. This naturally raises the question whether EM corporates have become excessively reliant on foreign-currency bonds for funding, increasing the external vulnerability through currency mismatch and refinancing risk. However, our view has been that the potential risk posed by corporate bonds is not as high given the relative size to the EM economies and the increasing participation from local investors. 2017 wrapped up being the best year for EM corporate fundamentals since 2011 as top-line revenues rose 13% with equally strong gains in EBITDA. Net leverage for EM High Grade declined to 1.3x in 2017, much lower than U.S. High Grade net leverage, which ended 2017 at 2.3x (*EM Corporate Fundamentals Checkup: Best year since 2011*, A. Meyers, 22 May 2018).

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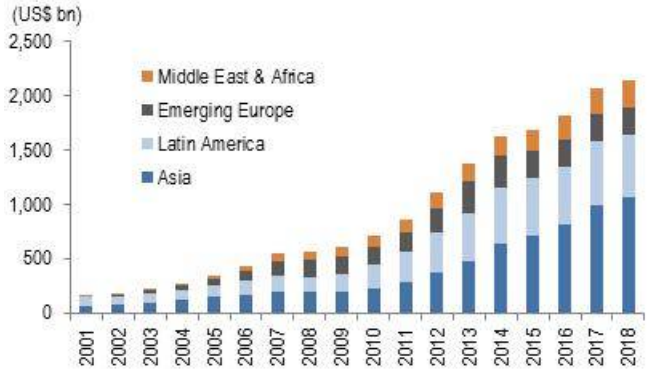
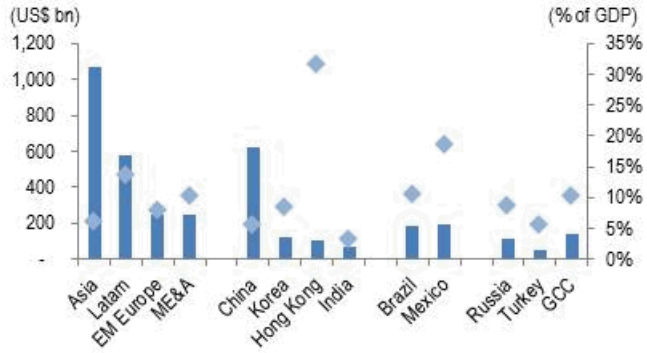
Figure 5: EM corporate external bonds outstanding reached US$2.1tn



Source: J.P. Morgan.

Despite the elevated growth, EM corporate external bonds range from 5% to 15% of GDP for most of the major countries with quasi-sovereigns contributing half. Approximately 58% of the CEMBI market capitalization is investment grade rated. Asia is the lowest at 6.9% of GDP notwithstanding the amount of bonds outstanding due to the large size of the economies. Latin America is the highest at 13.5%, but we do not find this to be a level that poses serious risk on external vulnerability by itself. Moreover, quasi-sovereigns account for about half of the bond stock, and the systemic importance of many of these entities makes it likely the sovereign will provide support if required. In addition, banks make up about one-third of the bond stock, and we think there is reason for large banks to be supported even if there is no direct government ownership. Hence, we think the external corporate bond market remains closely linked to the sovereign, both in terms of spread movements as well as fundamental trajectory. We have seen such linkage in recent years with major developments on the sovereign affecting corporates in Russia and Brazil that led to deteriorations in the corporate credits and risk perception, culminating in large spread widening.

Figure 6: EM corporate external bonds % of GDP not excessive



Source: J.P. Morgan.

We estimate that 53% of EM corporate external bonds are held by local investors, according to our recent analysis on *EM corporate bond ownership*. Local investors tend to be more stable holders of EM bonds, especially those in their own countries and regions. This is due to the better familiarity with the credits and higher comfort level in times of stress compared to global or crossover investors, who are more likely to be risk averse. We have also been seeing lower volatility in the regions with higher local ownership such as Asia and the Middle East compared to Latin America and EM Europe, which tend to have higher holdings by crossover and global EM investors. Moreover, we find that the local ownership has been rising in recent years, with Asian investors now estimated to hold about 80% of the region's bonds.

Although we do not find the rise in the EM corporate external bond stock itself to be a major source of vulnerability, we are still monitoring the overall increase in EM private sector debt. We have noted in our *EM Debt Overhang: Mostly Domestic, Private and in Loans* (J. Goulden et al., 2 Nov 2015), that domestic sources of borrowings primarily from banks have been the main drivers of the higher private sector debt, with China accounting for the bulk of the increase. Nevertheless, a deterioration in the domestic debt can also lead to a cross-default on external bonds, especially if there is pressure on the sovereign level, which can aggravate the refinancing conditions of the corporates. Hence, the level of default and credit events would depend on the ability of the corporates to withstand potential stress based on the credit fundamentals and extent of currency vulnerability.

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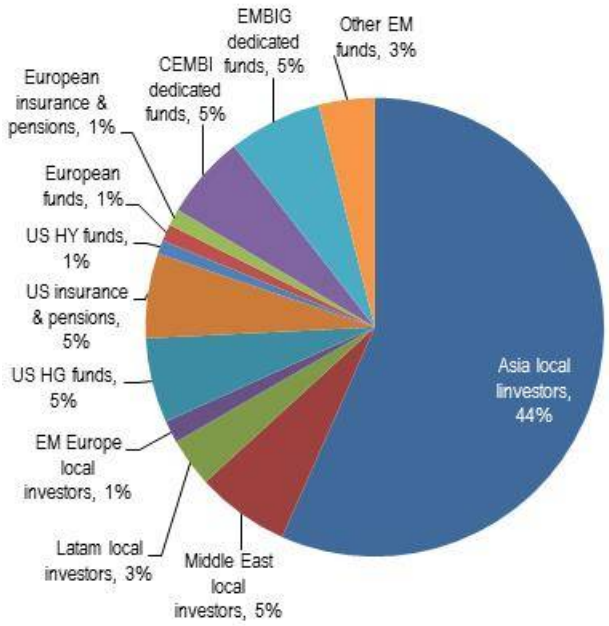
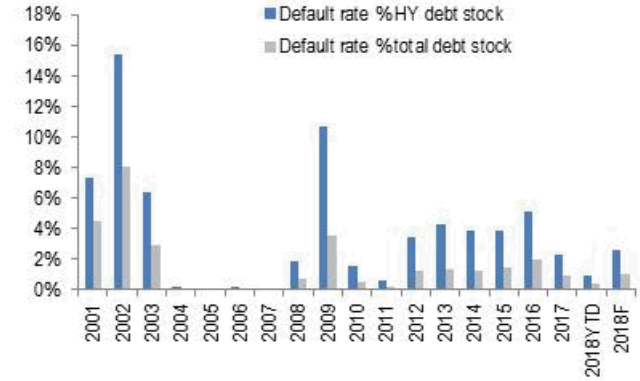
Figure 7: We estimate that over half of EM corporate bonds are held by local investors within EM regions
Covers US$1.7tn out of US$2.1tn EM corporate asset class



Source: J.P. Morgan, BondRadar, Bloomberg. Note: based on the US$1.7tn out of the US$2.1tn asset class that we identified – adds up to 78%.

Figure 8: Default rates have been stable in recent years but are yet to be tested on a global scale



Source: J.P. Morgan.

The default trend in recent years shows a relatively stable trend between 2-5% of high yield bonds, but while particular regions and countries underwent episodes of stress, corporates have not yet been tested on a global scale. In recent history, there have been two cases of 10%+ spikes in the default rate for EM corporates, once in 2002 led by Argentina/Brazil and again in 2009 following the Global Financial Crisis. Interestingly, this pattern is very similar to U.S. HY, suggesting that extreme default cycles have been synchronized. Following the Global Financial Crisis, the default rate exceeded 4% in 2013 and 2016, both mainly due to some large defaults from Latin America.

Nevertheless, these were still not levels that can be considered excessive, with low default rates in the other regions providing an overall buffer. Our near-term outlook on fundamentals has been constructive as the recovery in revenues and EBITDA is still on pace and corporates have, for the most part, not been aggressive in taking on debt given the still very modest capex and M&A activity. One area where we have been taking a more precautionary stance on defaults is in China HY, where there have been many new issuers in recent years that are not well covered in the market and may be more vulnerable to tighter monetary conditions. That said, the adverse case we included in our latest *EM Corporate Default Monitor* (A. Meyers et al., 16 July 2018), is still a modest 3.6%, which would be in line with the long-term historical average.

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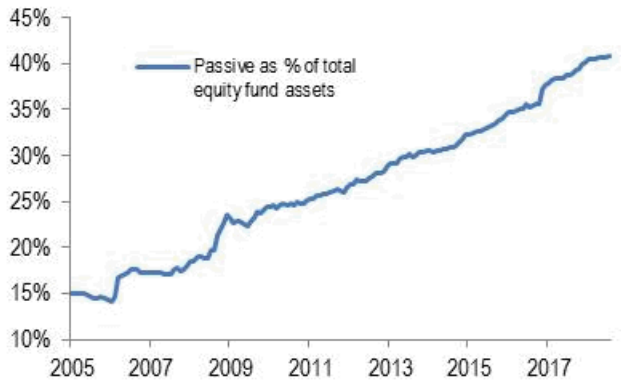
What will the next crisis look like?

- **The main attribute of the next crisis will likely be severe liquidity disruptions resulting from market developments since the last crisis.**
- **The shift from active to passive investment, and the prevalence of trend-following investors and market makers, reduces the ability of the market to prevent large drawdowns.**
- **In multi-asset portfolios, the ability of bonds to offset equity losses will be reduced. Private assets that are less frequently marked to market may understate the true risk exposure of portfolios.**
- **These factors may lead to a miscalculation of true risk due to a reliance on recent volatility as the main measure of portfolio risk.**

This year marks the 10th anniversary of the 2008 Global Financial Crisis (GFC) and also the 50th anniversary of the 1968 global protests. Currently, there are financial and social parallels to both of these events. Leading into the 2008 GFC, some financial institutions underwrote products with excessive leverage in real estate investments. The collapse of liquidity in these products impaired balance sheets, and governments backstopped the crisis. Soon enough governments themselves were propped by extraordinary monetary stimulus from central banks. Central banks purchased ~US$10 trillion of financial assets, mostly government obligations. This accommodation is now expected to reverse, starting meaningfully in 2019. Such outflows (or lack of new inflows) could lead to asset declines and liquidity disruptions, and potentially cause a financial crisis. We will call this hypothetical crisis the "Great Liquidity Crisis" (GLC). The timing will largely be determined by the pace of central bank normalization, business cycle dynamics, and various idiosyncratic events such as escalation of trade war waged by the current U.S. administration. However, timing of this potential crisis is uncertain. This is similar to the 2008 GFC, when those that accurately predicted the nature of the GFC started doing so around 2006. We think the main attribute of the next crisis will be severe liquidity disruptions resulting from these market developments since the last crisis:

- **Shift from Active to Passive Investment.** We have highlighted the growth in passive investment through ETFs, indexation, swaps, and quant funds over the past decade, transforming equity market structure and trading volumes. For instance, as of May 2018, total ETF assets under management (AUM) reached US$5.0 trillion globally, up from US$0.8 trillion in 2008. We estimate that Indexed funds now account for 35-45% of equity AUM globally, while Quant Funds comprise an additional 15-20% of equity AUM. With active management declining to only one-third of equity AUM, we estimate that active single-name trading accounts for only ~10% of trading volume.[1] We estimate ~90% of trading volume comes from Quant, Index, ETFs, and Options. The shift from active to passive asset management, and specifically the decline of active value investors, reduces the ability of the market to prevent and recover from large drawdowns. Figure 1 illustrates the trend in passive assets, showing the growth of passive equity fund AUM as a % of total equity fund assets since 2005.

Figure 1: Passive equity investment has doubled since 2005
Passive funds' (i.e. ETFs + mutual funds) share of total global equity fund AUM



Source: J.P.Morgan QDS, EPFR

The ~US$2 trillion rotation from active and value to passive and momentum strategies since the last crisis eliminated a large pool of assets that would be standing ready to buy cheap public securities and backstop a market disruption. Figure 2 highlights the inflows into passive equity funds since 2010 compared to outflows from active equity funds.

[1] J.P. Morgan's Quantitative and Derivatives team estimates fundamental single-stock volumes as a % of total equity trading by breaking down volumes by product type and then netting out single-stock volumes from non-fundamental investors, including 1) HFT strategies—primarily statistical arbitrage and index arbitrage that are counted in stock volumes but generally do not represent a fundamental / directional stock view; 2) Program Trades, which are primarily used by traditional quant strategies and passive funds; and 3) technical derivative hedging flows.

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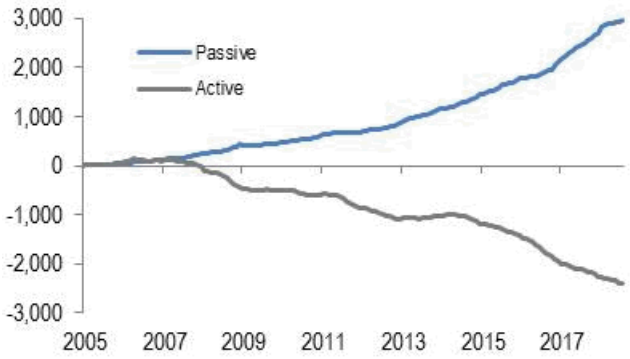
Figure 2: Strong inflows into passive equity funds, while active funds have experienced outflows
Cumulative net flows into passive and active equity funds since 2005



Source: J.P. Morgan QDS, EPFR

Figure 3: S&P 500 market depth has declined sharply during episodes of volatility

Source: J.P. Morgan Quantitative and Derivatives Strategy

- **Increased AUM of strategies that sell on "autopilot."** Over the past decade there was strong growth in Passive and Systematic strategies that rely on momentum and asset volatility to determine the level of risk taking (e.g., volatility targeting, risk parity, trend following, option hedging, etc.). A market shock would prompt these strategies to programmatically sell into weakness. For example, we estimate that futures-based strategies grew by ~US$1 trillion over the past decade, and options-based hedging strategies increased their potential selling impact from ~3 days of average futures volume to ~7 days of average volume.
- **Trends in liquidity provision.** The model of liquidity provision changed in a close analogy to the shift from active/value to passive/momentum. In market making, this has been a shift from human market makers that are slower and often rely on valuations (reversion) to programmatic liquidity that is faster and relies on volatility-based VAR to quickly adjust the amount of risk taking (liquidity provision). This trend strengthens momentum and reduces day-to-day volatility, but it increases the risk of disruptions such as the ones we saw on a smaller scale in May 2010, October 2014, and August 2015. Figure 3 highlights the decline in S&P 500 e-mini futures market depth following a volatility spike, measured against VIX. S&P futures represent the largest liquidity pool for broad equity market exposure.[2]
- **Miscalculation of portfolio risk.** Over the past two decades, most risk models were (correctly) counting on bonds to offset equity risk. At the turning point of monetary accommodation, this assumption will most likely fail. This increases tail risk for multi-asset portfolios. An analogy is with the 2008 failure of endowment models that assumed Emerging Markets, Commodities, Real Estate, and other asset classes were not highly correlated to DM Equities. In the next crisis, Bonds likely will not be able to offset equity losses (due to low rates and already large CB balance sheets). Another risk miscalculation is related to the use of volatility as the only measure of portfolio risk. Very expensive assets often have very low volatility, and despite the downside, risks are deemed perfectly safe by these models.
- **Tail risk of private assets:** Outflows from active value investors may be related to an increase in Private Assets (Private Equity, Real Estate, and Illiquid Credit holdings). Over the past two decades, pension fund allocations to public equity decreased by ~10%, and holdings of Private Assets increased by ~20%. Similar to public value assets, private assets draw performance from valuation discounts and liquidity risk premia. Private assets reduce day-to-day volatility of a portfolio but add liquidity-driven tail risk. Unlike the market for public value assets, liquidity in private assets may be disrupted for much longer during a crisis.
- **Valuation excesses.** Given the extended period of monetary accommodation, many assets are at the high end of their historical valuations. This is visible in sectors most directly comparable to bonds (e.g., credit, low volatility stocks), as well as technology and internet-related stocks. (Sign of excesses include multi-billion dollar valuations for smartphone apps or for initial cryptocurrency offerings that in many cases

[2] Market depth is measured as the average number of contracts within the top 5 ticks of the limit order book intraday (average of bid and offer side) or the number of futures contracts that one could instantaneously trade that would move the market by 1 index point (4 ticks) from the best bid/offer.

have very questionable value). Following the large U.S. fiscal stimulus, strong earnings growth reduced equity valuations to long-term average levels. Valuations came down in other pockets of excess such as Cryptocurrencies and several hyper growth stocks. Despite more reasonable valuations, equity markets may not hold up should monetary tightening continue, particularly if it is accompanied by toxic populism and business disruptive trade wars.

- **Rise of populism, protectionism, and trade wars.** While populism has been on the rise for several years, this year we have started to see its significant negative effect on financial markets as trade tensions have risen between the U.S. and numerous countries. The great risk of trade wars is their delayed impact. The combination of a delayed impact from rising interest rates and a disruption of global trade have the potential to become catalysts for the next market crisis and economic recession.

We believe that the next financial crisis will involve many of the features above, sparking the Great Liquidity Crisis (GLC), and addressing them on a portfolio level may mitigate their impact. It remains to be seen how governments and central banks will respond in the scenario of a great liquidity crisis. If the standard interest rate cutting and bond purchases do not suffice, central banks may more explicitly target asset prices (e.g., equities). This may be controversial in light of the potential impact of central bank actions in driving inequality between asset owners and labor. Other "out of the box" solutions could include a negative income tax (one can call this "QE for labor"), progressive corporate tax, universal income, and others. To address growing pressure on labor from artificial intelligence, new taxes or settlements may be levied on technology companies (for instance, they may be required to pick up the social tab for labor destruction brought about by artificial intelligence, in an analogy to industrial companies addressing environmental impacts). While unlikely, a tail risk could be a backlash against central banks that prompts significant changes in the monetary system. In many possible outcomes, inflation is likely to pick up.

The next crisis is also likely to result in social tensions similar to those witnessed 50 years ago in 1968. In 1968, TV and investigative journalism provided a generation of baby boomers access to unfiltered information on social developments such as Vietnam and other proxy wars, civil rights movements, income inequality, etc. Similar to 1968, the internet today (social media, leaked documents, etc.) provides millennials with unrestricted access to information on a surprisingly similar range of issues. In addition to information, the internet provides a platform for various social groups to become more self-aware, polarized, and organized. Groups span various social dimensions based on differences in income/wealth, race, generation, political party affiliations, and independent stripes ranging from liberal to alt-right movements to conspiracy theorists and agents of adversary foreign powers. In fact, many recent developments such as the U.S. presidential election, Brexit, independence movements in Europe, etc., already illustrate social tensions that are likely to be amplified in the next financial crisis.

How did markets evolve in the aftermath of 1968? Monetary systems were completely revamped (Bretton Woods), inflation rapidly increased, and equities produced zero returns for a decade. The decade ended with a famously wrong Businessweek article "the death of equities" in 1979.

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Global Economic Research
J.P. Morgan Perspectives
04 September 2018

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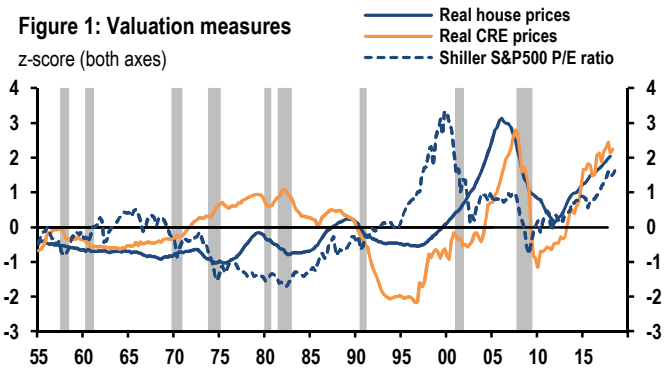
The next U.S. recession

- **We view current imbalances in the U.S. economy as ample but not glaring.**
- **And high-frequency indicators show little sign of the U.S. economy tipping into recession just yet.**
- **The lack of severe imbalances suggests the next recession will be less likely to trigger a 2008-style crisis.**
- **And we think monetary and fiscal policy are both likely to provide moderate stimulus during a downturn.**
- **The most likely recession scenario thus seems milder than 2008 and more akin to 1990 or 2001.**

Each crisis or recession has its own story, but the backdrop to past downturns has often involved some form of "imbalance," "vulnerability," or "overheating" that has built up over time. That is, some form or forms of activity or prices in the economy at higher levels than can be sustained in the long run. And then some kind of trigger or catalyst arises to create a "Wile E. Coyote" moment, where enough people become convinced that the situation is no longer sustainable, prompting an outbreak of pessimism and the final turn into crisis or recession. In past work on the 1970 and 1990 and 2001 U.S. recessions, we have noted that the timing of this final turn into recession would have been hard to predict with much precision in advance. Indeed, our quantitative models of recession risk do not pretend to predict the timing of the next recession precisely; instead they are framed as probabilities of a recession beginning within horizons from one to four years.

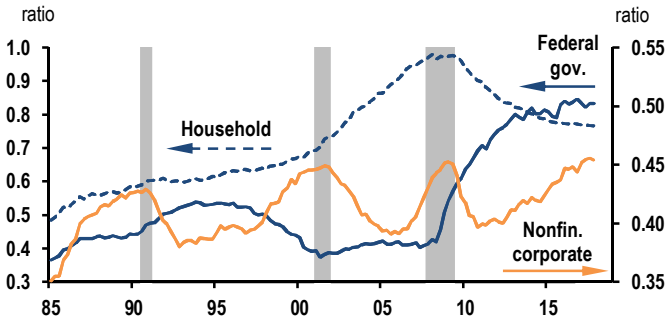
Figure 1: Valuation measures



Source: S&P, Federal Reserve, BLS, J.P. Morgan

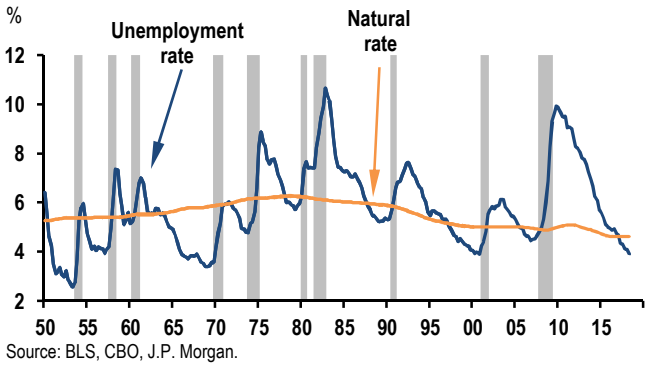
At this stage, we and our models see ample imbalances in the U.S. economy that could provide the backdrop for recession. Prices of many kinds of assets are quite high by historical standards, supported by historically low levels of interest rates (Figure 1). Debt levels in the nonfinancial corporate sector and the federal government are at their highest levels in recent decades (Figure 2). And perhaps the most important imbalance in the economy is prominently on display on the first Friday of every month—unemployment is well below most estimates of its natural, sustainable rate (Figure 3). Of course, these estimates are subject to the usual caveats about uncertainty, but it remains our best guess that the U.S. economy is currently well beyond the natural rate. The economy is likely employing more people and producing more output than will be sustainable in the long run, given labor productivity and the income that it generates. At some point, this imbalance will likely reverse and the unemployment rate will rise. If this increase is sharp and quick enough, it will be called a recession.

Figure 2: Debt to GDP ratios



Source: Federal Reserve, BEA, J.P. Morgan

Figure 3: Unemployment rate and natural rate



Source: BLS, CBO, J.P. Morgan.

At some point in the next several years, we thus think it likely that the current virtuous circle of high sentiment, asset prices, and business and consumer spending will turn into a vicious circle of falling sentiment, prices, and

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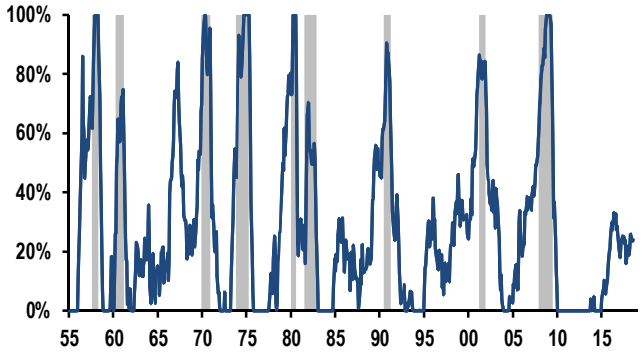
spending. This should eventually bring unemployment and asset prices back closer to historical norms. As we write, there is little sign of such an outbreak of pessimism occurring just yet. Most high-frequency indicators from sentiment surveys and the labor market remain quite healthy, and our models put the chance of recession starting within one year around 25% and not far from the historical average of 17% (Figure 4).

Figure 4: Probability of recession beginning within 12 months



Source: J.P. Morgan

In general, we remain quite humble about our ability to foresee the exact sequence of events that will eventually trigger a turn into the vicious circle. Nonetheless, it is hard to resist speculating about it. Some potential triggers could include an oil price spike, a constitutional crisis, or a fiscal cliff when the recent suspension of government spending caps expires. But perhaps the most prominent, currently visible risk that could trigger a U.S. recession is a trade war. A continued escalation of recent trade tensions could result in new tariffs on hundreds of billions of dollars of U.S. imports and exports. These tariffs could directly hurt affected businesses and disrupt supply chains, triggering layoffs and stock price declines in some sectors. Uncertainty could spread to other firms, leading to a wider pullback in business sentiment, producing a slowing in hiring and capital expenditures. The hiring slowdown and the beginnings of a rise in unemployment could spill into consumer sentiment, leading to a pullback in consumer spending that further reduces business income. At this stage, the key ingredients of a vicious circle affecting both business and consumer spending would be present, and the primary question would be how much the economy could slow before eventually returning to growth.

In 2008, the early rumblings of recession encountered massive imbalances in the form of a variety of interconnected financial vehicles and institutions that were ultimately levered to historically high levels of housing prices. The dramatic collapse of large pieces of this system deepened the disruptions in the rest of the economy through a tightening in financial conditions and further declines in sentiment, ultimately contributing to the most severe U.S. recession since the Great Depression.

But it is important to remember that not every recession looks like 2008—recessions need not trigger coincident financial crises and are not always so severe. Although risks are always clearer in hindsight, at the moment we see little sign of the kind of glaring vulnerabilities in the financial sector that developed during the mid-2000s, and thus the risk of the spiraling failures of financial institutions that occurred in 2008 seems low currently. One risk to watch will be whether the continued spread of electronic trading in the last decade will affect liquidity provision in the depths of a market downturn. Perhaps a lack of liquidity could deepen the kind of mutually-reinforcing downward spiral in prices, sentiment, and spending that is key to the dynamics of a recession.

Another key determinant of how the next recession will unfold will be the reaction of monetary and fiscal policy. It is now widely understood that the Federal Reserve believes that the neutral rate of interest (the rate that could stabilize the economy at full employment) is lower than in past decades. The Statement of Economic Projections released at the June FOMC meeting now suggests that most committee members see the federal funds rate peaking at a level below 3.5% in this expansion, considerably lower than the 5.25% seen in 2007 or 6.5% in 2000. Thus, there will be less room to provide stimulus during the next recession by lowering the federal funds rate before encountering the effective lower bound.

These considerations will prompt a debate about whether the Fed should attempt to lower interest rates below zero, as other central banks have done, and what further steps should be taken when rates have been taken as low as they can go. We suspect the FOMC will again embrace some form of forward guidance by signaling its intention to keep rates low for some time through the dots or similar communications devices. There will likely be further debates about the wisdom of approaches like the "Evans rule," where the FOMC would promise to keep rates below some level until some specified economic goal has been achieved. Similarly, a debate will arise about whether asset purchases (or "quantitative easing") would again be worthwhile. We suspect the Committee would

again opt to purchase assets when the lower bound on interest rates has been reached, as most evidence still suggests that purchases produced modest benefits in the form of declines in long-run interest rates, with few apparent costs.

On fiscal policy, it is also widely understood that federal government debt levels are already very high by historical standards, raising the question of how much "fiscal space" will remain to provide stimulus in the event of a downturn. As we have noted before, however, the risk of a debt crisis seems quite low in a nation like the United States with an independent currency and a central bank with a legal mandate to buy government bonds to maintain full employment and price stability. We would thus predict a more contentious than usual debate about the merits of deficit-financed stimulus in the event of recession. But we suspect that stimulus proponents would still win out and provide some package of stimulus checks or spending increases, as has occurred under both Democratic and Republican administrations during past recessions. With the Federal Reserve likely buying bonds through a quantitative easing program and standing ready to prevent the outbreak of crisis, the chance of a European-style debt crisis still seems remote.

We, thus think the next U.S. recession is unlikely to encounter the kind of financial accelerant that inflamed the economy in 2008, while both fiscal and monetary policy are likely to provide moderate offsets. The most likely recession scenario would therefore seem to be a relatively mild downturn like we saw in 1990 and 2001. The aftermath of these recessions did feature sluggish "jobless recoveries," thought to be driven in part by a backdrop of secular declines in the manufacturing sector, which had been a key contributor to rapid bounce backs after past historical recessions. As these secular forces are still present, a slow recovery (which could arguably be called a prolonged recession) also seems likely.

But just as the lessons of history suggest that the current expansion will not last forever, they also suggest that the next recession will itself eventually end. In the current political climate, we suspect that the next recession will be accompanied by deeper than normal concerns about whether it marks the beginning of even more severe and long-lasting disruptions to the U.S. economy or political institutions. It may prove important to maintain historical perspective in this situation as an overreaction by some investors to a run-of-the-mill recession could present buying opportunities for others.

Box: Modeling recession risk

We introduced our quantitative models of recession risk in July 2015. These original models were intended to measure medium-run or "background" risks of recession—that is, to assess the progress of the expansion in the big picture and to judge whether the conditions that proceeded previous recessions were present. In later work, we introduced another set of models using higher frequency, near-term data to assess whether the beginning of a recession is appearing right now. We combined the near-term and medium-term indicators into a single measure of the risk of recession beginning within 12 months. These models run every day, and we publish updates regularly; the latest update is here.

The near-term data consist primarily of timely, high-frequency indicators that are released with short lags, like consumer and business sentiment, housing permits, auto sales, payrolls, and unemployment claims. These are typically some of the first indicators to show signs of distress when a recession begins. We use the framework from our nowcaster to forecast any data still missing in the current month and compute the first principal component of the near-term indicators. Meanwhile, the medium-term data consist of slower moving indicators like the levels of the unemployment rate, profit margins, and investment spending, which are intended to capture the stage of the expansion. We similarly nowcast any missing data for the medium-term indicators and compute their first principal component as well.

We then use the first component of the near-term indicators and the first component of the medium-term indicators together in a regression to predict the probability of a recession beginning within different horizons. The probabilities at short horizons like one year load most heavily on the near-term component, while the probabilities at longer horizons like three years load more heavily on the medium-term component. The predicted probabilities of recession beginning within one year are shown in Figure 4 above.

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U.S. recessions and Euro area growth

- **Strong co-movement of U.S. and Euro area growth.**
- **Central bank responses to common inflation shocks may be more important than spillovers.**
- **ECB would likely have very limited room to ease.**

It is not surprising that some market participants are anxious about a U.S. recession in 2020/2021. After all, the current U.S. expansion will soon be the longest on record, the labor market is getting very tight, and the Fed intends to put monetary policy into restrictive territory. But if a U.S. recession does occur in the next few years, it will come at a very inconvenient time for the Euro area. There is a strong co-movement between swings in U.S. growth and swings in Euro area growth, so, in the absence of a big fiscal easing or a collapse in the euro, Euro area growth could be weakened significantly. This would present a real challenge to the ECB. On the basis of the ECB's current forward guidance, the policy rate will be close to zero at the end of 2020 and around 30bp at the end of 2021, and the ECB is unlikely to have begun shrinking its balance sheet. Thus, the ECB will have little room to ease conventional monetary policy and will have to return quickly to asset purchases and more aggressive forward guidance.

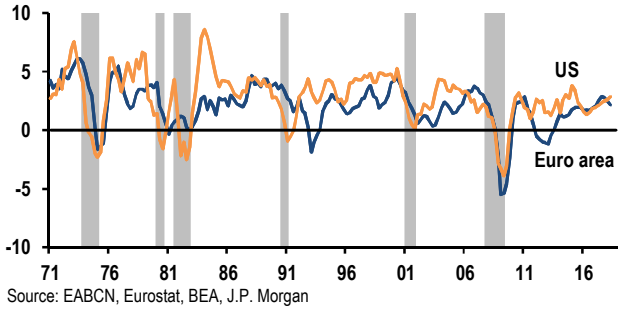
Earlier work estimating a VAR model suggested a very significant effect of U.S. growth on the Euro area. In this model, a 1% shock to the level of U.S. GDP affects the level of Euro area GDP by 1% after four quarters. If this were correct, then a U.S. recession would pull the Euro area into recession as well, but the impact this time might well be smaller than this. It is true that every Euro area recession has either coincided with or followed a U.S. recession, except the 2010/12 sovereign crisis. But, it is also true that every Euro area recession, except the sovereign crisis, has been preceded by a significant tightening of Euro area monetary policy, but this is not likely to happen this time. This suggests that the impact of a U.S. recession in the next few years would likely be smaller than the historical pattern might suggest.

Strong co-movement on the growth side

There is a strong co-movement between U.S. and Euro area growth (Figure 1). The relationship is particularly strong in downturns. In every U.S. recession since 1971, with one exception, the sharp slowdown in U.S. growth was matched by a sharp slowdown in Euro area growth. The exception was the period after German reunification in 1989, when fiscal policy in Germany was very expansionary. The U.S. had a recession in 1990, but the Euro area didn't have one until 1992.

Figure 1: Euro area and US growth

%oya, shading denotes US recessions



Source: EABCN, Eurostat, BEA, J.P. Morgan

Table 1 looks at the magnitude of the growth slowdowns in the U.S. and the Euro area, and the ratio of Euro area slowdowns to U.S. slowdowns, as the U.S. economy approaches recession. On average since 1971, Euro area growth has declined by 0.7%-pt alongside each percentage-point decline in U.S. growth. Furthermore, every U.S. recession has been either accompanied by or followed by a Euro area recession, albeit often a milder one, with an average lag of three quarters (Table 2).

Table 1: Magnitude of growth slowdowns in U.S. recessions

%-pts, from peak to trough in %oya growth rates

	U.S. growth	Euro area growth	Euro area to U.S. ratio
1973/1975	9.9	7.8	0.8
1980	8.3	4.3	0.5
1981/82	7.0	1.1	0.2
1990/91	5.2	2.9	0.6
2001	5.1	3.9	0.8
2007/09	7.3	9.3	1.3

Source: EABCM, BEA, J.P. Morgan

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Table 2: U.S. and Euro area recessions

% change peak to trough in level of real GDP

	U.S.	Euro area	Lag (no. of quarters*)
1973/1975	-3.1	-2.5	3
1980	-2.2	-0.5	0
1981/82	-2.8	-0.5	3
1990/91	-1.3	-1.9	6
2001	-0.3	-0.2	6
2007/09	-4.2	-5.7	1

Source: EABCN, BEA, J.P. Morgan

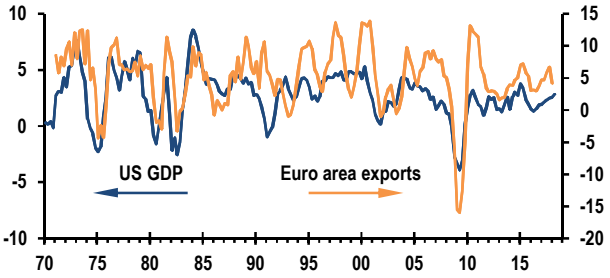
*Lag refers to the number of quarters between the start of the U.S. recession and the start of the Euro area recession.

The strong co-movement between U.S. and Euro area growth in downturns could reflect either significant spillovers from the U.S. to the Euro area or the response of both economies to common shocks. This distinction matters if the U.S. experiences a recession in the next few years for idiosyncratic reasons. The more the co-movement is due to spillovers, the more concerned we should be about the Euro area.

Spillovers can occur through a variety of channels: trade links, which would lower Euro area exports to the U.S. and other countries affected by the U.S. recession (Figure 2); financial links through the banking sector and foreign direct investment where Euro area investors receive lower income flows; contagion across financial markets; and confidence effects. An important issue is the extent to which Euro area households and corporates change their behavior in response to these spillovers, with households reducing consumption and housing investment and corporates reducing capital spending, inventory accumulation, and hiring. Direct trade effects are modest with Euro area exports to the U.S. only 2.6% of Euro area GDP. ECB analysis suggests that a 1%-pt negative demand shock in the U.S. would depress Euro area GDP only 0.1%-pt if trade were the only channel, but the actual impact is estimated to be closer to 0.25%-pt once other channels are included.[1]

Figure 2: US real GDP and Euro area real exports

%oya; both scales

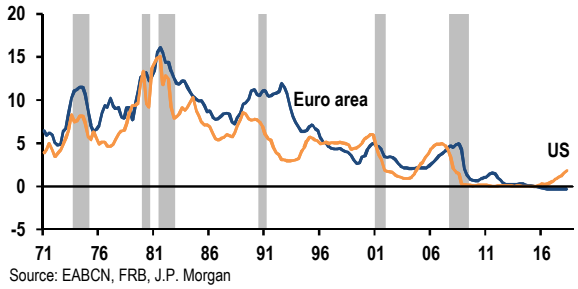


Source: EACBN, BEA, J.P. Morgan

Another explanation for the strong growth co-movement in downturns is that the U.S. and Euro area economies respond to common shocks. In the two U.S. recessions that clearly reflected global shocks—the 1973 oil price shock and the 2008 global financial crisis—U.S. and Euro area growth were highly correlated. But it could also be argued that every recession has reflected a common monetary policy shock. It is well known that U.S. monetary policy tightening has preceded every U.S. recession, but this is also true in the Euro area. Every Euro area recession except the 2010/2012 sovereign crisis has been preceded by significant Euro area monetary policy tightening (Figure 3).

Figure 3: Euro area and US short-term interest rates

%, shading denotes US recessions



Source: EABCN, FRB, J.P. Morgan

The behavior of monetary policy in the U.S. and Euro area suggests that the strong growth co-movement in downturns may be due more to a common monetary policy response to common inflation shocks than to significant spillovers. This would explain why the co-movement between U.S. and Euro area growth is much

[1] The Transmission of US Cyclical Developments to the Rest of the World, Dées and Vansteenkiste, European Central Bank working paper no. 798, 2007.

stronger in downturns than it is in upswings. Presumably spillovers occur in upswings as well as in downturns. It would also explain why the co-movement does not appear to have increased over time despite stronger trade links. This asymmetric co-movement is also evident in Euro area exports and U.S. growth. Euro area exports seemed unaffected by the 1990/91 recession in the U.S.

If this interpretation is correct, then the co-movement between U.S. and Euro area growth should be less than the historical average, if the U.S. enters recession in the next few years. However, this relatively sanguine view only holds as long as a U.S. recession does not trigger another debt crisis in the region like 2010/2012.

Table 3: Monetary policy in Euro area recessions

%-pts, Euro area short-term interest rates

	Tightening prior to recession	Easing in recession
1973/1975	6.8	5.1
1980	5.5	1.0
1981/82	3.9	4.3
1990/91	4.6	5.5
2001	2.4	1.6
2007/09	2.6	4.2

Source: EABCN, J.P. Morgan

Table 4: Monetary policy in U.S. recessions

%-pts, effective federal funds rate

	Tightening prior to recession	Easing in recession
1973/1975	7.5	7.7
1980	7.5	8.6
1981/82	10.1	10.6
1990/91	3.3	6.9
2001	1.9	4.7
2007/09	4.3	5.2

Source: FRB, J.P. Morgan

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Global Economic Research
J.P. Morgan Perspectives
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J.P.Morgan

Does the last decade tell us the Euro is doomed? No

- **Impulse toward existential threat has shifted from markets to politics.**
- **Existing institutional structures can cope with market pressure, provided countries are willing to endure a loss of policy autonomy.**
- **Any local challenges to the policy consensus will be resisted via liquidity denial, as in the case of Greece.**
- **In our view, the risk of any member country leaving EMU over the next decade is ~10%, and the risk of a full break up is significantly lower.**

Can the euro survive? Some economists have long argued that the region was too heterogeneous for a single currency to work. Others have come to this view more recently, arguing that the euro was among the forces that exaggerated the build-up of imbalances prior to the GFC, while the euro's flaws have been exposed by the weakness in economic performance and financial and political strains thereafter. Among Anglo-Saxon economists at least, the view that the euro will ultimately collapse is widespread.

In our view, the likelihood of any individual country leaving the euro over the next decade or so is low. Without a claim to be informed by quantitative modeling, we would assess the likelihood of such an event at about 10%. Moreover, we would put the probability of a multi-country breakup of the euro, rather than an individual country leaving, at substantially less than 10%. Our expectation is not that the region will see rapid institutional change in the direction of fiscal union, which makes the euro appear more viable. Instead, we see the institutional changes that have already occurred, combined with the dynamics that would accompany a country moving toward leaving the euro, as sufficient to keep the system together, even in the face of secular mediocrity of economic performance.

A changing existential threat

The nature of the existential threat facing the euro has fundamentally changed since the height of the regional debt crisis through 2010-2013. Back then, the crisis was largely driven by a sudden stop in private capital flows, with funding for banks and sovereigns in the region denied. This forced the region to find a new political settlement, wherein the ability to access support from the rest of the region (via both program loans and the central bank) was made dependent on a loss of sovereignty over policy.

During this phase, financial markets were the key driver of the impulse for institutional change, with policy makers in the region struggling to find a way to convince markets of the sustainability of debt burdens in the region. It took a number of institutional innovations, namely the creation of the European Stability Mechanism (ESM), banking union, and the ECB's Outright Monetary Transactions (OMT), before that challenge was met.

The connecting thread through these institutional changes is that individual countries need to both follow the regional policy consensus, and be willing to submit to a loss of policymaking autonomy, to avail themselves of support from others in the region. And a simple lesson to take from the recent history of the crisis is that **markets *alone* cannot push a country out of the euro.**

Through the first phase of the crisis, there was ongoing concern that the region would not generate enough fiscal capacity to support a large country, like Italy, should its ability to access markets be threatened. The ECB's OMT went a long way toward easing those concerns, with the central bank's balance sheet available as a source of support for short-term debt provided the country in question is granted admission to an ESM program and remains within the constraints implied by the program.

Given that OMT has never actually been deployed, there is debate about how robust it would prove should a large country, like Italy, need support. Since the development of the OMT, the ECB has also demonstrated its willingness to use its balance sheet in large scale should macroeconomic conditions warrant it. We see little reason to anticipate that the ECB would not be willing to make the OMT commitment credible provided a country remained program compliant. And with the ability to issue debt at shorter maturities guaranteed, it is likely that some degree of market access for a large sovereign along the yield curve would be retained under a precautionary program. Provided the country is prepared to enter a program, support for its banking system is available via the single resolution mechanism, which on current plans will be able to lean additionally on the ESM for funding. Thus, in our view, a country like Italy could plausibly be supported through a combination of ESM loans, OMT, and some market access. However, the willingness to enter and remain compliant with a program is key.

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Looking forward, the impulses for change appear far more likely to come from the political decisions taken in individual countries rather than from markets in the first instance. This is not to say that funding pressures that emerge in markets will not be a key part of stresses around euro membership. But the impulse toward crisis-type conditions is now much more likely to begin with political decisions to challenge the regional policy consensus, as seen in Greece in 2015, rather than beginning with contagion from financial market disturbances elsewhere. Providing a country is prepared to endure the loss of policy autonomy required by a program, we believe the region will insulate it.

Populism versus liquidity

Given the rise in support for political parties that challenge both the national and international policy consensus, the shift in the source of the existential threat from markets to politics may not appear to be grounds for optimism. Recent experience in Germany, France, the Netherlands, and Spain has seen parties outside the traditional center ground become a significant electoral force, even if they have been unable to become part of the government. In Greece, Italy, and Austria, such parties have broken through to the position of either forming the administration or at least being part of it. Although unemployment has been falling quickly, and the phase of aggressive fiscal tightening has come to an end, political groupings previously relegated to the fringe of public debate appear to be consolidating their presence within it. Whether coming from the left or right of the political spectrum (or a combination of both), the likelihood of administrations that follow in the footsteps of Syriza in Greece appears high when we look forward, with Italy the current example.

The **Greek experience** over the first seven months of the Syriza administration demonstrates how the region is likely to respond when its policy approach is challenged. As Syriza came into office, perceptions of restructuring or currency redenomination risk rose. That intensified the liquidity difficulties for both the sovereign and banks. As Syriza continued to challenge the logic of its EU-IMF sponsored program, the ECB limited the use of Greek debt instruments as collateral, forcing Greek banks to borrow from the central bank on emergency terms. As the policy conflict continued, the ECB restricted the quantum of emergency lending allowed by the Greek central bank, ultimately forcing the imposition of capital controls and restrictions on cash withdrawals from banks. The increasing inability of the state to fund its day-to-day activities, alongside the diminished functionality of the banking system, serves to both create an air of political crisis and intensify downward pressures on activity. Although Syriza was able to retain its position in office through this period, the Greek authorities ultimately agreed to a new bail-out package in July 2015 that did not include the debt restructuring they had previously insisted on and which had a number of penal features (such as the exercise of foreign control over the privatization program).

Given the backdrop of ECB and Eurogroup control over liquidity, the process of seeking to challenge the region's policy consensus, including contemplating leaving the euro, is sufficiently painful that any political grouping will find it extremely difficult to sustain. Many have challenged this regime on the grounds of an absence of democratic legitimacy. Those arguments, however, have not generated a meaningful reform of how the ECB or Eurogroup operates, nor do they look likely to.

An alternative challenge to this regime is to seek to create sources of liquidity outside of ECB/Eurogroup control. Hence some have advocated the development of "fiscal money," wherein the local sovereign creates a financial instrument that reduces future tax liabilities and allows that instrument to be transferred between individuals. In the Greek case, the former finance minister has revealed that plans were developed in secret for an electronic system of tax credits, a plan that was never put into effect. In Italy, Lega (part of the current governing coalition) has publicly advocated the issuance of "mini-BOTS," potentially small denomination notes that would entitle the bearer to a reduction in future tax liabilities. The difficulty with such schemes, however, is that they would likely exacerbate the liquidity strains they are designed to overcome. It is difficult to explain why such a sovereign would introduce these instruments other than as part of a process of challenging the ECB/Eurogroup policy consensus, and any payments mechanism based on such instruments clearly has the features of being a prototype for a successor currency upon euro exit. Hence early reports of these schemes coming into effect would likely intensify flight of euro-denominated deposits into cash and/or out of the local banking system. Such a system would hence need to be introduced rapidly in large scale and with ability to function immediately upon its introduction, which is extremely difficult to do.

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What about that union?

The difficulties of seeking to challenge the regional policy consensus or to exit the euro described above create what may appear to be a very negative reason for expecting the euro to survive in its current form. It suggests that periodic challenges from "populist" administrations would be faced down by a combination of an unyielding ECB and foreign finance ministers. To some extent, that characterization is true. However, there is incremental progress at the level of institutional reform.

Some degree of socialization of risks at the regional level has already occurred with the creation of the ESM, OMT, and the banking union. The operation of the fiscal framework by the European Commission has moved toward more recognition of the need for focus on cyclically adjusted measures of the fiscal position rather than headline deficits. And it explicitly recognizes that there are limits to the degree of fiscal adjustment that should be attempted during a business cycle downturn.

There remain deep differences of views between the "North" and "South" of the region about the appropriate degree of risk sharing in the region and the governance mechanisms that should be associated with it. We do not base a view that the euro is likely to hold together on the expectation that movement toward "fiscal union" will be at all rapid. However, we do retain the expectation that, should the system be placed under renewed duress, it will attempt to evolve as necessary.

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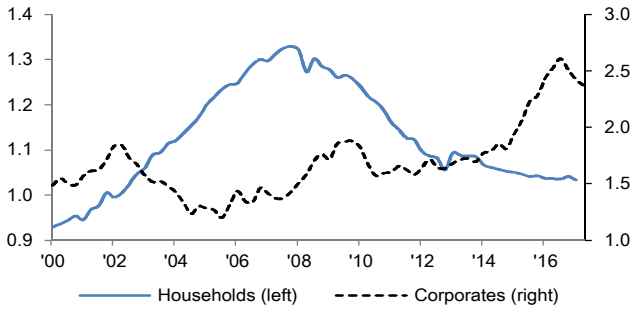
Ten years later, a U.S. consumer in much better shape

- **Household debt-to-income ratio is 30% lower than 2007 peak at 1x.**
- **U.S. consumers are less exposed to rate fluctuations as only 15% of the outstanding mortgage market has adjustable rates.**
- **Most worrisome issue is the rise in non-bank lending, which has surged to over 80% of the market from under 20% before the crisis.**

Many investors have recently looked to the mortgage market for clues to where the next recession or crisis will originate. However, it is said that lightning never strikes the same place twice, and the financial equivalent is that a crisis never plays out the same way twice. More specifically, we believe the housing market is in a much healthier position than it was before the crisis. But we do note that there are areas of concern in selected areas of the consumer market. More broadly, less leverage in the financial system overall makes the likelihood of broader contagion less likely, no matter which asset class is the spark.

First for the good news: we believe the consumer is in a far better position fundamentally than during the pre-crisis period. For instance, Figure 1 shows the debt-to-income levels for households and U.S. corporations since 2000. Household debt-to-income ratios went from around 1x to 1.3x at the 2007 peak, before declining back to 1x recently as the consumer de-levered. Corporations, in contrast, have seen their net debt-to-EBITDA ratios increase steadily since the crisis as issuers have taken advantage of lower interest rates to issue debt.

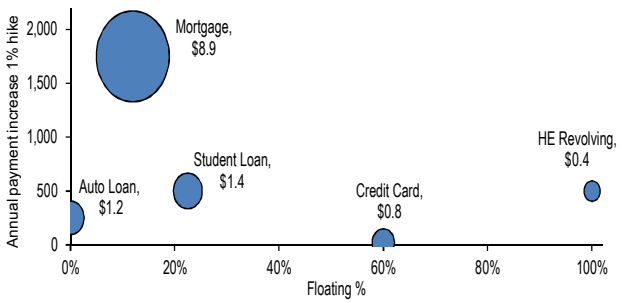
Figure 1: Household leverage has declined significantly since the crisis, while corporate leverage is up
Debt-to-income for households (lhs) vs Net Debt-to-EBITDA for corporates (rhs)



Source: J.P. Morgan, Federal Reserve, BEA

Second, while the Fed is embarking on a series of rate hikes, U.S. consumers are not as exposed to rates as they used to be. Figure 2 shows for various consumer sectors the annual payment shock for a 100bp hike in rates (y-axis) plotted against the percentage of each market that is floating rate, with each bubble scaled to the size of the market. The biggest sector is the mortgage market at nearly US$9 trillion, and while a 100bp rate shock would cause average payments to increase by US$1,500-2,000 annually, only about 15% of the outstanding market is adjustable rate today. For new issuance, roughly 90% of all new originations are fixed rate. The home equity market is essentially 100% adjustable, but it is relatively small in size (US$400 million), and the average payment shock is only about US$500. Consequently, we believe that consumers are generally insulated from future hikes, unlike in the 2008 era when many borrowers needed to refi two years after loan origination in order to avoid a payment spike.

Figure 2: Consumers are less sensitive to rate hikes
Amount of debt that is floating rate (x-axis) vs. the payment increase expected for a 1% rate hike within that group (y-axis); bubbles scaled to size of sector (amount shown in US$tn)



Source: J.P. Morgan, Federal Reserve

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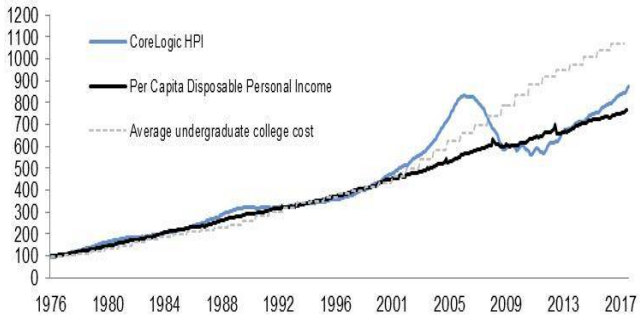
There are some areas of concern in consumer markets, though arguably some of these types of concerns could be extended to other sectors as well (e.g., corporates, equities, etc.). First, housing valuations have increased faster than income in recent years. As shown in Figure 3, housing prices tracked median U.S. incomes fairly closely over most periods of time going back to the 1970s. Just before the crisis, home prices surged far beyond income levels (fueled by affordability products) and then overcorrected in the other direction. Currently, home prices seem a bit high versus income, but we are less concerned for several reasons. First, supply has been very low and has been a major driver of home price growth in the past few years. Second, the home price surge in certain pockets of the country has been driven in part by foreign purchases, not domestic buyers, making the income comparison less relevant. Third, affordability products (e.g., interest-only loans, short-reset adjustable rate mortgages) are no longer prevalent, meaning that any correction in home prices that did occur would have much less impact on broader consumer markets than it would in the past.

Figure 3: Home prices have largely tracked income; the recent deviation is far less than the pre-crisis era

CoreLogic HPI, per capita income and college costs, indexed to 100 in Jan 76

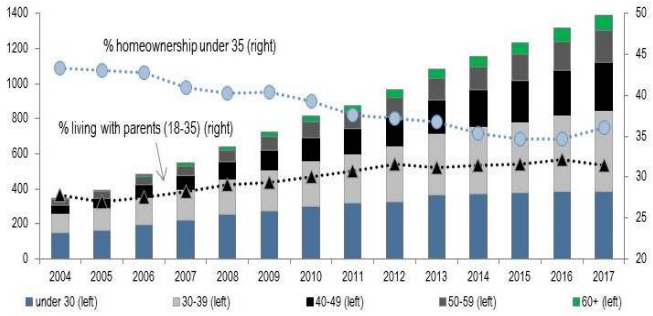


Source: J.P. Morgan, CoreLogic, BLS

While the overall consumer debt burden has been reduced, student loan debt has been growing and could impact borrowers' ability to purchase a home. Figure 4 shows that student loan debt has grown to US$1.4 trillion in size, an increase of about US$1 trillion in the past 15 years. That debt is spread across all age groups as parents increasingly shoulder the burden of this debt. Meanwhile, roughly a third of people between 18-35 years old are living with their parents, and the homeownership rate for individuals in this age bracket has fallen nearly 10 percentage points since the early 2000s. While we do not see these trends as a source of a crisis, they will act as a headwind for consumers and home prices.

Figure 4: Student loan debt has surged, pressuring homeownership

Right axis (%), left axis (US$bn)

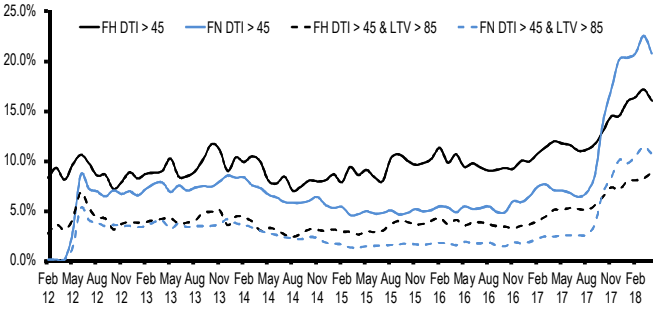


Source: FRBNY Consumer Credit Panel / Equifax , FRB - Household Debt and Credit: Student Debt Overview by Meta Brown

Separately, lending standards have eased and, while nowhere near where they were prior to the crisis, the expansion of the credit box is noteworthy. Figure 5 shows average FICO scores for newly originated loans guaranteed by FHA and the GSEs. In response to the financial crisis, FHA tightened its lending standards significantly, with average FICO scores surging by 70 points; GSE loans showed a similar though less dramatic effect. Since that time, however, FICO scores have drifted steadily lower as Ginnie competes with Fannie and Freddie borrowers for some of the weakest credits. Meanwhile, the share of loans with debt-to-income ratios exceeding 45% has spiked from around 5% to over 20% of production for Fannie Mae recently. The percentage of high LTV loans has also grown significantly (Figure 6). This credit box expansion has not been matched by a dramatic shift in private lending, making this situation far less problematic than it was pre-crisis; nevertheless, it's a trend worth noting.

Figure 5: The mortgage credit box has expanded, with the GSEs targeting borrowers with high debt-to-income ratios…

% DTI>45 and LTV>80% Shares by Issuance Months in Fannie Mae and Freddie Mac data



Source: J.P. Morgan, Fannie Mae, Freddie Mac

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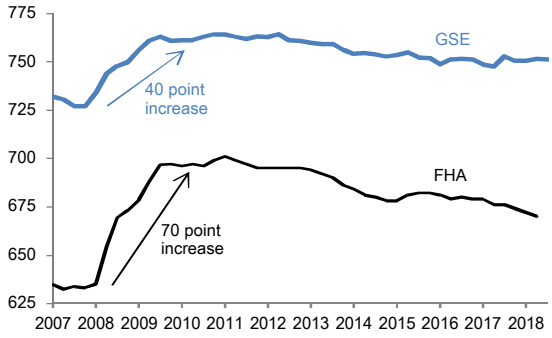
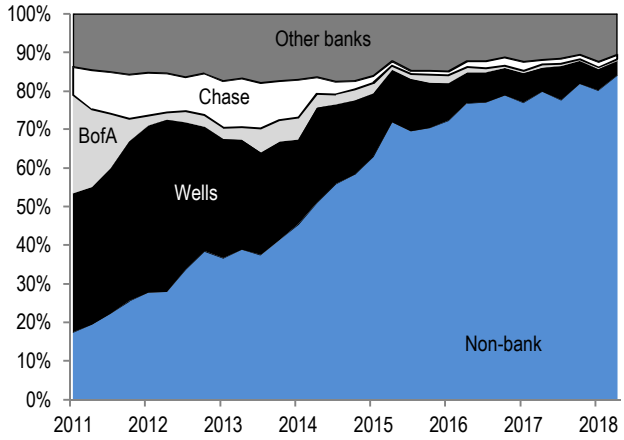
Figure 6: … and FICO scores have been drifting lower as well
Average FICO of newly originated 30yr GSE purchase loans (left) and 30yr FHA purchase loans (right)



Note: GSE information based on Freddie Mac loan-level data disclosures, FHA information comes from the FHA Single-Family Origination Trends Report

Source: J.P. Morgan, Freddie Mac, FHA.

Figure 7: Non-bank servicers now make up over 80% of the mortgage markets, raising questions about stability in a crisis
Share of new 30yr FHA originations by originator category



Source: J.P. Morgan, Ginnie Mae

Finally, there is some concern about the structure of lending and the fragility if another crisis actually did occur. For instance, the share of non-bank lending has surged to over 80% of the market, from under 20% before the crisis. This is perhaps the most worrisome issue as it threatens the stability of the overall lending market and its resiliency in the face of delinquencies. In the event that a borrower becomes delinquent on an FHA loan, the servicer needs to advance the payment to investors. However, non-bank lenders are typically less capitalized than banks, and if a financial crisis were to occur again, it's unclear if these entities would be able to advance, or if they could survive the turbulence, depending on the severity. Just as important, it's unclear who would take over the servicing role of these non-banks if they were to go out of business, potentially creating large disruptions to the mortgage payment system in this country.

Despite these concerns, we do believe that the U.S. consumer is in much better shape and less leveraged than before the crisis. Banks are considerably more capitalized, meaning that the contagion of any issue will be far less than it was before the crisis. While student loan debt has grown and the credit box has broadened, we believe that the consumer is unlikely to be the source of the next crisis, and it would more likely originate in sectors of the economy where leverage has actually increased.

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Global Economic Research
J.P. Morgan Perspectives
04 September 2018

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Don't fret about U.S. household (yet)

- **Media reports of an overleveraged household sector are not borne out in official data.**
- **The household sector aggregate debt-to-income ratio has remained virtually unchanged for five years.**
- **The share of total loans to households that are current just hit a new expansion high.**
- **Credit scores of auto loan borrowers are now at the highest level in seven years.**

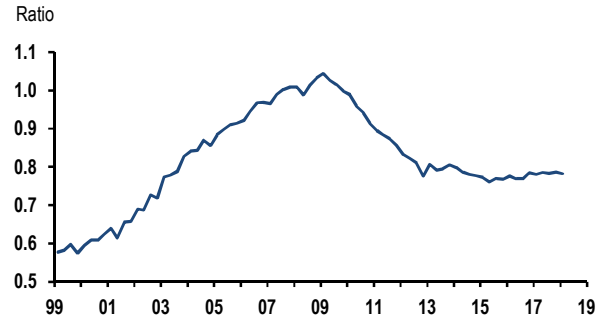
It feels like every few months a major media outlet will splash a story about the return of the overleveraged U.S. consumer. Every few months—three, to be precise—the NY Fed's quarterly report on household debt and credit arrives to provide a cross-check to these stories. Unlike many of the data sources in the news, the NY Fed report is a rigorously designed, nationally representative look at all forms of household credit. The NY Fed's Quarterly Report on Household Debt and Credit indicates there is little evidence that households are levering up, that credit quality is worsening, or that loan performance is deteriorating.

In fairness to the fourth estate, it doesn't hurt to remain vigilant, particularly in light of the aftermath of the early 2000s credit boom. While there is so far little sign of household credit becoming a problem, that could change fairly quickly, and so a quarterly check-up is well advised. And rather than continually fighting the last war we should also be vigilant on other areas of credit growth. Credit growth in the nonfinancial business sector, for example, may be exhibiting a little more froth than in the household sector.

Facts are stubborn things

Total household debt increased by US$63 billion last quarter to US$13.3 trillion, well above the US$12.7 trillion peak reached at the end of the last cycle. Of course a lot of nominal variables are at all-time highs—GDP, consumption, income, etc.—and so a sense of proportion is warranted. Scaled by personal income, household debt stood at 75.9% of income in 2Q18 (Figure 1), down slightly from 4Q17 and well off the 104.5% peak reached in 1Q09. In fact, since 4Q12 the debt-to-income ratio has hovered in a narrow 76-80% range. Aggregates can mask demographic heterogeneity, but the separately-reported triennial Survey of Consumer Finances indicates that in 2016—the latest data point—leverage was below its peak for all income quintiles.

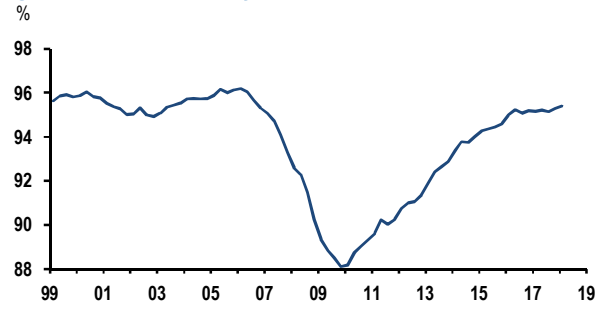
Figure 1: Debt to income ratio



Source: NY Fed, BEA, J.P. Morgan

The performance of loans to the household sector continues to improve. Perhaps this should not be surprising given the decline in the unemployment rate and steady growth in labor income. Households are now current on 95.4% of their loans (Figure 2); this is the highest level of the expansion.

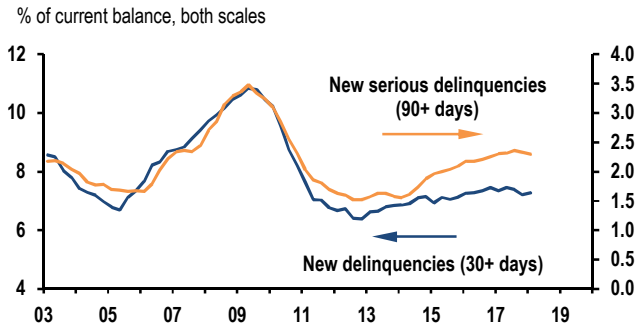
Figure 2: Loan delinquency status: share current



Source: NY Fed, J.P. Morgan

One area of recurring focus for household loan performance is auto loans. Newly delinquent loan balances for autos stood at 7.3% of current balances in 1Q18 (Figure 3).

Figure 3: New auto loan delinquencies



Source: NY Fed, J.P. Morgan

Recent auto delinquencies are lower than they were during most of the last expansion, and obviously well off recession highs, though they are somewhat higher than the lows of the cycle. Those lows occurred after auto lenders tightened

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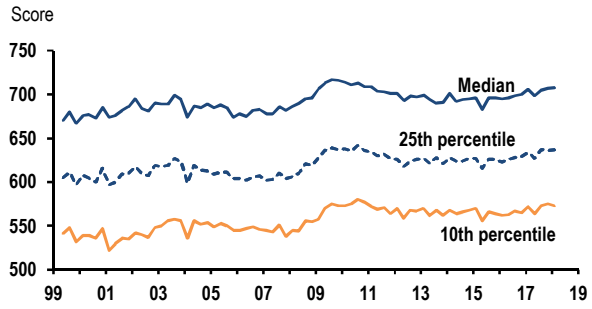
standards in the wake of the recession (Figure 4). As the recovery became more entrenched, standards loosened modestly, with subsequent effects on performance. More recently, however, auto lenders have begun requiring cleaner credit, and the latest median credit score stood at 708, the highest since early 2011 (the bottom of the credit score distribution has risen in tandem). Given the recent tightening in standards, auto loan performance should remain reasonably healthy.

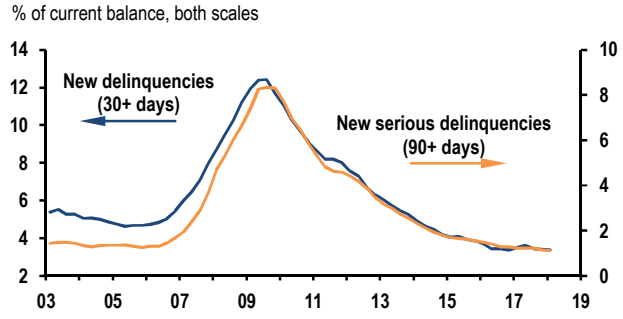
Figure 4: Credit score at auto loan origination



Source: NY Fed, J.P. Morgan

Auto loans represent less than 10% of household credit, while home mortgages are 67% of borrowing. It is harder to write a scary story about mortgage performance: newly delinquent mortgages stand at only 3.38% of current balances, the lowest in the history of a series going back 15 years (Figure 5). The low level of new or seriously delinquent loans is being felt down the pipeline as the percent of consumers with new foreclosures remains at an all-time low of 0.03%.

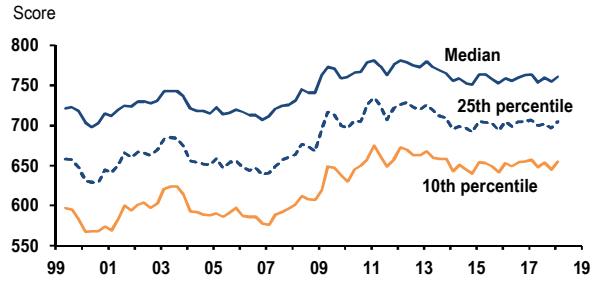
Figure 5: New mortgage delinquencies



Source: NY Fed, J.P. Morgan

The favorable news on mortgage loan performance has not encouraged mortgage lenders to loosen standards noticeably, so far. Median credit scores in 1Q18 stood at 761. While this is off the immediate post-recession highs, it remains 40 points higher than the pre-recession average (Figure 6).

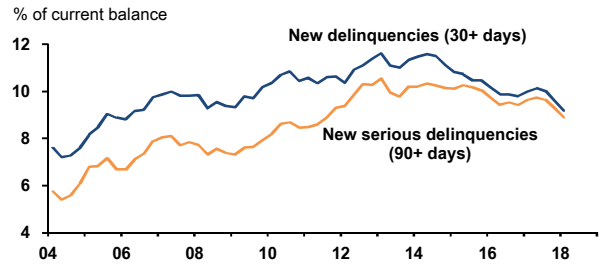
Figure 6: Credit score at mortgage origination



Source: NY Fed, J.P. Morgan

Excessive and unaffordable debt can be a problem for the macro economy via two channels. First, for borrowers a debt overhang can limit their ability to spend on other items. Second, for lenders non-performing loans can eat into capital, thereby limiting the lenders' ability to extend credit to other borrowers. This second channel is not operative when it comes to student loans: the lender is increasingly the federal government. However, the first channel could still be a concern, particularly if the economy heads to a nasty place. Recently there has been some rare but welcome good news concerning student lending. First, student loan growth has slowed to 4.7%oya, the first time in the history of the series that student loan growth has been slower than nominal GDP growth. Presumably the improving job situation has left fewer "labor market refugees" going back to school on loans. Second, newly delinquent loans recently slipped to 9.2% of current balances (Figure 7). This is still an extremely high number but has fallen rapidly lately and is now at its lowest level since 2006.

Figure 7: New student loan delinquencies



Source: NY Fed, J.P. Morgan

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Global Economic Research
J.P. Morgan Perspectives
04 September 2018

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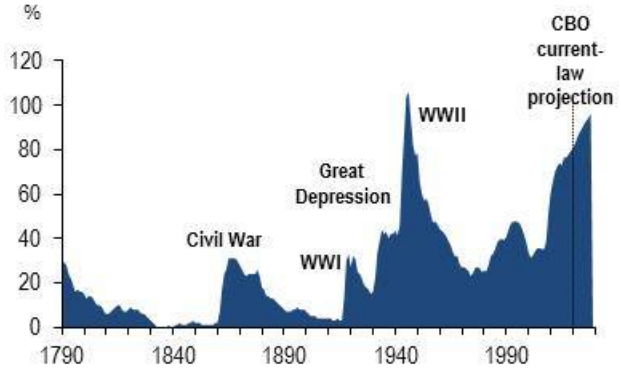
Too early to worry about a U.S. sovereign debt crisis

- **With the national debt set to keep rising in coming decades, we assess risks around a U.S. sovereign debt crisis.**
- **Defaults, bailouts, and inflation spikes have been rare in developed markets post-WWII, even at high debt levels.**
- **And risks are further limited by debt denominated in U.S. dollars, which are controlled by the Federal Reserve.**
- **Overall risks thus seem quite low, but it would be naïve to think that they are zero.**

Federal government borrowing is set to continue rising as planned spending to support an aging population exceeds the revenues collected by our tax system. Outstanding federal debt is already larger when compared to the economy than at any other time in the nation's history outside the aftermath of World War II (Figure 1). Under current law, the Congressional Budget Office expects the debt-to-GDP ratio to reach a new all-time high in less than 20 years.

Figure 1: National debt as fraction of GDP



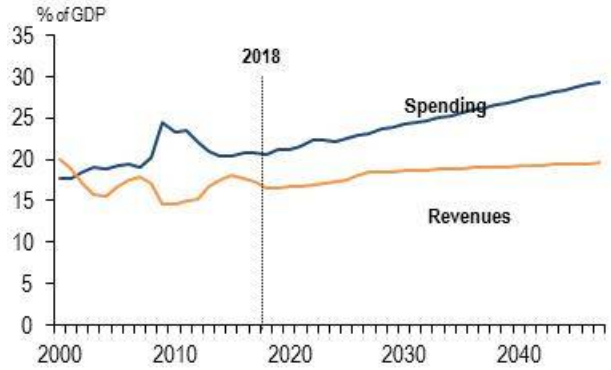
Source: CBO, J.P. Morgan

In prior work, we have pointed out that high debt levels likely place some burden on future generations, reduce capital formation and growth, and create some small risk of crisis. In this note, we examine this risk of a U.S. sovereign debt crisis more carefully, both quantitatively and qualitatively. Using historical data from a variety of sources, we find that government debt defaults, bailouts, or inflation spikes have been quite rare in nations that look anything like the United States in the era since World War II. The historical probability of any of these forms of debt crises occurring within five years in G7 nations since 1955 has been less than 6%. And in fact, the historical link between government debt levels and debt crises has been surprisingly weak—past crises often occurred at lower levels of debt than now seems commonplace among developed countries. Indeed, many past crises were intertwined with currency problems in a way that seems less relevant for the U.S., whose debts are denominated in U.S. dollars, which are controlled by the Federal Reserve. Nonetheless, we should not ignore lessons from history on the fragility created by debt, and we must recognize some tail risk of crisis.

Deficit = spending - revenue

Figure 2 illustrates the fundamental arithmetic that drives the U.S. debt problem. In the just-released Budget and Economic Outlook for 2018 to 2028, the CBO forecasts that federal revenues will bottom at 16.5% of U.S. GDP in fiscal 2019 before returning to 18.5% of GDP by 2028, if certain components of the recent tax cuts expire on schedule. Meanwhile, federal outlays are forecast to hit 23.6% of GDP by 2028 and are set to keep rising thereafter as an aging population drives continued increases in Social Security and Medicare spending under current law. With spending rising and revenues about flat as a share of GDP, deficits and debt will keep rising. Debt held by the public (which excludes debt held in government trust funds but includes debt held by foreigners and the Fed) is already above 75% of GDP, and CBO projects it will reach 96% of GDP by 2028.

Figure 2: Projected federal spending and revenues



Source: CBO, J.P. Morgan

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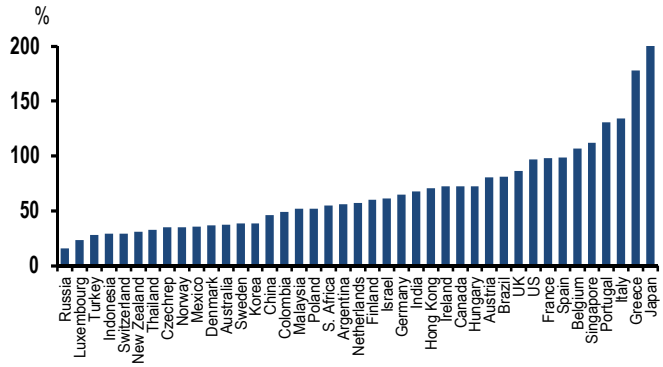
Figure 3: Public debt to GDP ratios



Source: BIS, J.P. Morgan

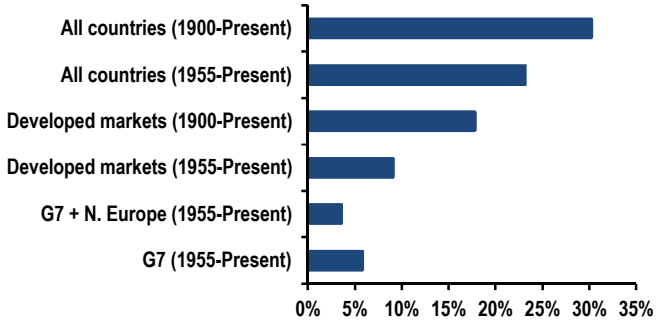
In fact, the United States is not so unusual in this regard. Figure 3 compares current debt-to-GDP ratios of a range of countries from the Bank for International Settlements (BIS). The group of countries with higher current debt levels than the U.S. includes some of the worst casualties of the European sovereign debt crisis, like Greece, Italy, Portugal, and Spain, but it also includes some developed economies that avoided the worst of the crisis, like Japan, Singapore, and France. Several more relatively healthy economies like the U.K., Austria, and Canada are not far behind.

Is this OK?

After everything we have learned in the last 10 years about the dangers of debt, how worried should we be about risks of a crisis? We make no claim that predicting rare events like crises is easy, but we still find it informative to look at data on past episodes to inform our views, as we have done in the past for recessions and housing corrections.

First, we note that the definition of a "government debt crisis" is open to debate. We use the data on government debt defaults to both domestic and external creditors that are assembled by Carmen Reinhart and Kenneth Rogoff in their 2009 book, *This Time Is Different.* But governments can often avoid a formal default through other means like rapid inflation or bailouts from international organizations. We thus construct a variable that indicates a "crisis" when any one or more of a default, a bailout, or a year of inflation exceeding 20% has occurred.[1]

Figure 4: Historical probability of debt crisis within 5 years



Source: J.P. Morgan estimates

We focus on a sample of about 40 countries, including many emerging markets. The data go back many decades or even centuries, in some cases. Looking across this wide range of historical experience, sovereign debt crises have not been uncommon. Figure 4 shows that in an average country-year in the data since 1900, at least one form of debt crisis has occurred within five years more than 30% of the time. But as we narrow the sample to countries that more closely resemble the United States in 2018, the probabilities fall steadily. Across all currently-developed countries in the period after 1955 (after the last of WWII-related defaults had ended), a debt crisis occurred within five years only 9% of the time. Further limiting the sample to the post-war G-7 reduces the probability to 6%, and including developed northern European countries to 4%. By our criteria, there have been no post-war government debt crises in Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, New Zealand, Norway, Sweden, Switzerland, or the U.S.

We also gather data on historical government debt-to-GDP ratios for a wide range of countries from the IMF and the BIS. Figure 5 splits all of the country-year observations from now-developed countries since 1900 into 25%-pt bins by their debt-to-GDP ratios (i.e., 0 to 25%, 25% to 50%, etc.). Then the dots show the fraction of those country-year observations where the country experienced a debt crisis within five years. The size of the dots equals the number of country-year observations in the bins.

[1] We adopt Reinhart and Rogoff's 20% inflation threshold for this purpose, though it is obviously somewhat arbitrary.

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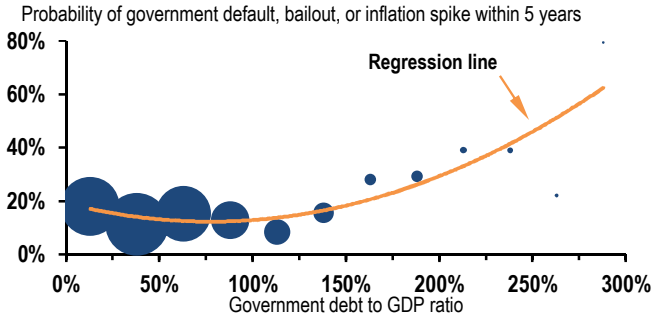
Figure 5: Government debt crisis probabilities and debt levels

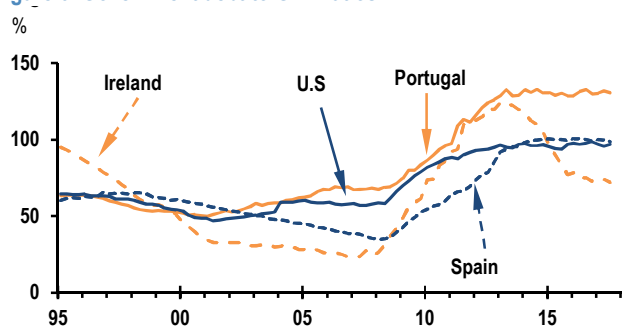


Source: J.P. Morgan. Sample is DM countries, 1900-present. Dot size is number of observations

The relationship between debt-to-GDP levels and crises is fragile, at best. In Figure 5, the relationship looks downward-sloping between debt levels of 0 and 125% of GDP; it is only above 125% that we start to see a clear upward slope. And in fact, this upward slope is highly dependent on the specific data sample of years and countries chosen. In the post-war G7 sample, for example, the relationship is downward-sloping at all debt levels as nations with the highest debt levels (like Japan in recent decades) have experienced no crises.

And in fact, past crises often have occurred at relatively low initial debt levels. When the U.K. received an IMF bailout in 1976, its debt-to-GDP ratio was just over 50%. Figure 6, meanwhile, shows debt-to-GDP ratios for the U.S., Portugal, Spain, and Ireland since 1995. As of 2007, U.S. debt levels exceeded those of Spain and Ireland and were only narrowly behind Portugal. Over the next five years, all four countries saw varying combinations of housing and banking crises, and deficits rose as governments bailed out banks, paid out increased safety net benefits, and received less tax revenue.

Figure 6: Government debt-to-GDP ratios



Source: BIS, J.P. Morgan

In Portugal, Ireland, and eventually Spain, this borrowing unnerved investors, who began demanding a risk premium that pushed up interest rates on government debt. The higher interest payments required to roll over maturing debt then exacerbated the government's deficits, and a further spiral of insolvency concerns and rising borrowing costs threatened to become self-fulfilling. Eventually, each of these three nations (along with Greece and Cyprus) decided a bailout from the IMF (or the European Stability Mechanism, in Spain's case) was needed to stem the negative feedback loop. And, in fact, investors' concerns did not subside until Mario Draghi's pledge that the ECB would use asset purchases to do "whatever it takes" to end the crisis, essentially acting as a lender of last resort to troubled governments. Meanwhile, in the United States, a "flight to safety" response by markets pushed the 10-year Treasury yield *down* sharply in late 2008 during the heat of the financial crisis, and yields would sink further to a then-record low below 1.5% in 2012 during the worst of the Eurozone crisis.

So why did investors run toward the U.S. and away from certain European countries with similar debt levels? There is no doubt some inherent unpredictability in investor behavior in situations like this that is subject to self-fulfilling feedback loops (or "multiple equilibria" as an economist might say). But one distinction between the U.S. and the troubled European economies lay in the institutional framework around a lender of last resort. In many ways, the European debt crises had elements of a classic bank run, where lenders have incentives to pull back their lending before other lenders do the same, even if a borrower is fundamentally solvent. Such a situation would lend itself to self-fulfilling bank runs, and a role for a lender of last resort to step in with liquidity to stop the feedback loop. In the European situation, it was unclear early in the crisis if the IMF or ECB would play this role, or if there was, in fact, a chance of outright default. In the U.S., it seems clearer that this role would fall to the Federal Reserve, although the Fed's introduction of quantitative easing was not a foregone conclusion and was not without controversy.

Further, past sovereign debt crises, even in advanced countries, often have been intertwined with currency problems in a way that seems less relevant for the U.S. A proximate cause for the 1976 U.K. debt crisis was the need to repay a U.S. dollar-denominated loan, which had itself been taken out to stabilize the pound after a sharp devaluation. The various emerging market crises of the 1990s also often featured domestic currency depreciation that threatened the ability to repay foreign currency-denominated debts. In the case of Europe in the 2010s, the inability of the currencies of the most troubled nations to

depreciate and stimulate exports may have contributed to the economic downturn and resulting deficit widening. It also seems, for whatever reason, that lenders from primarily northern European nations were more willing to continue funding the governments of their own countries than their neighbors to the south, even when their government debt levels were similar.

These factors generally suggest that U.S. government debt is more benign. The Federal Reserve controls the supply of U.S. dollars and can lower interest rates and allow a dollar depreciation to stimulate both domestic spending and export demand. Such depreciation would not threaten the government's ability to repay its debts because the debts are denominated in U.S. dollars. A majority of U.S. debt is still held by domestic investors, with government trust funds and the Federal Reserve holding trillions of dollars each. The Federal Reserve is legally authorized to buy unlimited amounts of U.S. government debt in pursuit of price stability and maximum employment, so it should be able to step in and short-circuit a negative feedback loop of rising interest rates and widening government deficits if necessary.

Still, there is little doubt that the U.S. benefited during the crisis from domestic and foreign investors' trust that our debt can be considered safe, which underlies the dollar's status as a reserve currency. And if there is one lesson from past crises, it is that such trust can evaporate quickly in situations with the possibility of negative feedback loops or multiple equilibria. We would also note that institutions are only as strong as the people leading them. It is not hard to imagine a future U.S. Congress that fails to raise the debt ceiling, possibly causing a temporary default that could unsettle markets. And one can imagine the possibility of future Federal Reserve leadership that decides in the heat of crisis, perhaps under political pressure, that intervening to "bail out" the federal government by supporting Treasury markets would be inappropriate. Or, on the other hand, we could also imagine future leadership that errs on the side of going too far with the printing press, creating an effective default through inflation. So while the risk of a U.S. debt crisis in the next several years seems very low—likely less than 1%—we think it would be naïve to conclude that it is truly zero.

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Tactical investing around the next turn in the cycle

- **If the next business cycle downturn is like previous ones, most investors probably have a clear notion of how to position: short Equities, underweight Cyclical versus Defensive stocks, underweight Credit versus Bonds, underweight EM assets and long Gold. Is the conventional wisdom correct, and are there particularities about the current expansion or market structure perspective that argue for a different approach?**
- **This note details our likely playbook for the next recession based on which trades across Equities and Fixed Income have delivered the best and most consistent returns during previous U.S. recessions and taking into account macro and market particularities of the current cycle.**
- **Historically, the best trades based on risk-adjusted returns and success rates have been UW HG & HY Credit, OW Quality versus Growth stocks, and long Oil & Gold. The worst have been UW EM assets and Peripheral European bonds; duration trades have also generated mediocre returns. Macro and Systematic hedge funds outperform EM, Equity Long/Short, and Equity Quant Directional funds. Performance for most styles deteriorates late cycle.**
- **The current cycle is delivering the typical, earlier underperformance of Credit relative to other assets. It may differ from previous ones, however, by generating smaller gains on Oil due to OPEC policy and greater ones from UW of EM and the Periphery due to leverage and China's path. Duration has always required nimbleness—that should not change.**
- **It's too early for the great rotations (Equities to Bonds, Cyclicals to Defensives, Growth to Value, USD to JPY, and USD to Gold) without strong conviction that markets will soon price the expansion's end, maybe due to valuation and liquidity concerns. Unlike Credit, drawdown on such late-cycle trades is high for those focused on tracking error.**

If the next business cycle downturn is like previous ones, most investors probably have a clear notion of how to position: short Equities, underweight Cyclicals versus Defensive stocks, underweight Credit versus Bonds, underweight EM assets, and long Gold. But is the conventional wisdom correct, and are there particularities about the current expansion from a macroeconomic or market structure perspective that argue for a different approach? This note details our likely playbook for the next recession based on which trades across Equities and Fixed Income have delivered the best and most consistent returns during previous U.S. recessions and taking into macro and market particularities of the current cycle. It draws on conclusions from the longer research note *The best late-cycle trades: Rotations for an outcome that's highly anticipated but hardly positioned for across markets*, 14 June 2018.

I. Comparing defensive/recession trades

Within and across asset classes, there are at least 20 typical trades (or rotations) that most investors think of when positioning for an economic downturn (Table 1). In **multi-asset portfolios,** rotations include underweighting Equities and Credit versus Bonds or Cash, or underweighting EM assets versus DM ones. In **Equity portfolios,** the rotations are from Cyclical sectors (Financials, Technology, Consumer Discretionary, Materials) to Defensive ones (Utilities, Healthcare, Consumer Staples); from Growth and Momentum to Value and Quality; and from Small Cap stocks into Large Cap ones (for those who assume that large companies have better access to finance in a downturn). In **Commodities,** the rotations shift from production inputs (Base Metals, sometimes Oil) into stores of value (Gold). In **Currencies,** typically the shift is from high-yielding and/or commodity currencies into low-yield ones (into JPY and CHF within the majors or into USD for EM currencies). Late-cycle trades are slightly trickier to define in **Bonds,** where Fed tightening initially inclines investors to be short duration, but only until growth slows enough to trigger expectations of recessions and Fed easing. In this note, we define the late-cycle trade as short-duration since tightening always precedes a downturn.

To examine the risk-return characteristics of these trades around U.S. recessions, we calculate total returns and success rates for each position over two horizons: two years before and one year after the start of the recession (for those who prefer to position well in advance of the event); and one year before and after the start of the recession (for those who prefer to rotate only somewhat early). The sample period for most trades covers the last six U.S. recessions in 1973, 1980, 1981, 1990, 2001, and 2007, though data limitations preclude many pre-1990 episodes for equity styles and sectors and for EM assets.

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Table 1: Typical defensive trades examined in this research note

Bonds	• short U.S. duration • long U.S. linkers versus nominals • short Periphery (10Y Italy & Spain) versus Germany • short EM Local (GBI-EM in USD terms)
Credit	• short U.S. HG versus Bonds • short U.S. HY versus Bonds • short U.S. HY versus HG • short EM Sovereigns (EMBIG-D) • short EM Corporates (CEMBI)
Equities	• short U.S. Equities versus Bonds (S&P 500 versus USTs) • short EM versus DM Equities (S&P 500 versus MSCI EM in USD terms) • long Large versus Small Cap (S&P 500 versus Russell 2000) • short S&P Cyclicals (Financials, Technology, Consumer Discretionary, Materials) versus Defensives (Utilities, Healthcare, Consumer Staples) • long S&P Value versus Growth • long S&P Value versus Momentum • long S&P Quality versus Growth
Currencies	• long JPY versus USD • long JPY versus Commodity FX (AUD and CAD) • short EM FX versus USD (ELMI+)
Commodities	• long Oil futures (S&P GSCI Excess Return Index) • long Gold futures (S&P GSCI Excess Return Index) • long Precious versus Base Metals (S&P GSCI Excess Return Indices)

Source: J.P. Morgan

Figures 1 and 2 summarize results across all 22 trades, grouped by asset class—Bonds, Credit, Equities, Commodities and Currencies. The historical patterns have been the following:

1) **The highest and most consistent returns tend to be generated with holding periods of either two years before and one year after the event or one year before and after,** highlighting some benefit to positioning early. The lowest and least consistent returns are generated by holding trades for two years before and after the event, since the average recession lasts one year and the longest recessions have persisted for 1.3 to 1.5 years (those that began in 1973, 1981, and 2007). Thus, we will discuss results mainly for the 2Y/1Y and 1Y/1Y holding periods but present event study figures for the 2Y/2Y horizon for completeness.

2) **By asset class,** those in Commodities have generated the highest risk-adjusted returns and the most consistent profits, though returns are skewed by the hyperbolic moves in oil and gold prices spikes during the 1970s and early 1980s. Next come Credit and Equity trades. Rates and FX trades have proven the least profitable, indeed generating negative returns on average as a block.

3) **By trade** (Figure 1), **the five most profitable positions** one year before and after the event have been (risk-adjusted returns in parentheses) short HG Credit versus USTs (1.9), long Quality versus Growth stocks (1.9), short HY Credit versus USTs (1.7), long Gold (1.4) and short S&P 500 versus USTs (1.3). For trades held two years before and one year after the event, four out of five trades overlap with the previous list: long Oil (1.9), long Gold (1.7), short HG Credit versus USTs (1.6), short HY Credit (1.2), and long Quality versus Growth stocks (1). **The five least profitable positions one year before and after the event** have been (risk-adjusted losses in parentheses) short Peripheral European sovereigns versus Germany (-1.2), long U.S. linkers versus nominals (-1), long USD versus EM FX (-0.7), long Value versus Momentum stocks (-0.7) and long JPY versus USD or short EM Local Bonds (both -0.2). For those positioning two years before the event and holding until one year after recession starts, most of these same trades have been the least profitable: long USD versus EM FX (-1.3), short Peripheral European sovereigns versus Germany (-1.1), short EM Sovereigns (-0.9), long U.S. linkers versus nominals (-0.8), and short EM versus DM Equities (-0.8).

4) **The five most consistently profitable trades** (Figure 2) **have been** (success rate in parentheses) short HY Credit (100%) and short HG Credit versus USTs (80%), short S&P 500 versus USTs (67%), long Defensive stocks versus Cyclicals (67%), and long Quality stocks versus Growth (67%). Shorting EM Corporates and shorting U.S. HY versus USTs have both had 100% success rates, but the EM trade covers only one episode in 2007 given the index's inception in 2002 and HY only two episodes given inception in 1994. **The least consistent trades** have been buying USD versus EM FX, shorting EM Local Bonds, shorting EM versus DM Equities, (0% success rates) and shorting the Periphery versus Germany (33%). Note that the EM FX and Local Bond trades cover only one or two episodes, however.

5) **By hedge fund style,** Macro and Systematic funds have tended to generate the highest returns-to-risk (1.7) and most consistent returns (100% success rate over three cycles), if measured from the two years before the recession starts through one year after (Figures 10 and 11). The worst performers have been

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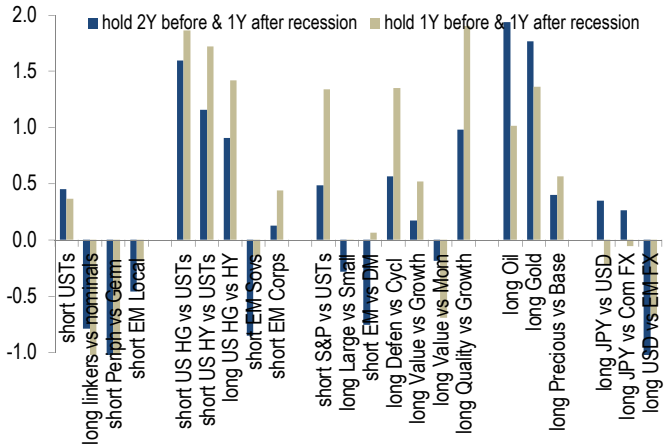
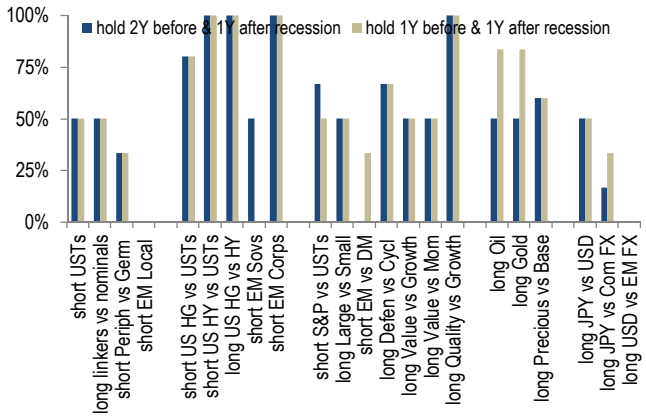
EM funds (0.65) and Equity Quant Directional (0.45). Performance for all styles deteriorates dramatically over a shorter window of one year before and after the start of a recession, suggesting that these funds are unlikely to have well anticipated the reversal in fundamental and market momentum late in the cycle. Over this tighter time frame, only Macro and Systematic funds posted positive returns-to-risk of 1.0 and 0.8, respectively, compared to losses for EM, Equity Long/Short and Equity Quant Directional.

Figure 1: Profitability of late-cycle trades: risk-adjusted returns
Annualized return divided by volatility for each trade held either 1Y before and after start of recession or 2Y before and 1Y after start of recession



Source: J.P. Morgan

Figure 2: Consistency of late-cycle trades: success rates
Success rates on each trade held either1Y before and after start of recession or 2Y before and 1Y after start of recession



Source: J.P. Morgan

II. What could be different this cycle

Cycle analysis is always just a starting point for discussions on how markets could behave as the economy evolves. Since every economy and asset class enters each business cycle with some particularity that can amplify or frustrate what appears to be the norm, we propose a few factors that bear monitoring. Figures 3 through 9 further highlight some distinguishing characteristics of the current macroeconomic and market backdrop.

In Rates, there are probably as many arguments for the short duration trade to deliver below-average returns late cycle as there are arguments for this trade to deliver above-average returns. The bullish arguments for rates include secular stagnation and disinflation, spillovers from ECB and BoJ QE, and a soft ceiling on oil prices, while the bearish ones include Fed balance sheet shrinkage and the Trump Administration's two pro-cyclical fiscal easings in December 2017 and February 2018. When our U.S. Rates strategists net these influences, they still arrive at end-2018 and mid-2019 targets of 3.2% and 3.4%, respectively, for 10-year yields, so slightly above the forwards. Thus, as mediocre a trade as it's typically been over the past three cycles.

Underweighting Peripheral Europe and EM Local are more likely to break with tradition and deliver high, positive returns, however. All of the periphery plus France now have government debt-to-GDP ratios at or above 100% and have experienced roughly a 50 percentage point increase in this figure over the past decade (Figure 3). Such balance sheet weakness leaves their spreads to Germany more vulnerable to widening during the late cycle when rates rise and growth weakens. EM sovereign debt-to-GDP is typically lower than DM ratios but is still an all-time high for a few large countries like Brazil and India (Figure 3). Corporate indebtedness is extremely high for Brazil, Turkey, and China (Figure 3). Pockets of refinancing risk create country-specific currency weakness, but as 2018 has shown, a few problematic areas can be sufficient to drive underperformance for the asset class as a whole.

In Credit, there is little reason to question the direction of spreads late cycle given leverage trends. Record indebtedness for U.S. and some EM corporates (Figure 4) and relatedly, record-low credit quality for indices of U.S. HG, Euro area HG, EM sovereigns, and EM corporate bonds (Figure 4) affirm the vulnerability of this market. Six months ago, we would have argued that this cycle might be different in terms of timing: perhaps U.S. corporate tax cuts plus above-trend global growth might have allowed spread markets to remain stable for longer in

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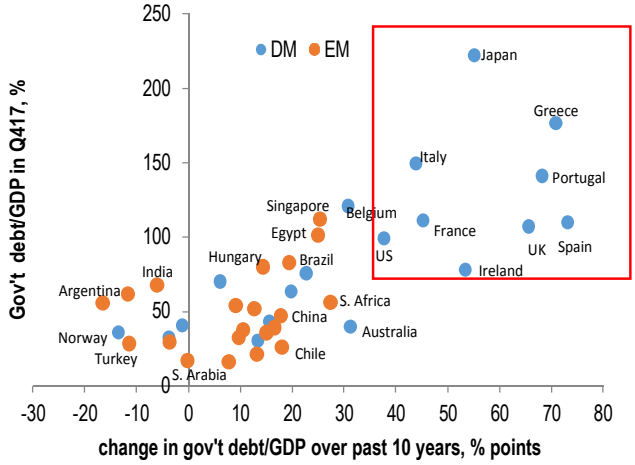
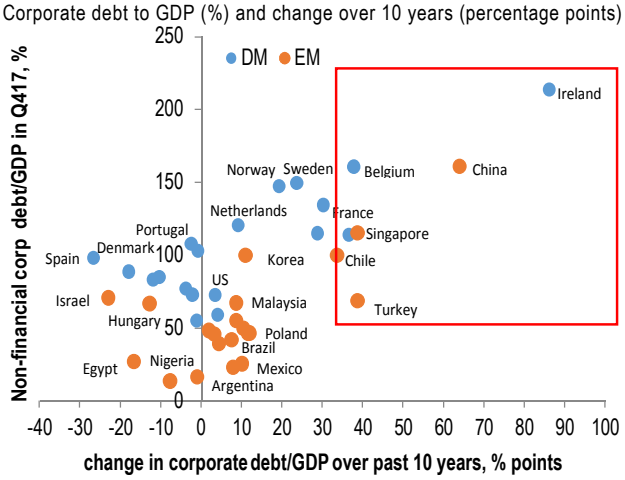
a very old business cycle, but we have been wrong in assuming such resilience. If indeed 2020 marks the start of the next recession, corporates and sovereigns will have turned earlier than in all previous cycles, perhaps due to underlying leverage issues.

Figure 3: Sovereign indebtedness late cycle—high level and large increase over decade for U.S., Peripheral Europe, France & Brazil
Government debt to GDP (%) and change over 10 years (percentage points)



Source: J.P. Morgan, IIF

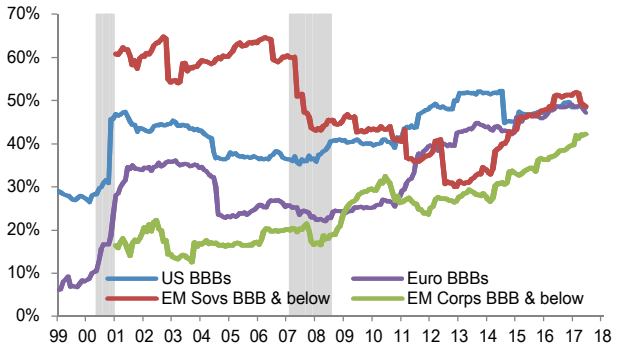
Figure 4: Corporate indebtedness late cycle—high and/or large increase over decade for U.S., China, Turkey, Brazil, and Chile
Corporate debt to GDP (%) and change over 10 years (percentage points)



Source: J.P. Morgan, IIF

In Equities, high P/Es in the U.S. distinguish this old business cycle from previous ones. Whether on a forward or a trailing basis (the latter used here to widen the sample), multiples have only been this elevated once—in the late 1990s during the dot-com bubble (Figure 5). Elevated valuations sometimes correspond to heavy investor positioning, but either condition can leave markets vulnerable to even minor inflection points in the business or policy cycle. Combine these elements with well-known concerns about market liquidity and the faster response time of model-driven strategies, and the surprise element with stocks could be that they begin underperforming Bonds sooner than the historical range of zero to 12 months before a recession begins.

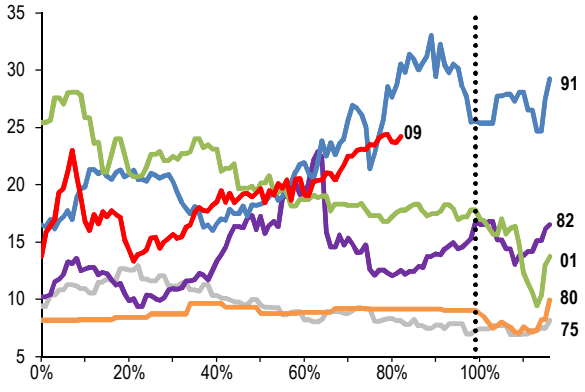
Figure 5: Average credit quality has declined to cycle low
Percentage of BBBs in index for U.S. & Euro HG Credit, and percentage of BBBs & below for EM Sovereigns & Corporates



Source: J.P. Morgan

In **Commodities,** there are two key differences with previous cycles. One is that OPEC, which usually limits output and supports prices late in the cycle, may be relaxing its production cuts in H2. Combined with the record pace of U.S. production increases, this market could become oversupplied (Figure 6) well before demand slows materially due to tight monetary policy. Second, Chinese growth is unlikely to surge late-cycle as occurred pre-Lehman and thus allow the commodity complex to decouple from a U.S. demand slowdown as it did in 2006-07 (Figure 7).

Figure 6: Current S&P500 P/E is second highest on record at this stage of the business cycle, after the late 1990s tech bubble
S&P 500 trailing P/E during U.S. expansions, with x-axis representing percentage completion of each cycle. Year of expansion's start indicated for each series. Current expansion began in 2009 and assumed to end in 2020.



Source: J.P. Morgan

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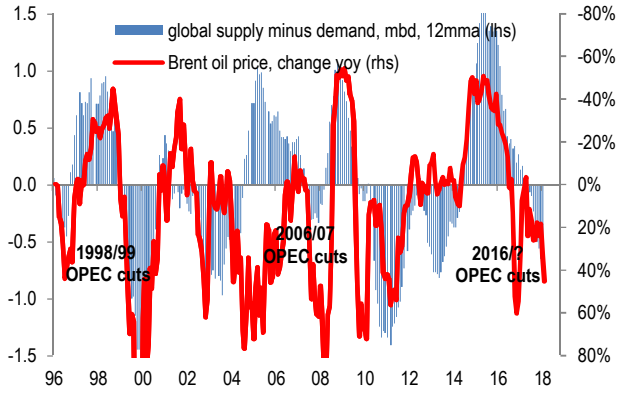
Figure 7: OPEC production cuts have tightened markets late cycle, though it is unclear for how long the current ones will endure
Global oil balance (global supply minus demand) versus change in oil prices. OPEC production cuts in 1998/99, 2006/07 and 2016-18 marked.



Source: J.P. Morgan

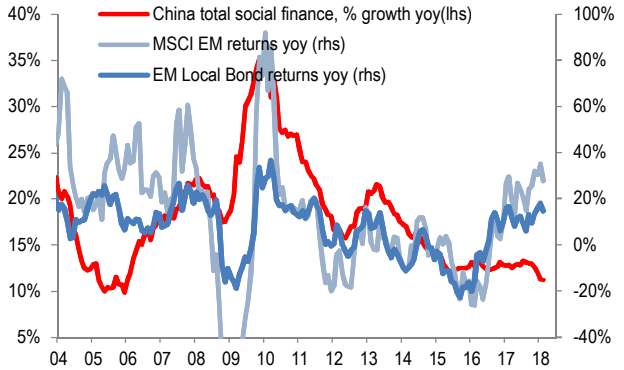
In Currencies, both the OPEC and China make it more likely that commodity and EM currencies weaken late cycle, in contrast to their mixed performance in previous decades (success rates have been under 50% over most holding periods). The yen also seems more likely to appreciate late cycle than its historical 50% success rate would imply, given the near-record twin fiscal and current account deficits (-5% and -4% of GDP, respectively) that the U.S. will carry into the next downturn.

For hedge fund styles, what may distinguish this cycle from previous ones is their moderate leverage, proxied here by the ratio of their return volatility to the volatility of the underlying assets they tend to trade. By this standard, all styles are less leveraged than before the GFC and the February 2018 equity flash crash. This indicator bears watching, however, since it has ample scope to shift over the next year. Since these funds still appear to be net long risk—their returns correlate positively with those of the underlying markets—their rotation into late-cycle positions can still move risky markets lower. Less leverage means less scope for disruption than in previous cycles as funds rotate positons, but this quality must be weighed against the intangible of more model-driven strategies with quick response times than previously, which could turn a relatively minor economic downturn into a much more extreme financial market event.

III. Implications for current strategy

Our cross-asset strategy since late 2017 has incorporated lessons learned from previous cycles for some markets (Credit, Equities, Oil, major currencies) but probably had too little appreciation of differences for others (EM). We were early adopters of the principle that corporate credit returns tend to peak well before equity returns, so we have been underweight U.S. and/or European HG Credit versus Equities all year.

Figure 8: Chinese credit growth continues to slow, unlike the late-cycle acceleration in 2006-08 that generated EM resilience then
China total social finance versus returns on MSCI EM and GBI-EM in USD terms. Percent change year-on-year for all series.



Source: J.P. Morgan

We thought EM Sovereigns, Corporates, and Local Bonds would remain resilient in H1 2018 due to above-trend global growth and a stable to weaker U.S. dollar, before peaking in H2. Thus, we remained overweight for too long, turned neutral all three sectors only by May, and began adding selective overweights in Equities and Currencies in July. We have been mindful of Oil's historical tendency to end expansions through an acute supply shock or low-intensity supply stress, either of which squeezes corporates and households through higher prices. Hence the long in Oil futures we carried until June 2018, when OPEC-Russia comments about relaxing their compliance suggested that Oil was peaking earlier than the historical norm. We have avoided expressing late-cycle views through G-10 currencies, in line with the historically poor return-to-risk this soon before a U.S. downturn. The same applies to gold in a low-inflation environment—there is still time to own when real rates fall. They are still climbing as the Fed normalizes policy more quickly than core PCE rises, since achieving positive real interest rates is the mechanism by which inflation remains contained.

The most material rotations in a multi-asset portfolio are still to come and concern when to reverse our current overweights in Equities versus Bonds and in Cyclical versus Defensive stocks. This paper highlights the poor risk-reward on underweighting Equities versus Bonds, Cyclicals versus Defensives, Growth versus Value, or Growth versus Quality more than a year before a recession begins. Since neither our economists' discretionary call nor their model-based prediction puts year-ahead recession risks at high levels (current odds are about

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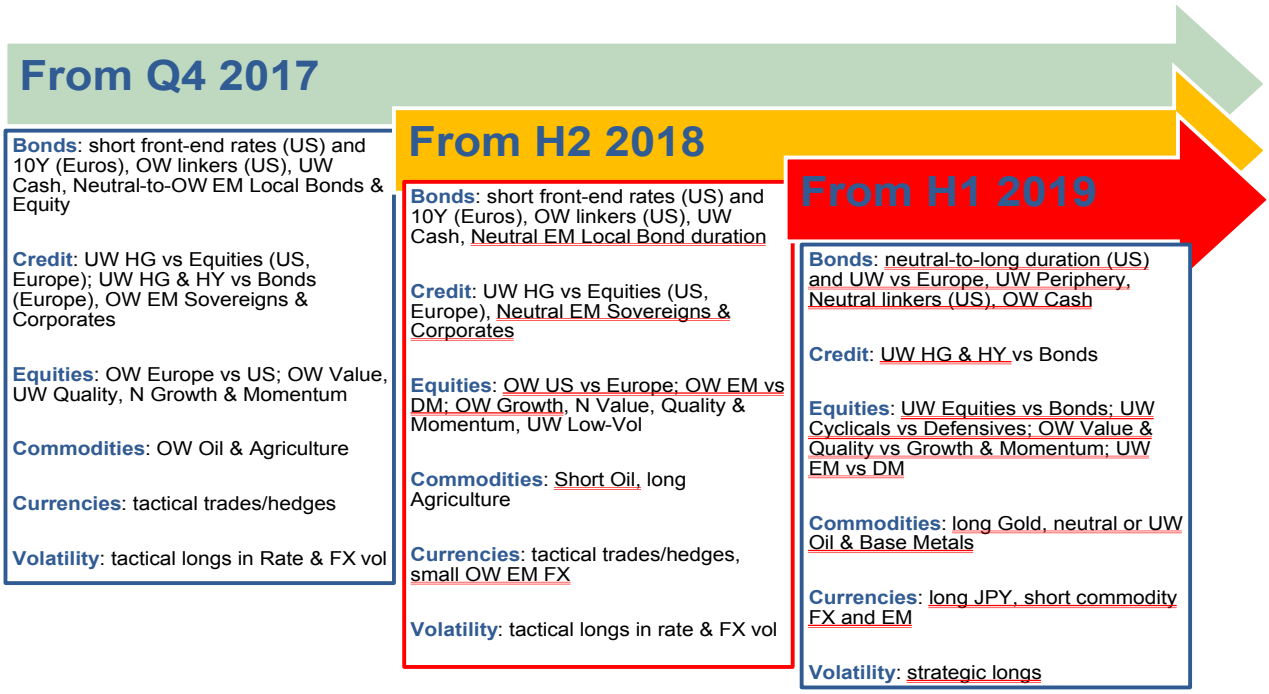
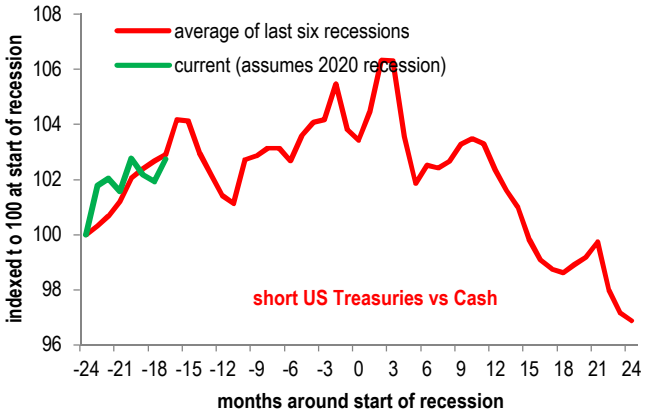
25%), we'll remain overweight. But given the possibility of an earlier turn based on concerns about valuation or liquidity, there is some wisdom in averaging out of these exposures progressively each quarter even during a robust expansion. Table 2 traces a roadmap for this process, where Q4 2017 and H2 2018 reflect actual adjustments in J.P. Morgan global recommendations, and the red underlined text highlights rotations from phase to phase.

Table 2: The transition from mid- to late-cycle investing
Cross-asset rotations as business cycle matures. Red text shows transition.



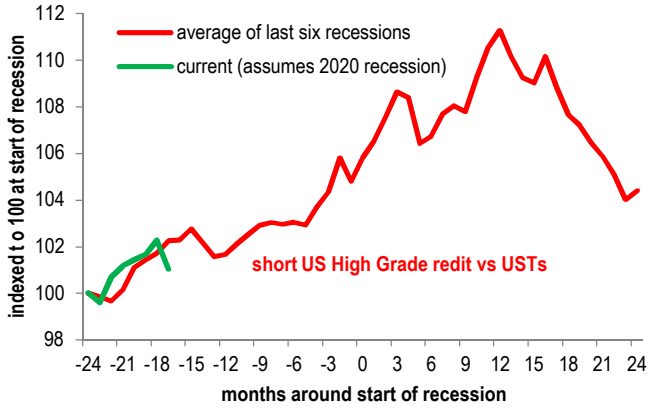
Source: J.P. Morgan

Figure 9: Short U.S. Treasuries vs Cash: average across six recessions vs current cycle assuming 2020 recession
x-axis shows two years before and after start of U.S. recessions; y-axis shows returns on trade, indexed to 100 two years before start of recession.



Source: J.P. Morgan

Figure 10: Short U.S. High Grade Credit vs Treasuries: average across six recessions vs current cycle assuming 2020 recession
x-axis shows two years before and after start of U.S. recessions; y-axis shows returns on trade, indexed to 100 two years before start of recession.



Source: J.P. Morgan

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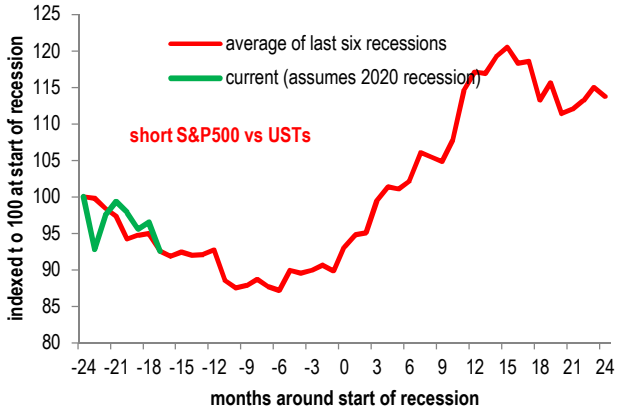
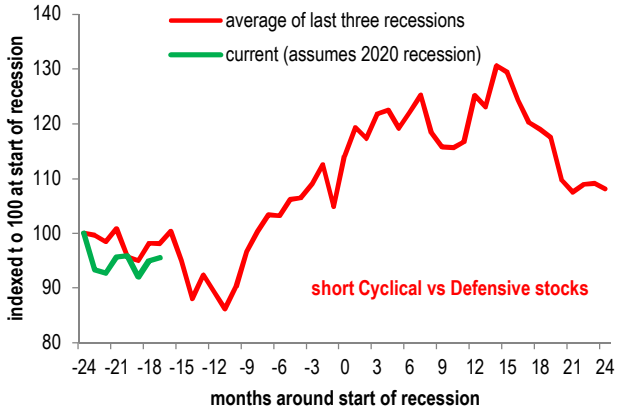
Figure 11: Short Equities (S&P500) vs Bonds (USTs): average across six recessions vs current cycle assuming 2020 recession
x-axis shows two years before and after start of U.S. recessions; y-axis shows returns on trade, indexed to 100 two years before start of recession.



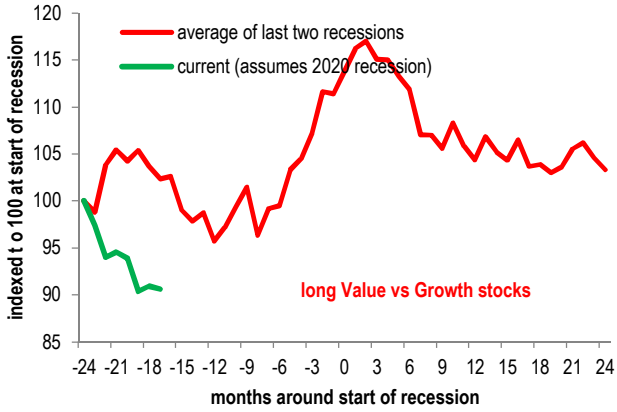
Source: J.P. Morgan

Figure 12: Short Cyclical vs Defensive stocks: average across three recessions vs current cycle assuming 2020 recession
x-axis shows two years before and after start of U.S. recessions; y-axis shows returns on trade, indexed to 100 two years before start of recession.



Source: J.P. Morgan

Figure 13: Long Value vs Growth stocks: average across two recessions vs current cycle assuming 2020 recession
x-axis shows two years before and after start of U.S. recessions; y-axis shows returns on trade, indexed to 100 two years before start of recession.

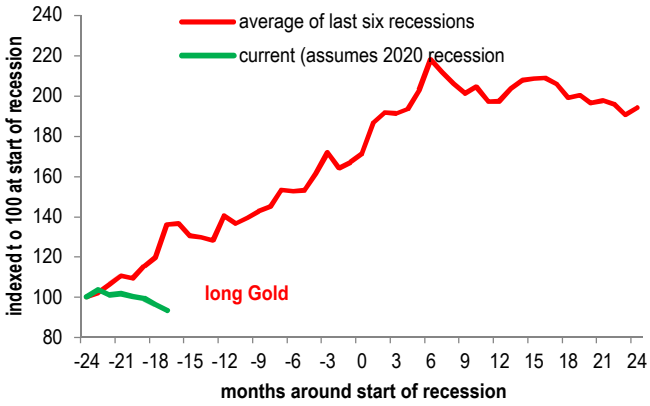


Source: J.P. Morgan

Figure 14: Long Quality vs Growth stocks: average across two recessions vs current cycle assuming 2020 recession
x-axis shows two years before and after start of U.S. recessions; y-axis shows returns on trade, indexed to 100 two years before start of recession.

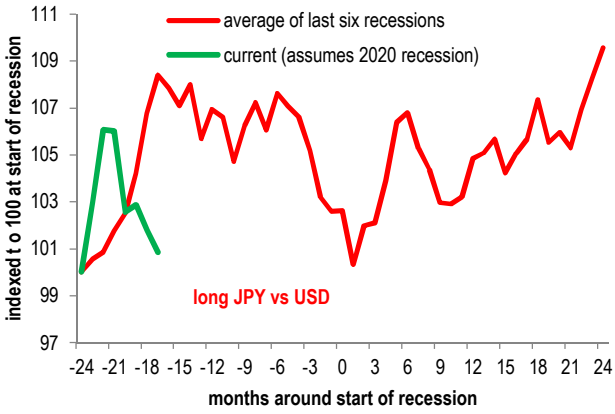
Source: J.P. Morgan

Figure 15: Long Gold futures (S&P GSCI Gold ER Index): average across six recessions vs current cycle assuming 2020 recession
x-axis shows two years before and after start of U.S. recessions; y-axis shows returns on trade, indexed to 100 two years before start of recession.



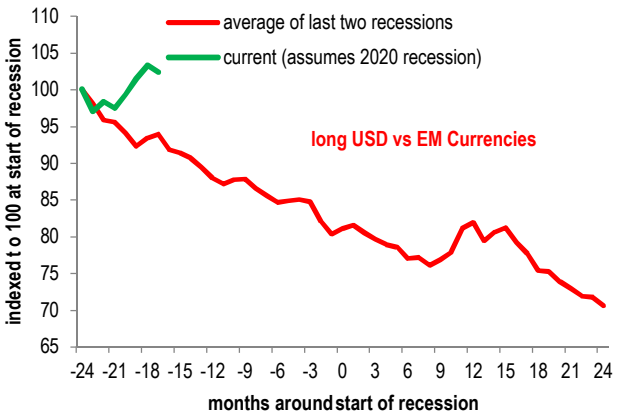
Source: J.P. Morgan

Figure 16: Long JPY vs USD: average across six recessions vs current cycle assuming 2020 recession
x-axis shows two years before and after start of U.S. recessions; y-axis shows returns on trade, indexed to 100 two years before start of recession.



Source: J.P. Morgan

Figure 17: Long USD vs EM Currencies (ELMI+): average across two recessions vs current cycle assuming 2020 recession
x-axis shows two years before and after start of U.S. recessions; y-axis shows returns on trade, indexed to 100 two years before start of recession.



Source: J.P. Morgan

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Are U.S. Treasuries the perfect hedge in the next recession?

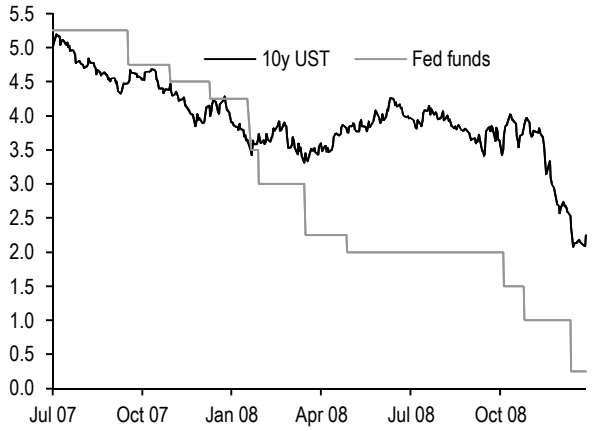
- **Ten-year Treasury yields declined nearly 300bp during the last recession and the US GBI returned 14.3% in 2008, the third-strongest annual performance in history.**
- **The performance of the Treasury market in the next recession will be dictated by the stance of monetary policy and the market's perception of the asset class as a viable safe haven . . .**
- **. . . The Fed will have less nominal room to ease, leaving less scope for Treasury yields to decline than in the past. Meanwhile, the federal government is already starting from a weaker fiscal position than in previous expansions.**
- **Budget deficits do indeed matter for yield levels: each 1%-pt increase in budget deficit expectations relative to GDP has increased 10-year yields by 11bp, over the last quarter century, and could limit declines in long-term yields in the next recession.**
- **In the next recession, if the FOMC lowers the Fed funds rate to 0%, we project there is scope for 2-, 10-, and 30-year yields to decline 320bp, 175bp, and 100bp from their local peaks.**

The Federal Reserve's aggressive easing, coupled with Treasuries' status as the safe-haven asset of choice, led Treasuries to sharply outperform during the last recession: Figure 1 shows that 10-year Treasury yields declined nearly 300bp from mid-2007 through the end of 2008 as the Fed funds rate declined 500bp over the same period. More broadly, the US-GBI returned 14.3% in 2008, the third-strongest annual performance in the history of this index, following just 1995 and 1991.

Looking ahead, the performance of the Treasury market in the next recession will depend on two important factors: the stance of monetary policy and the market's perception of the asset class as a viable safe haven. On the first point, as our economists argued above, the FOMC will have much less scope to lower policy rates than it has in past easing cycles. A lower potential growth rate naturally lowers the neutral Fed funds rate—the equilibrium rate at which economic growth is neither stimulated nor restrained: Figure 2 shows that the FOMC's median estimate for the Fed funds rate over the longer run has declined by 150bp over the last five years to 2.875%.

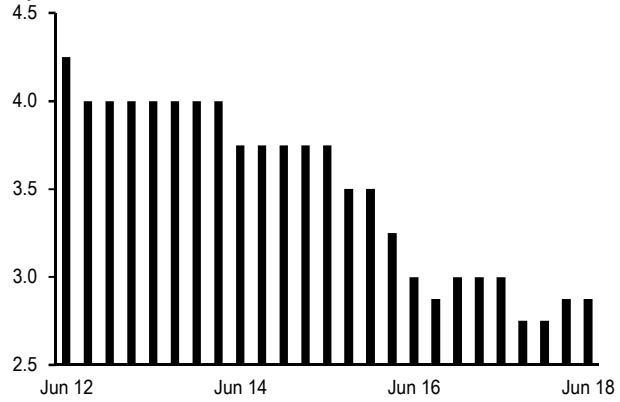
Against this backdrop, our economists project the top end of the Fed funds target range will rise to 3.5% by year-end 2019, a full 175bp lower than where the Fed funds rate peaked in 2006 and 300bp lower than the 2000 peak. The median FOMC participant sees a Fed funds rate of 3.4% by the end of 2020, implying that the Fed would have significantly less room to ease in the coming recession, assuming it remains limited by the zero bound. To put this in context, the Fed has eased by an average of more than 550bp in each of the last three easing cycles (1989-1993, 2000-2003, 2007-2008). Therefore, while Treasury yields have significant room for yields to decline from current levels, the magnitude of the decline is likely to be smaller than in other easing cycles.

Figure 1: Treasury yields declined sharply in 2008 as the Fed eased by 500bp and also introduced QE . . .
Fed funds target and 10-year Treasury yields; %



Source: Federal Reserve, J.P. Morgan

Figure 2: . . . but neutral interest rates are much lower, leaving less room for yields to decline than in other easing cycles
Longer-run Fed funds rate median projection from Summary of Economic Projections; %



Source: Federal Reserve

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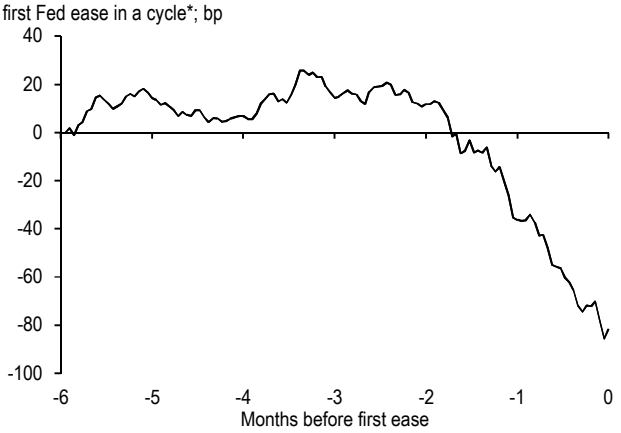
Nevertheless, Treasury yields tend to decline sharply around the onset of Fed easing cycles, but markets anticipate a shift in monetary policy only months before the Fed begins to ease. Figure 3 shows the average cumulative change in 5-year Treasury yields in the six months prior to the first ease in the 1989, 1998, 2001, and 2007 easing cycles. As the Figure shows, intermediate Treasury yields tend to decline about 100bp before the Fed even begins to ease, but the bulk of this decline only begins to occur within two months of the first ease. At current, our near-term indicators suggest there is a 24% probability of a recession over the next 12 months, and the probability rises to 59% over a two-year horizon (see *Recession Risk Model Update: Still little sign of disruption from trade fears*, Jesse Edgerton, 19 July 18). Given the behavior of Treasury yields around easing cycles, this data indicate it is too early to position for the next easing cycle at the current time.

Figure 3: Treasury yields tend to anticipate a shift in monetary policy only 2 months before the Fed begins to ease . . .
Average cumulative change in 5-year Treasury yields from 6 months before the first Fed ease in a cycle*; bp



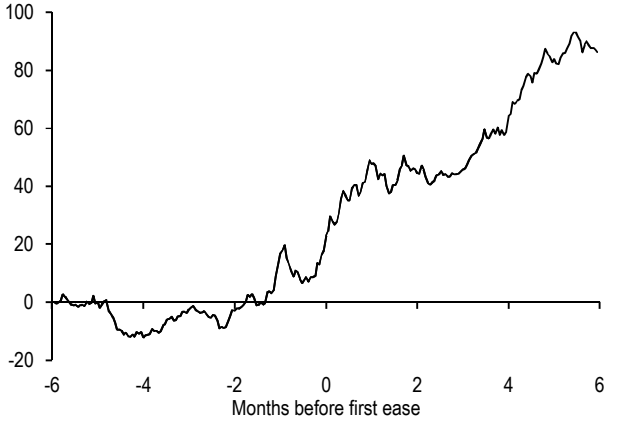
* Dates used: 6/6/89, 9/29/98, 1/3/01, 9/18/07

Source: J.P. Morgan

While Treasuries across the curve tend to rally in response to the Fed's easing, maturity selection matters as the Treasury curve does not respond uniformly to monetary stimulus. Figure 4 shows the cumulative change in the 2s/10s curve in the 12 months around the onset of the last four easing cycles. On average, the curve tends to steepen about 100bp from two months prior to the first Fed ease until six months after. Therefore, this indicates that investors should add exposure at maturities that tend to show the greatest sensitivity to changes in the Fed funds rate, namely the short end to intermediate sector of the curve.

On the second point, **the federal government is starting from a weaker fiscal position than in previous expansions.** Figure 5 shows the federal budget balance as a share of GDP in the fiscal year prior to each of the last five recessions over the past 50 years. On average, the budget deficit averaged 1% of GDP prior to recessions, though there are outliers on either side: the government consistently ran surpluses in the late 1990s and entered the 2001 recession with a surplus that was 2.3% of GDP. Conversely, the conditions in FY90 appear similar to current dynamics as the budget deficit was 3.7% of GDP prior to the 1991 recession. Interestingly, Treasury term premium increased sharply in the early 1990s as the budget balance deteriorated sharply.

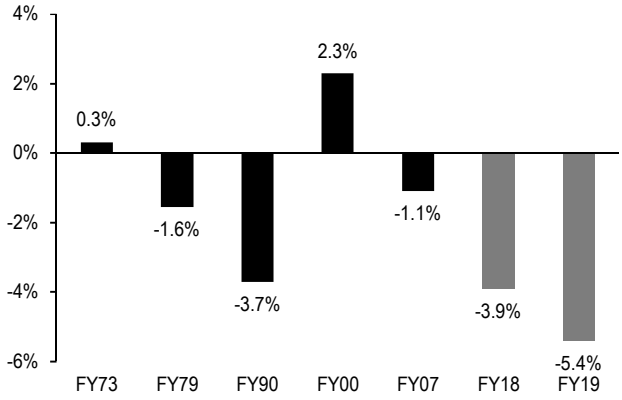
Figure 4: . . . and maturity matters as the curve tends to steepen
Average cumulative change in 2s/10s Treasury curve in 12 months around the first Fed ease in a cycle*; bp



* Dates used: 6/6/89, 9/29/98, 1/3/01, 9/18/07

Source: J.P. Morgan

Figure 5: Budget deficits over the next two years are set to be historically large compared to late points in previous expansions...
Budget balance as % of GDP in the fiscal year prior to each of the last 5 recessions, compared with FY18 and FY19 projection; %



Source: NBER, Federal Reserve Bank of St Louis, J.P. Morgan

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Importantly, our work shows that budget deficits do indeed matter for yield levels. Table 1 models 10-year Treasury yields as a function of the real Fed funds rate, budget deficit expectations, and global FX reserves (as a measure of excess global savings) and shows that these three variables explain 90% of the variation in 10-year yields over the past 25 years. Unsurprisingly, real policy rates and global FX reserves are significant drivers of long-term yields, but we find that budget deficit expectations also matter. In fact, **each 1%-pt increase in budget deficit expectations relative to GDP has increased 10-year yields by 11bp, on average, over the last quarter century, all else equal**. Therefore, given that budget deficits tend to expand in recession, as well as the sensitivity of long-term Treasuries to deficit expectations, this could limit the scope for long-term yields to decline in the next recession.

Table 1: …and we find that 10-year yields have risen 11bp for each 1%-pt increase in budget deficit expectations relative to GDP

Quarterly average of 10-year Treasury yields (%) regressed on real Fed funds rate (%, 3m MA)*, 1y ahead budget expectations as % of GDP (%), and global FX reserves as share of GDP (%, 3m MA); quarterly data from 1Q93 – 4Q17

Variable	Current value	Coefficient	T-Statistics
Intercept		6.66	29.5
Real FF rate; 3m MA; %	-0.53	0.31	7.5
1 year ahead budget expectations as % of GDP**	-2.44	-0.11	-4.8
Global FX reserves as % of GDP	0.2	-26.50	-13.2
R-squared	90.2%		
Standard Error; %	0.52		

* Fed funds rate less over-year-ago core CPI
** Surplus (+) or deficit (-)

Source: Federal Reserve, IMF, J.P. Morgan

Overall, heading into the next recession, the Fed will have less room to lower policy rates compared to previous recessions, but Treasury yields, particularly at the front end and in the intermediate sector, should decline as the market anticipates the onset of an easing cycle. Using previous recessions as a guide and applying the sensitivity of Treasury yields to the Fed funds rate, we can come up with hypothetical estimates on how much Treasury yields decline in the next recession (Table 2).

With the Fed funds rate peaking at 3.4% in the FOMC's latest Summary of Economic Projections, we can assume it will likely decline to 0% in the next recession. Historically, 2-year yields have displayed a 90% beta to the Fed funds rate during an easing cycle, and assuming they peak around 3.5% in the next two years, there is scope for front-end yields to decline to approximately 0.30% at the nadir, or 320bp. Meanwhile, longer-term Treasuries have been historically less sensitive to the Fed's actions than the front end and could also lag as further increases in federal budget deficits could offset the impact of easier monetary policy. Therefore, applying historical sensitivity to the Fed's easing, and also projecting some lag from expanding budget deficits, we project 10- and 30-year yields will decline from peaks of around 3.5% to 1.75% and 2.50%, respectively, at the trough in yields.

Table 2: If the Fed cuts rates to the zero bound in the next recession, there is scope for Treasury yields to decline 125-300bp

Scenario analysis for Fed funds rates and various maturity Treasuries at local lows during next recession*, scenarios assume Fed eases to 0%, with and without QE; %

Tenor	End of tightening cycle	0% Fed funds	With QE
Fed funds	3.50	0.00	0.00
2y	3.50	0.30	0.25
10y	3.50	1.75	1.25
30y	3.50	2.50	2.15

* Scenarios assume yield curve is completely flat at end of current tightening cycle. Also assumes 2-, 10-, and 30-year Treasury yields show 90%, 55%, and 35% beta, respectively, to Fed funds rate, and that budget deficits as share of GDP rise 1%-pt from current year-ahead expectations.

Source: J.P. Morgan

In the event of a more severe recession; however, in which cutting the Fed funds rate is not sufficient, and the FOMC once again utilizes QE to ease, we could foresee 10- and 30-year yields declining an additional 35-50bp.

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Global Credit Research
J.P. Morgan Perspectives
04 September 2018

J.P.Morgan

Corporate bonds in the next recession

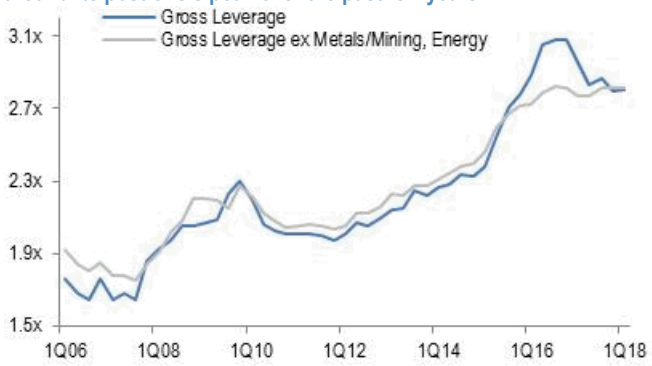
- **Corporate (non-Bank) credit metrics of High Grade companies are likely to enter the next recession in a weaker position than ahead of prior recessions, leading to considerable downgrade risk to High Yield.**
- **Banks are better capitalized than prior to the GFC though, thanks to regulatory changes, so should fare better in the next downturn.**
- **Credit markets have grown substantially over the past 10 years, particularly High Grade, which may contribute to spread widening in the next downturn.**
- **In High Yield the market has not grown as quickly, but investor protections in transactions have weakened, so recovery rates in the next default cycle will likely by lower.**

There is a market focus on credit markets as being particularly at risk in the next recession. This is due to the rapid growth in the size of parts of the corporate bond markets and the increase in leverage by some corporate borrowers. Historically, extended periods of low-cost funding have often led to a rapid increase in debt, which then becomes a problem down the road. Some parts of the corporate bond market have been in this situation. Low funding yields, caused in part by QE, allowed some corporates to borrow at yields that were the lowest they have ever experienced. In Europe there has been direct intervention in the corporate bond market by the ECB, contributing to low borrowing costs for many issuers there. The trend in borrowing costs and in official market intervention is changing now. This does not mean there will be an issue, but if higher borrowing costs are met with a sharp slowdown in growth, corporate bond markets will feel the impact.

Different factors are at play in different segments of the global credit complex

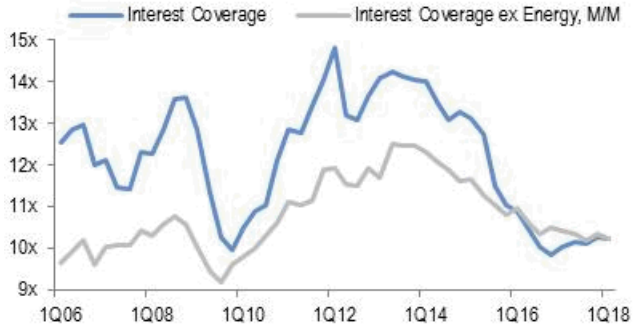
The key credit metrics of leverage and interest coverage have deteriorated in the U.S. High Grade bond market. Both are near the weakest end of their post-crisis ranges (Figures 1 and 2). Some of this deterioration has come from the less risky companies, but there has been a broad rise in leverage across sectors and ratings. As a result, companies are more at risk of being downgraded from High Grade (HG) to High Yield (HY) compared to a few years ago. That said, the tail risk remains concentrated in a few sectors such as Food/Beverages, Cable/TV, Diversified Media, Utilities, and Healthcare where leverage has been lifted by large M&A transactions recently.

Figure 1: Gross leverage of U.S. HG companies remained stable around its post-crisis peak over the past few years



Source: J.P. Morgan, Capital IQ

Figure 2: Interest coverage of U.S. HG companies has improved slightly but is near the post-crisis low



Source: J.P. Morgan, Capital IQ

Second, the period of low funding costs for corporates appears to be over with higher sovereign yields globally, driven in part by less QE and higher U.S. government borrowing needs. For U.S. HG companies the cost of newly issued debt has exceeded the cost of maturing debt this year for the first time since 2009 (Figure 3). While this move has been modest so far, and there is little rollover risk in the market, if UST yields continue to rise, U.S. HG companies will experience higher funding costs for the first time in many years, in aggregate.

Third, the potential for the further large-cap M&A is of particular concern to U.S. High Grade creditors at a time when there is a broad focus on the size of the BBB

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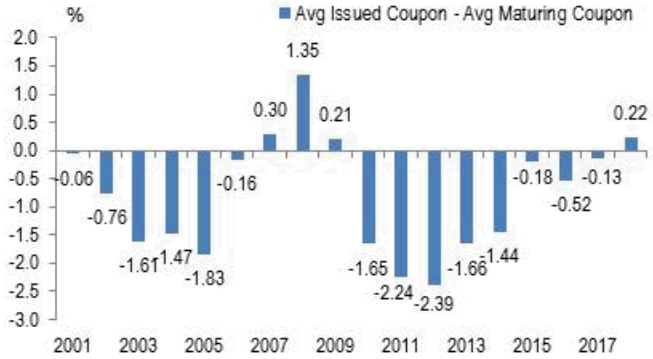
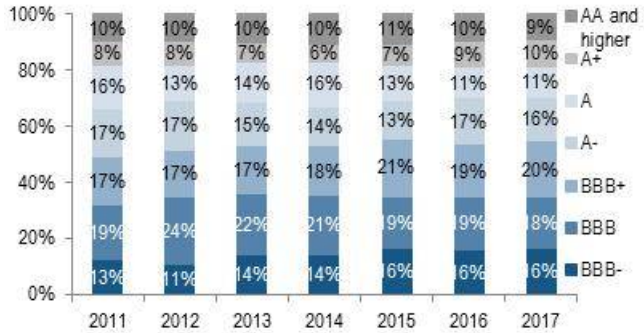
universe and fallen-angel risk. Over the past few years, the rapid growth of the HG bond market and the increase in leverage on the balance sheet of many issuers has led to an even more rapid growth in the lowest High Grade rating category of BBB- (Figure 4).

Figure 3: The average coupon on U.S. HG new issues has exceeded those on maturing bonds, and this has not happened for a full year since 2009



Source: J.P. Morgan

Figure 4: BBB- debt represents 16% of U.S. HG non-Financial debt as of YE17, up from 11% of YE12

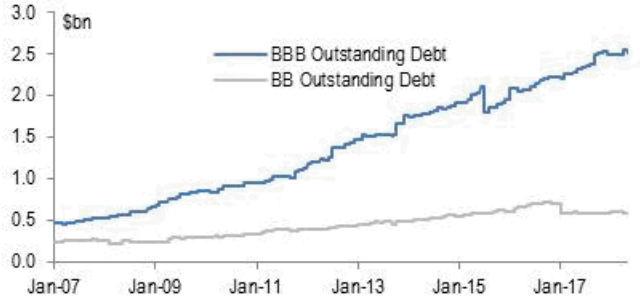


Source: J.P. Morgan, Moody's, S&P

The amount of BBB- rated non-Financial bonds has grown by US$240 billion (+70%) to US$575 billion from 2013-2017, representing 16% of the USD HG bond market. The rate of growth for the BBB- market is 1.5x the rate of growth of the HG non-Financial market overall. This increases the risk to HG investors in the next recession or sector disruption period. However, through YE17, the growth of BBB- has been concentrated in Energy and Healthcare.

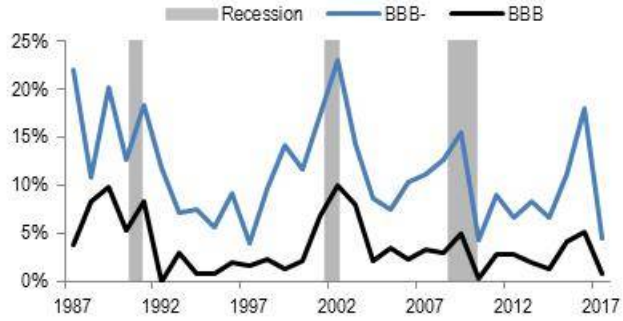
We expect significant downgrade activity in the next cycle, and there are reasons to believe this will be more disruptive than in prior cycles. The size of the BBB market has grown much faster than the BB market. The BBB market is currently 4.3x the size of the BB market, versus 2.0x 10 years ago. Over the past four years since 2013, BBB debt in the JULI index has grown by US$729 billion (+42%) to US$2.5 trillion, while the BB market has grown by US$94 billion (+19%) toUS$579 billion. This makes it more difficult for the HY market to absorb fallen angels in quantity, if/when this happens. Higher leverage of HG issues and a more-ratings sensitive investor base should matter in the next downturn as well.

Figure 5: The U.S. BBB market has outgrown the BB market by 2.2x over the last four years and 3.0x in the past 10 years



Source: J.P. Morgan, Moody's, S&P

Figure 6: The risk of downgrade to HY over one year for U.S. BBB issuers is volatile and correlated with the economic cycle
y-axis: % of debt downgraded to HY in the next year



Source: J.P. Morgan, Moody's

Our view of a more damaging downgrade cycle in the next recession does not apply to Financials. Banks are significantly better capitalized and more highly regulated than in prior periods. The growth in leverage occurring in non-Financials has not been happening in banks due to the regulatory framework now in place and the lessons learned from the financial crisis. Banks are currently in a period of rating upgrades.

Finally, extremely large capital structures have emerged over the last few years. They represent a significant idiosyncratic risk for the High Grade market. An industrial/strategic mistake at one of these mega-issuers, including disruptive innovation by a competitor, which would lead to a downgrade to HY,

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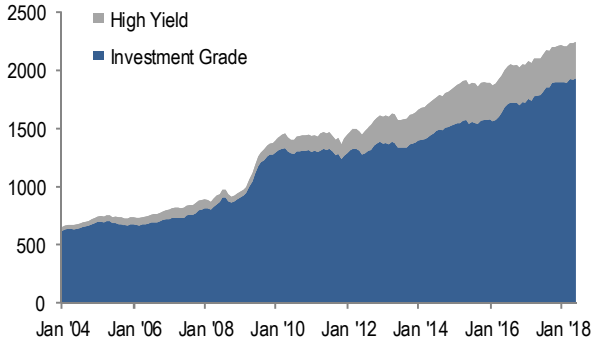
would likely lead to a significant repricing of the whole corporate bond market.

Banks have traditionally been the largest single issuers in the High Grade bond market. However, some Non-Financial issuers are now about as large as the largest banks in terms of debt outstanding. Most of these very large issuers are in the TMT sector. AT&T is the largest one, with US$97 billion of debt outstanding. It is the third largest issuer in our JULI index, close behind J.P. Morgan (US$102 billion) and Bank of America (US$100 billion). Furthermore, Verizon, Apple, and Microsoft all have around US$70-75 billion of debt and are among the 10 largest issuers. Finally, some post-M&A companies are also quite large, such as ABIBB (US$62 billion) and CVS (US$59 billion).

European Corporates: Times have changed

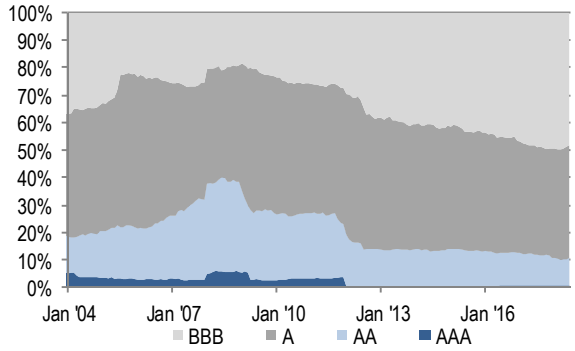
The past decade has seen disintermediation in private sector funding, with a shift from bank loans to capital markets seeing the total stock of bonds outstanding triple to €2.2 trillion (Figure 7). This has gone hand in hand with deterioration in the average rating of the market, with the share of BBB-rated bonds in European Investment Grade growing from 25% to 48% (Figure 8), and European High Yield market growing from €80 billion in 2007 to €320 billion today. This downward rating drift has been due to both lower-rated first-time issuers and also because of periphery downgrades with banks and domestic corporates often notched to the sovereign.

Figure 7: Euro credit market size, €bn



Source: J.P. Morgan, Markit Group.

Figure 8: Investment Grade market breakdown by rating



Source: J.P. Morgan, Markit Group.

However, it is not all bad. While the average rating of the market has fallen, there are fewer signs of excess in credit markets than in the run-up to the financial crisis. Primarily, banks have massively de-risked, with balance sheet leverage falling to 12x from 19x in 2007 (Figure 9). Further, high in the political agenda in the EU is properly cleaning up bank balance sheets and a greater degree of risk sharing in the form of the Single Resolution Fund. It is still to be seen to what extend this would be effective in reducing the bank-sovereign feedback loop that fueled the Eurozone crisis, but we think that this is certainly a step in the right direction.

Non-financial corporate behavior has also been fairly conservative. Western European M&A volumes are still running well below the levels seen in both 2000 and 2007 at an average of US$200bn/quarter over the past three years (Figure 10). Interest coverage ratios are at record highs due to extraordinary low euro yields.

The other major development over the past cycle has been the emergence of the central bank bid. Since June 2016, the ECB CSPP has purchased €163 billion of non-financial corporate bonds, or approximately 20% of their eligible universe. While the program is set to end in the next six months, we believe that it is now a permanent addition to their monetary policy toolkit and that it will be restarted if the economy begins to contract.

Altogether, if the next recession is more modest than the financial crisis, we would expect renewed central bank buying to restrain spread widening.

However, in a more severe recessionary scenario, we may see investors demand greater compensation for redenomination risk, especially for local law periphery bank bonds.

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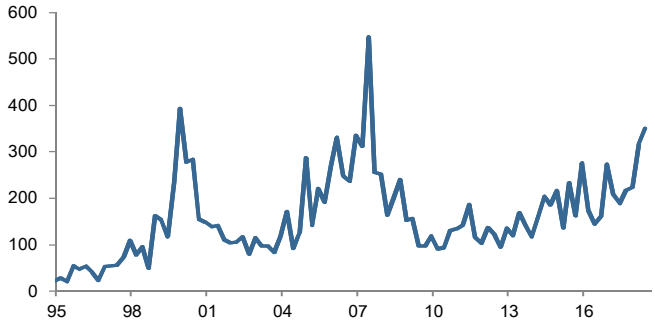
The crossover space looks vulnerable. Even in the base case of a modest recession, fallen angel rates could be higher than in previous cycles due to the skew toward lower rated companies in investment grade. This could put substantial technical pressure on the crossover space of the high yield market, which would have to absorb a large volume of new paper at a time when demand for risk is naturally low.

Figure 9: European bank balance sheet leverage ratio, total assets / total equity

Source: J.P. Morgan.

Figure 10: Western European M&A volumes, US$bn



Source: J.P. Morgan, Bloomberg.

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Global Emerging Markets Research
J.P. Morgan Perspectives
04 September 2018

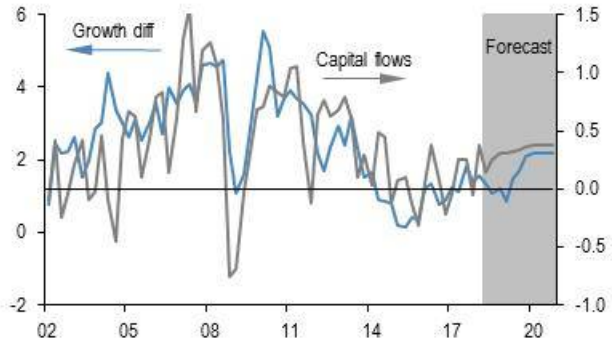
J.P.Morgan

How will EM fare?

- **EM's growth differential with DM should stay positive but faces headwinds from a trade war.**
- **External vulnerabilities for the most part remain contained, yet rising twin deficits bear monitoring.**
- **Less fear of floating has improved EM's ability to adjust to shocks.**
- **Over the medium term as the U.S. cycle nears its end, EM assets will face increasing headwinds.**

In trying to explain the relative performance of EM assets versus their DM counterparts, we have argued that EM-DM growth differentials are the dominant driver of capital flows into EM.[1,2] The underlying logic is simple and familiar: investing in EM is riskier than in DM, and the higher growth compensates for the additional risk. This relationship was strong and held well during the 2002-2007 EM growth surge, the adjustment during the 2008-10 global financial crisis (GFC), the subsequent decline in 2011-15, and the recovery since 2016. **Assuming EM and DM grow in line with their potential rates of 3.6% and 1.4%, respectively, EM capital inflows should be positive on the order of 0.4% of GDP** (Figure 1).

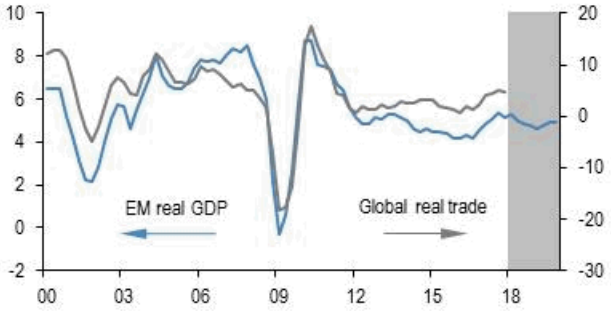
Figure 1: EM-DM growth differential and capital flows
Left scale: %-pt; right scale: % of GDP



Source: J.P. Morgan. EM excludes China.

Anti-trade measures constitute the biggest downside risks to EM's growth differential in the near term. There is a great deal of uncertainty over both the timing and scale of potential impacts of an escalation in trade tensions. But it is likely to have ramifications for sentiment, global capex, and global trade: We have yet to fully incorporate these into our baseline forecasts. As global trade growth has been a crucial driver of EM economic activity, a meaningful decline in world trade would pose serious headwinds for EM growth (Figure 2). Simple macroeconomic frameworks suggest at least a 0.5% reduction in global growth from medium-intensity conflict, before accounting for tighter financial conditions and sentiment shock.[3] It is likely that EMs would bear the brunt of such a global growth hit, resulting in a narrowing of the EM-DM growth differential.

Figure 2: EM growth and global trade are inexorably linked
%oya, both scales



Source: J.P. Morgan, CPB.

A sustained shift toward anti-globalization could have a serious and lasting impact on EM potential growth as well. Globalization is a critical part of our framework for thinking about EM potential growth.[4] Booming global trade in the 2000s significantly increased input usage as well as EM productivity growth. In a less supportive environment for global trade, EMs would no longer be able to reap the quick and large benefits of productivity-boosting reforms focused on external liberalization. Instead, reforms and productivity growth would need to be more domestic-oriented, the benefits of which can take time to start showing up in higher incomes.

Structural factors such as demographics or financial catching up in EMs can also drive significant changes in EM savings rates and potential growth. If left unaddressed, population aging is likely to be an important factor weighing on EM savings over the coming decade (see "Supply-sliding away: Lasting GFC damage on growth").

[1] EM: It's all about growth, 13 June 2016.
[2] Robin Koepke, "What Drives Capital Flows to Emerging Markets? A Survey of the Empirical Literature," IIF Working Paper, 2015
[3] IMF model simulation assuming a 10%-pt across-the-board rise in US import tariffs with matching retaliation from the rest of the world.
[4] Emerging Markets: where has all the growth gone? Special Report, February 2017.

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Much will depend on the EM policy response, but the space to ease policy is generally limited. Macroeconomic policy support in China is helping to offset some of the external headwinds to EM growth, but in an environment of tightening financial conditions, the space to ease monetary and fiscal policies has become more constrained. For example, many others in EM Asia could face market stress as a result of CNY depreciation. While EM central banks largely have overcome their fear of floating, excessive FX depreciation would prompt them to defend their currencies. Substantial monetary policy tightening, in turn, would further lower medium-term growth, narrow EM-DM growth differentials, and weigh down on capital inflows.

The decline in EM savings

Improvements in macroeconomic stability after the 1990s crises helped spur a material rise in EM investment rates. This increase in EM investment persisted through the 2008 GFC but was not matched by increases in EM savings. EM net savings turned sharply lower as policies turned counter-cyclical as the external tailwinds in the immediate aftermath of the 2009 growth recovery faded. At the same time, DM net savings rates rose—a move that gathered pace with the onset of QE. The resulting shift in the distribution of global savings-investment balances has been large.[5] Excess EM savings have declined by 2% of GDP, while DM savings increased by a similar amount (Table 1). One implication of this has been the flow of risk-willing capital into EM.

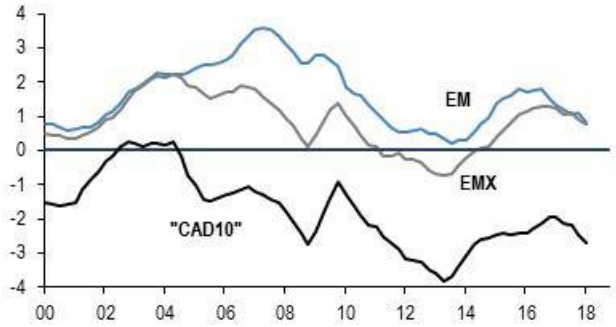
Table 1: Changes in net savings by region

	Change since 2008	
	USD bn	% of GDP
EM	**-651**	**-2**
China	-249	-2
Asia ex China	-15	0
Latin America	-45	-1
Emerging Europe	101	5
Middle East Africa	-356	-14
DM	**1104**	**2**
Euro area	550	4
U.S.	341	2
Japan	53	1
Other	160	-
Statistical discrepancy	-476	-1

Source: IMF WEO, Haver, J.P. Morgan

In the aftermath of the EM financial crises of the late 1990s, most EM economies took to self-insurance by accumulating FX reserves by improving savings-investment balance. However, over the past decade this process has stalled as current account balances stopped rising and FX reserve accumulation slowed. Instead, EM policy makers have relied more on flexible exchange rates to smooth the adjustment to shocks. EM on aggregate runs a moderate current account surplus (CAS), but CAS countries have a lower surplus than in 2008, while deficits for the "CAD10" are around 2008 levels (Figure 3).

Figure 3: EM current account balances
% of GDP



Source: J.P. Morgan.

With a few exceptions, EM FX reserve adequacy is lower today than it was heading into the GFC and also lower than in the late 1990s. Still, FX reserve adequacy remains more than sufficient for most.[6] The decline in EM current account surpluses is primarily the result of the commodity super-cycle coming to an end in 2014. While the rebound in oil prices since mid-2017 has helped to improve EM fiscal and external balances,[7] a meaningful slowdown in global demand could weigh on commodity prices and EM savings. Under a negative oil scenario, oil exporters with pegged exchange rates (i.e., Middle East) could thus take the largest hit (Figure 4). During the previous commodity price downturn episode, the region embarked on debt-financed fiscal stimulus and is already struggling with high debt and fiscal deficits.

[5] The difference between savings and investment is equal to the current account balance. When a country runs a CAD, domestic savings are inadequate relative to the level of domestic investments and a net inflow of savings from other countries must occur.

[6] Based on the IMF's ARA adequacy ratio, South Africa, Turkey, Chile, Malaysia, and China have sub-optimal FX reserves.

[7] "EM: Parsing the impact of the oil price rise," JMM, February 9, 2018.

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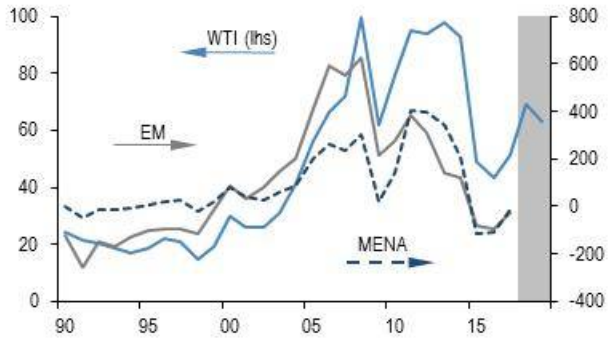
Figure 4: EM S-I balances vs. oil price
Left: US$/bbl, J.P. Morgan forecast for 2018-19; right scale: US$bn

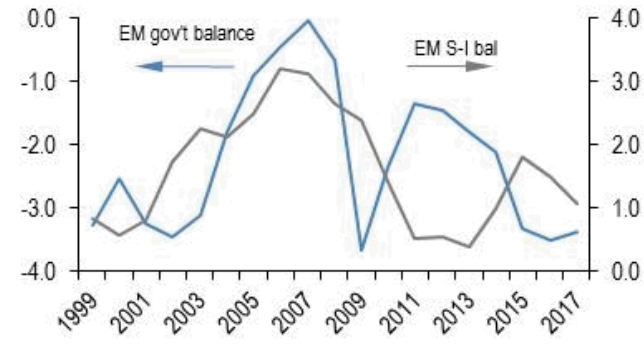


Source: J.P. Morgan.

Increases in government spending (and public debt) bear close monitoring as many high current account deficit (CAD) countries also run large twin deficits. Economic theory links current account deficits with the private saving-investment gap and the fiscal deficit. Without an adjustment in the private saving-investment gap, current account and fiscal deficits must move in tandem, creating a twin deficit. A twin deficit indicates vulnerability as countries that run both fiscal and current account deficits require more avenues to fund them, and this increases their reliance on external markets.

Fiscal consolidation played an important role in restoring macroeconomic equilibrium in the aftermath of the 1990s EM crises (Figure 5), but also contributed to the deterioration in the immediate aftermath of the 2008 GFC. The aggregate EM fiscal deficit is now wider than it was ahead of the 2008 GFC, and several EMs have large twin deficits, although a couple of countries (mainly Argentina) have seen a large deterioration since 2018.

Figure 5: EM public sector and overall S-I gaps
% of GDP, both scales



Source: J.P. Morgan, IMF.

Lessons from earlier crises should hold

The lessons learned from the previous EM crises (see "1990s' lessons helped EM avoid GFC crisis") should hold into the next crisis too. Economies with more flexible exchange rate regimes, disciplined monetary and fiscal policies, and adequate FX reserves should again be best positioned to weather the storm, while those with high financing needs/indebtedness (especially in FX), low reserve adequacy, and rigid currency regimes are likely to fare worst.

With the decline in EM savings rates and an end to the continued rise in current account balances, the pace of EM FX reserve accumulation is set to slow, in our view. Against such limits, EMs should continue to rely primarily on flexible exchange rates as a buffer against shocks. The fact that EM economies are generally less overheated this time around offers some degree of comfort. Consequently, with a handful of exceptions (mainly the CAD10), the adjustment to external shocks may not necessarily need to involve large rate hikes, large CAD adjustments, or deep recessions, especially if exchange rates are allowed to bear the brunt of the adjustment.

Counter-cyclical monetary and fiscal responses should serve as an important buffer to limit the fallout from the next crisis. But policy support is unlikely to be sufficient to completely shield EMs from a meaningful global growth shock. **If we are indeed entering a "war on trade" and a phase of de-globalization, no EM economy will be truly immune.** External headwinds from a collapse in DM demand and global trade flows and/or a sharp fall in commodity prices would still drive a meaningful slowdown in EM growth.

Medium-term fixed income and FX strategy

The end of a U.S. growth cycle is typically accompanied by large moves higher in EM spreads and local bond yields as well as EM FX depreciation. The pattern over the past two recessions for EM hard currency sovereign and local currency sovereign bonds has been consistent, with higher spreads into a U.S. recession (Figure 6, data over previous cycles are not available). EM spreads on average started widening 12 months before a U.S. recession and over an 18-month period widened an average 450bp to the wides, around six months after the start of the recession. For local bond yields we only have one cycle of data, and these similarly saw the lows of the local bond yield spread to UST yields

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13 months before the U.S. recession start. The local yield spread to UST then rose 300bp over the next 21 months, peaking eight months after the start of the recession.

While EM markets have evolved compared to previous U.S. recessions, we would expect a similar direction in movement of spreads and local yields around the next U.S. recession. In "Is it really coming home?" we note that EM currencies have reliably depreciated around a U.S. recession with EM REERs depreciating 17% on average from 12 months before to 12 months after a U.S. recession. The same pattern is seen using the EM FX spot return versus USD on our local bond index (Figure 7), where in the last recession EM FX started depreciating nine months before the onset of the recession and eventually bottomed three months after the start of the recession with a 15% depreciation.

Figure 6: EM spreads typically widen at the end of the cycle and EM local bond yields rise versus UST yields

EMBI until end 2001 and EMBIGD spreads from 2002 (bp); GBI-EM local bond index yield minus UST index (bp)

Source: J.P. Morgan

Figure 7: EM FX also depreciated significantly during previous U.S. recessions

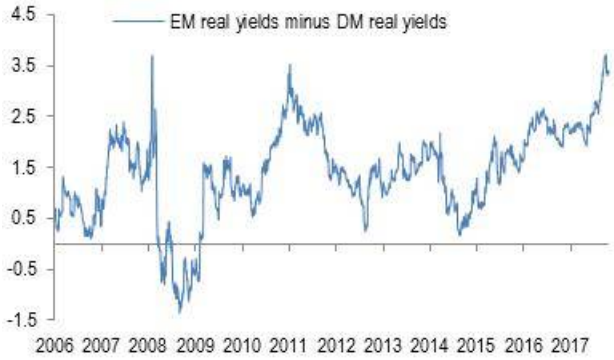
GBI-EM Index FX return index vs USD, Index = 100 at start of U.S. recession

Source: J.P. Morgan

The starting point for this end-of-cycle period points to greater risks to EM credit assets compared to local markets given valuations and vulnerabilities. Historical comparisons are a helpful guide to potential changes in EM assets into a recession, but the starting point is important as well in thinking about how different parts of the EM asset class will fare as the cycle ends. The first factor that is different between hard and local markets is valuations—EM local markets look cheap, whereas hard currency sovereign spreads are not cheap in our models and not wide on a historical basis. Given the recent sell-off in EM local bonds, the premium of EM to DM real yields hit all-time highs in late June (Figure 8). This puts real yields over 2%-pts higher than they were in 3Q07 before markets turned down ahead of heightened concerns about the risk of a U.S. recession. EM FX is also looking cheap in our short-term valuation models (Figure 9), having depreciated versus the dollar from 2013 to 2016 and then again in 2Q18. This valuation difference will likely mean there is more downside from spread widening for EM credit than there is for local markets FX weakness and rates rising into the end of the cycle.

Figure 8: EM local bond yields have cheapened as seen by very high real yields versus DM . . .

GBI-EM yields deflated by actual 12M CPI. DM yield calculated as the weighted average of 10Y UST, 10Y EUR and 10Y JPY (60%, 30%, and 10%).



Source: J.P. Morgan

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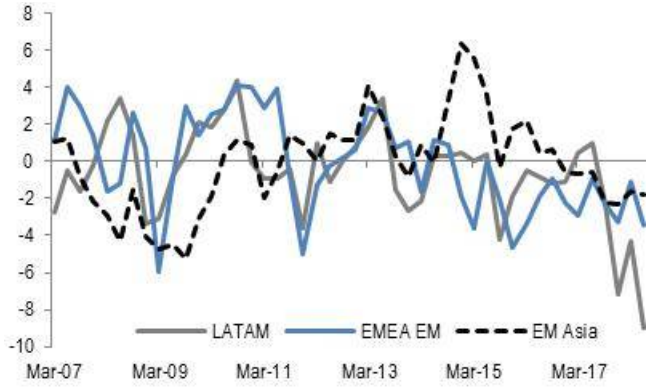
Figure 9: . . . and EM FX is looking cheap across regions, particularly in Latin America

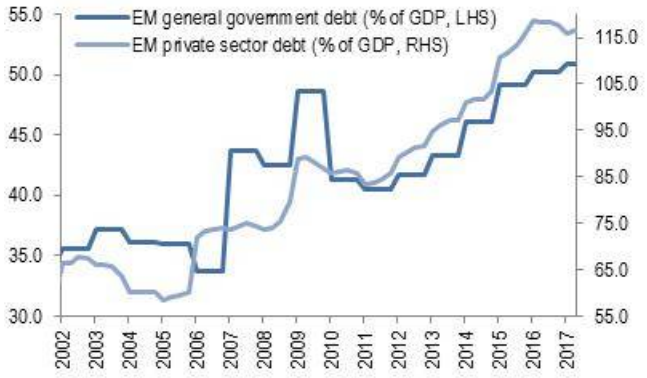
% deviation from JPM BEER EM FX fair value model (unweighted average by region)



Source: J.P. Morgan

Figure 10: EM overall debt levels are high as we approach the end of this business cycle

Left axis: EM general government debt (% of GDP), Right axis: EM private sector debt (% of GDP)

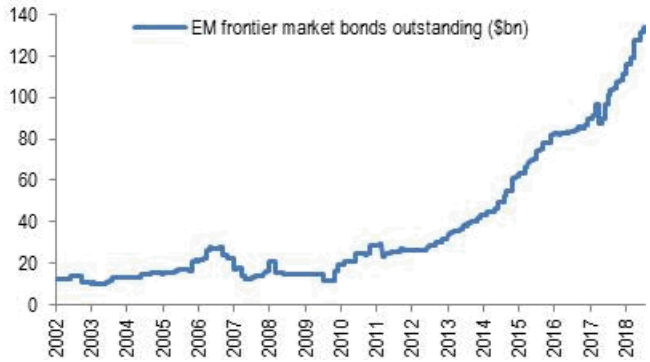


Source: J.P. Morgan

The second factor that argues for greater risks to EM hard currency spreads compared to local market is the difference in fundamental vulnerabilities that drive different EM assets. From 2013 to 2016, and since April 2018, markets have been very focused on the external vulnerabilities of major EM markets, specifically current account deficits and their financing with portfolio flows. These have led to weaker currencies and higher local rates in response, and arguably these vulnerabilities are well understood and have seen improvements. Four out of the 2013 "fragile five" countries have seen improvements in their current account deficits over the past five years (Brazil, India, South Africa, and Indonesia). However, vulnerabilities for hard currency sovereigns have been less in focus for markets and will likely become more a source of concern at the end of the cycle. EM overall debt levels are going into this part of the cycle at all-time highs as a % of GDP for both EM sovereigns and corporates (Figure 10). There has also been an expansion in hard currency debt issuance from the more vulnerable and less well understood frontier markets (Figure 11). This has included 30 countries that are new EM sovereign USD bond issuers since 2010. As liquidity tightens toward the end of the cycle and eventually growth and commodity price expectations fall, these risks will likely see larger spread widening in this segment.

Figure 11: Frontier markets have growth tremendously in this business cycle, expanding 10-fold since 2010

NEXGEM index of EM frontier market sovereign USD bonds, ex-Argentina



Source: J.P. Morgan

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U.S. banks much better positioned

- **Large U.S. banks are better positioned to withstand a recession with higher levels of capital and liquidity.**
- **Banks subject to harsh stress tests annually.**
- **Next recession likely to be marked by higher losses on commercial loans.**

We believe large banks are much better positioned for the next recession because of several factors: 1) much higher equity capital levels, 2) greater liquidity, 3) more stable debt funding, 4) tighter regulation, 5) regular stress testing with shifting scenarios each year, which tempers risk profile, and 6) changes in business mix. We expect the next crisis is more likely to be in commercial-related loans. As regards consumer loans, we expect losses will likely be higher in non-mortgage debt. Subprime loans in all categories will likely see high losses, but U.S. banks have less subprime loans than prior to the crisis. Regulators have also improved resolvability potential in the future to limit contagion risk and reduce overall risk in the financial system.

Higher capital, more liquidity

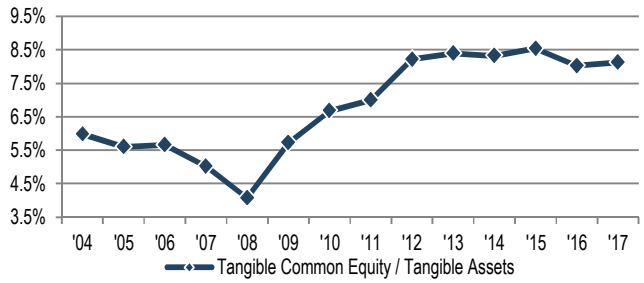
As a result of post-crisis regulation, the largest U.S. commercial banks are less levered, have less risky balance sheets, greater liquidity and debt funding, and are less complex.

Higher capital levels

Large banks are far better capitalized compared with capital levels at the start of the last crisis. On average, tangible common equity ratios have almost doubled from 4.1% in mid-2008 to 8.1% currently (Figure 1). Higher capital levels will allow banks to absorb larger losses without having to boost capital by selling assets, raising equity externally, or receiving government aid—all of which were common features of the last crisis.

Large banks have to meet several capital requirements and have different types and layers of capital—common equity, preferred equity, and subordinated debt. The various requirements are 1) Common Equity Tier 1 (CET1), 2) Supplementary Leverage (SLR), 3) Tier 1 Leverage, 4) Tier 1 Capital, and 5) Total Capital.

Figure 1: Higher capital levels, less leverage at large U.S. banks
Tangible common equity ratio, median of coverage group



Source: SNL.

Gold plating of requirements

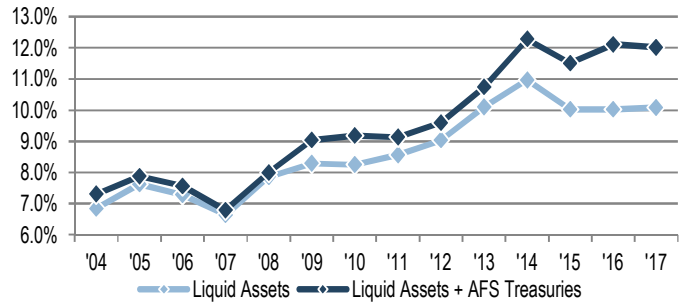
The largest U.S. banks are subject to higher capital requirements based on the Basel Committee's risk measurement and determination of capital buffers, which range from 1.0% to 2.5% above minimum capital required. In addition, U.S. regulators have layered on a separate additional capital buffer for the largest banks of 0.5% to 2%. As a result, large U.S. banks capital buffers range from 1.5% to 3.5%.

More liquid balance sheets

Banks hold significantly more liquid assets and liquid securities today versus pre-crisis levels as required by the post-crisis liquidity regulations. Liquid assets have risen to about 10% of total assets, and liquid assets plus Treasuries have risen to about 12% of total assets—these metrics were at 6.6-6.8% of total assets at their lows in 2007 (Figure 2). Banks have also sharply reduced their reliance on short-term funding.

All of the large U.S. banks, as well as mid-sized regionals, are subject to the Liquidity Coverage Ratio (LCR). In addition, all U.S. banks would be subject to the Net Stable Funding Ratio (NSFR) as proposed.

Figure 2: Large U.S. banks hold more liquid assets
Liquid assets as percent of total assets, median of coverage group



Source: SNL. Liquid assets include cash and due from banks, deposits, fed funds sold, and repos.

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More stable debt funding

In addition to common equity, a new regulation has also increased long-term debt funding at the banks via a requirement for Total Loss Absorbing Capital (TLAC). TLAC requirements, including long-term debt, for our banks range from 21.5% to 22.5% of RWA.

Resolution planning to reduce systemic risk

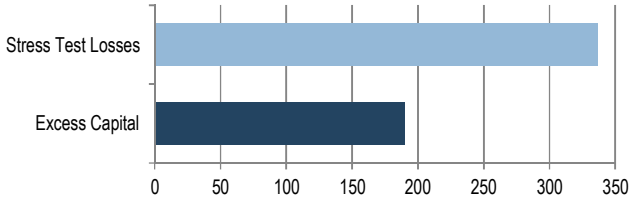
U.S. banks have become less complex since the last crisis by selling non-core assets and divisions, reducing proprietary trading, and cutting links to other financial firms, structured vehicles, and off-balance-sheet entities. In addition, regulators now require banks to submit so-called "living wills," or plans as to how the banks could be liquidated in the event of insolvency, as an attempt to end "too-big-to-fail" and reduce risk in the overall system.

Stringent stress tests by Fed position banks better

U.S. banks are also better positioned because of the harsh stress tests they must undergo annually. The scenarios change each year, and the test stresses for market-related losses, losses from failure of a counterparty, operational losses, and sharply higher credit losses to mimic the worst environment in the last crisis. Banks must meet the minimum capital requirements before they can pay out dividends or buy back stock. Figure 3 shows that our banks had about US$190 billion of excess capital even after US$340 billion of losses in the most recent stress test in 2018 per the Fed's models.

Figure 3: Banks had about US$190 billion of excess capital after US$340 billion of losses in 2018 stress test

US$ billion, 2018 DFAST severely adverse scenario



Source: Federal Reserve and J.P. Morgan estimates and calculations. Excess capital over 4.5% required minimum CET1 ratio.

Capital planning process also improved

Large banks are also subject to qualitative stress tests, which look at the banks' capital planning and governance processes. This is partly to ensure that senior management and the Board are actively involved in this exercise and signing off on it. In addition, banks are also required to conduct their own stress tests twice a year and publish the results so that their own estimates can be compared with the Fed's estimates as another attempt to gauge the quality of the banks' approach to stress testing and hence risk management.

Key areas of concern: Commercial, subprime

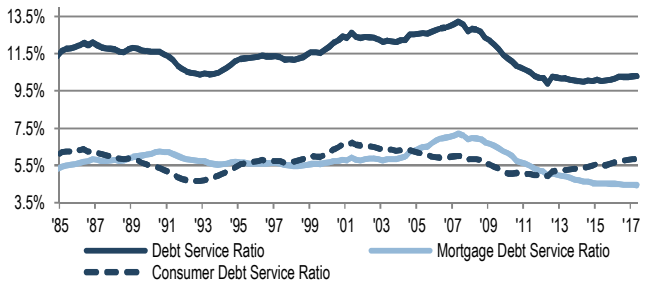
From a credit perspective, we expect the next recession to see greater losses in commercial-related loans and also high losses in subprime consumer loans. Losses could also be higher in the shadow banking sector as risk has increased outside of the traditional banking system with rapid growth in institutional loans, CLO issuances, and other entities providing commercial loans, including for commercial real estate.

Less mortgage debt, more consumer debt

Total debt service coverage ratios for individuals have fallen since the last crisis and are below the levels seen even in the mid-1980s. However, the mix of debt service has shifted with a decline in mortgage debt service ratio but increase in consumer debt service ratio (Figure 4). This has occurred due to faster growth in unsecured lending such as credit cards, instalment loans, and other unsecured loans, plus growth in other consumer loans such as auto loans.

Figure 4: Debt service ratio close to lowest level in 30 years, well below even mid-1980s, but mix has changed

Debt service coverage ratio for individuals



Source: Federal Reserve.

Shadow banking system growing rapidly

Risk has also increased in commercial lending in the financial system outside of the traditional banks. Institutional leveraged loans grew sharply in 2017 by 8.5% and accelerated further in 2018, with loans outstanding up 9.3% to US$1.04 trillion as of June 30, 2018 (Figure 5).

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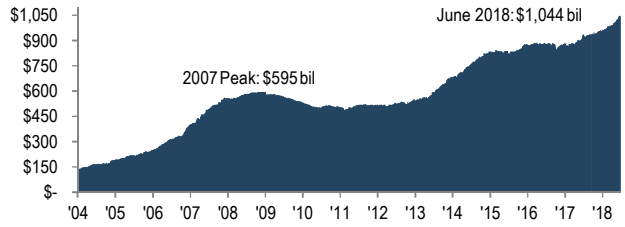
Figure 5: Institutional leveraged loans exceeded US$1 trillion in 2018

Institutional leveraged loans outstanding, US$ billion



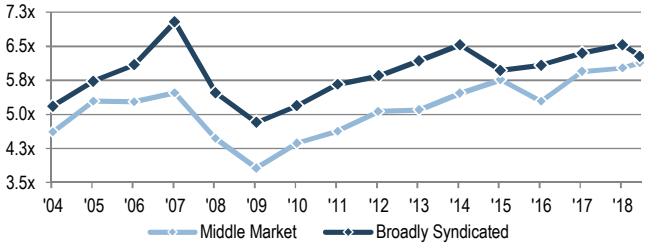
Source: LPC.

Corporate leverage rising

Leverage levels are increasing in commercial loans. Debt to EBITDA ratios have risen over the past few years to 6.5x, a little below 7.0x peak in 2007 (Figure 6). As interest rates rise, the implications are greater for highly leveraged companies; however, some of these companies have tempered this risk by putting on interest rate hedges.

Figure 6: Average debt/EBITDA ratios has risen to 6.5x

Average debt/EBITDA ratio in LBO syndicated loans



Source: LPC

Increased risk in commercial real estate

There is also risk of higher credit losses in some sectors of commercial real estate, such as retail malls and parts of multifamily, notably high-end apartments in some markets. Terms and pricing have been softening, and there has been increased competition from non-banks, including from debt funds and life insurance companies.

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European Banks: Improved capital position, but weak profitability an ongoing concern

- **European Banks are now better positioned in solvency and liquidity than before GFC.**
- **But low profitability, NPLs, and the remaining bank/sovereign feedback loop remain sources of concern when the eventual recession arrives.**

Financial sector vulnerabilities were one of the key contributors to the domino effect created in the Global Financial Crisis with failure/near-failure of some institutions putting further pressure on an already weakened system. The interconnected nature of the financial system and high leverage with limited capital buffers exposed the banks to and amplified the shocks in the system.

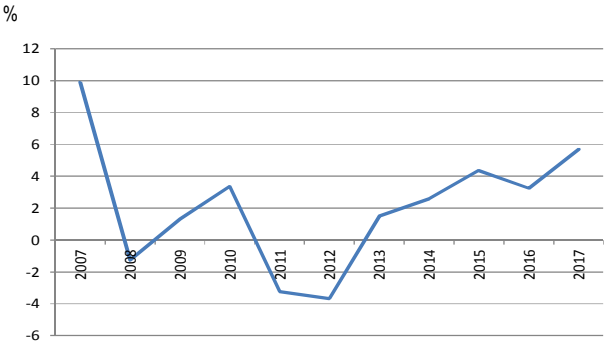
European Banks like other Global Banks have faced an unprecedented level of regulatory scrutiny in the aftermath of the GFC, and while there have been some unintended consequences of these increased regulations, we think European Banks overall are better positioned from a solvency as well as liquidity perspective going into the next potential recession.

Low profitability for European banks is an area of concern alongside high stock of NPLs

As with any period of sell-off, we expect bank earnings will be hit in the short term as activity levels decline with clients staying on the sidelines for a prolonged period of time before coming back to the market post a flurry of activity during the sell-off. This is not a concern in our view for banks showing solid profitability currently—as they can withstand a few quarters of sub-par returns.

However, we believe the key concern from shareholders' perspective would be for banks for which profitability has remained poor even 10 years post crisis (i.e., banks that have yet to find the right balance of business mix), have been late to restructure, and are earning returns (ROE) below their "cost of equity." In a recession, pressure on profitability is likely to mount further for these banks, meaning their business models will be subject to further scrutiny by shareholders. We find some European Banks with low ongoing profitability due to a mix of low/negative interest rates, impaired business models, and a large stock of non-performing loans (NPLs) in particular need of addressing these concerns in order to be prepared for the next recession/global slowdown.

Figure 1: European Banks*: low RoE generation is a concern in event of next recession



Source: ECB.* Euro area (Member States and Institutions of the Euro Area) - Domestic banking groups and stand-alone banks

European Banks have made progress on reducing the stock of non-performing loans, but the high level of NPLs remains an issue in some geographies. This could be a source of further concern in the event of deterioration in macro conditions resulting in higher unemployment or weaker corporate health. The volume of secondary market NPL transactions could also decline in such a downturn scenario, slowing the pace of NPL disposals.

Table 1: European banks NPL stock remains high in selected countries

€ billions, %, 4Q17

	NPLs	Other NPEs	Total NPEs	Gross Loans	NPL ratio	NPE ratio
Italy	167	105	272	1,501	11.1%	18.1%
Spain	113	62	175	1,778	6.4%	9.8%
Portugal	29	13	41	196	14.7%	21.1%
Ireland	21	7	28	195	10.8%	14.4%
Sub-total	**330**	**186**	**516**	**3,670**	**9.0%**	**14.1%**

Source: Central Bank data, J.P. Morgan estimates.*NPE: non-performing exposure, NPL: non-performing loans

The European Bank/sovereign feedback loop is another area where we believe, despite progress, there is still some risk, especially with domestic banks in the periphery. In the event of a material widening in sovereign spreads, these domestic banks holding sovereign debt in their portfolios are likely to see negative hits to capital ratios, as seen for the Italian Banks post the recent Italian political uncertainty led sell-off.

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Global Equity Research
J.P. Morgan Perspectives
04 September 2018

Mid and small-cap U.S. banks: capital levels built, but stocks still vulnerable

- **The primary challenges for U.S. regional banks in the financial crisis were land acquisition, development, and construction loans.**
- **U.S. regional banks are now in a very strong position from a capital, liquidity, and risk management perspective.**
- **During the next downturn, however, we expect investors to sell first and ask questions later.**
- **Our advice: At the first sign of economic or credit weakness, trim exposure to regional banks.**

The three risk factors facing U.S. mid and small-cap banks primarily relate to credit, interest rates, and regulatory matters. Although a lack of sufficient liquidity is technically a risk factor facing any financial institution (and the primary cause of failures for many), for U.S. mid and small-cap banks, experience has demonstrated that liquidity levels tend to build rapidly during a crisis rather than deplete. This occurs as businesses and consumers increase their own liquidity (with the end result being a surge of deposits coming into the banking system). Despite this surge in liquidity into regional banks during the financial crisis, however, regional bank stocks saw significant selling pressure tied to mounting credit losses.

Although U.S. regional banks were not large holders of the toxic securities, such as CDOs, that led to the financial crisis, there was an asset class that placed significant pressure on credit quality for regional banks: **land acquisition, development, and construction (or ADC) loans.** While ADC loans were under pressure from coast to coast as home sales slowed, this asset class proved to be particularly toxic in markets where real estate values had plunged, including Florida, Nevada, Arizona, and California.

For companies in the business of either acquiring or developing land, it is the sale of the land or project upon completion that generates the needed cash to repay the loan. During the real estate boom that preceded the financial crisis, we participated in many real estate tours in markets such as Florida, where land was being acquired not necessarily by experienced home builders but rather by speculators looking to make a quick buck by acquiring and developing land. The end product (ironically) was then sold in many cases to other speculators who had become proficient in flipping homes.

With the supply as well as demand side for housing taken over by speculators, once the music ended, the aftermath was ugly. We remember visiting markets that took on the nickname of "pipe farms." These were areas where land had been acquired for development and, after the sewage and electric lines had been run, the project was vacated. At that point the only things visible from a distance were the pipes sticking out of the ground where the homes were supposed to then be built. In many cases, the value of the "pipe farms" in market such as Arizona, Nevada, Florida, and the Inland Empire of California fell to below the value of undeveloped land. Partially or fully developed homes fared even worse given that in the face of needing to pay real estate taxes with no hope of an eventual sale, housing developments were being vacated with some of the owners (literally) mailing the keys to the bank that held the note.

With the value of the underlying collateral declining in some cases down to "zero," land acquisition, development, and construction loans became a toxic asset class for banks. Although many other asset classes were also under intense pressure at the time, including home equity loans, banks with an outsized concentration of ADC loans saw the most intense selling/shorting pressure. In fact, with our average bank having a tangible common equity ratio only in the 6% range at YE2007, although all banks saw selling pressure, for the banks above 3% or 4% of their loan portfolio in ADC loans, it was questionable whether they had enough capital to survive. The end result was a wave of bank failures, particularly in the hardest hit real estate markets.

Post the financial crisis and the implementation of the Dodd-Frank reforms, however, **many lessons were learned** among regional banks, including 1) **capital levels** needed to be bolstered (with our average bank now having 9% tangible common equity, up from 6% pre-crisis); 2) **reliance on wholesale funding** sources needed to be curtailed (with loan/deposit ratios declining from 106% in 2007 to 93% today); and 3) capital levels would need to be **stress tested** (by regulators but also by the banks themselves as many banks voluntarily took on this much needed practice). Although the industry is without question in a significantly stronger financial condition today than in the period leading up to the financial crisis, in our view this could provide a false sense of security to some investors.

Despite the industry increasing its tangible common equity level significantly since the financial crisis, as well as reducing its reliance on wholesale funding, the reality of

the situation remains even though the industry is now much better prepared to weather the storm: when it comes to credit cycles, **investors sell first and ask questions later**. This point is very well illustrated by the sharp decline in oil prices, starting from mid-2014 and lasting through 2016. During this time frame, banks with exposure to companies in the oil business (from exploration to transport to services) were taken to the wood shed. For example, although Cullen Frost (CFR) is arguably one of the most conservative underwriters in the U.S., as the price of WTI declined by around 50%, from mid-2014 through 2016, CFR shares also declined by around 50% over this time frame (even though ultimate credit losses for Cullen Frost proved to be very manageable).

When we give teach-ins on the bank sector, we share a view that the five most important areas for investors to worry about when investing in bank stocks are credit, credit, credit, regulatory, and rates (and in this order). The bottom line for us: do not fight the credit cycle. Although many banks have proactively worked over the past decade to reduce concentration risk, particularly to higher risk asset classes, with regional banks being in the primary business of taking in deposits and then lending out these deposits, there's not much room for error on the lending side without panicking investors. Consequently, even though the U.S. regional banks are without any doubt the strongest we've seen them in our near two decades of covering the bank sector, should a recession hit the U.S. economy, even a relatively shallow one, from an investor perspective the same "sell first, ask questions later" mentality would certainly be maintained.

Our advice: at the first sign of economic or credit weakness, trim exposure to regional banks. Consequently, we would recommend an underweight position in regional banks relative to the broader markets at the earliest signs of the credit cycle starting to degrade. While many management teams will argue that the industry is now better equipped to work through a credit storm, which is indeed a valid point, in our view it's only when the storm damage can be properly assessed that bank stocks tend to find a bottom. Up until that point, a better buying opportunity is likely to be had.

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J.P.Morgan

Specialty finance: things are different this time, again

- **Incrementally cautious as credit normalizes and late cycle behavior emerges. Assuming next downturn will be "normal" not unprecedented.**
- **Stocks to avoid in a downturn: lenders with highest non-prime exposure (COF, OMF, SC, SYF).**
- **Stocks to own in a downturn: companies with concentration of government-guaranteed credit (AGNC, NLY, NAVI).**
- **What's different this time: Auto lenders likely to face more credit pressure than prior cycle.**

Over the past three quarters, our sector outlook has become more cautious. To date, this has less to do with fundamental deterioration but rather the increasing frequency of late-cycle behavior and expectations that earnings are approaching a cyclical peak. Consumers and corporate borrowers are re-levering, spreads are narrowing, and terms are loosening. Across our coverage, the benefit of higher rates is being eroded by competitive pressures. While profits are buoyed by low credit costs, we are beginning to see the disabling of safeguards.

We are cautious, but we are not alarmists. We do not subscribe to the notion that because the last cycle was severe, the next one will be. Not everything can be unprecedented. We believe **the next recession is more likely to be a "normal" downturn and that post-crisis reforms will have a moderating impact**.

Our strategy for a downturn is based on conditions that would be generally consistent with the Fed's "Adverse Scenario" from the 2018 CCAR framework and with our own U.S. economist's outlook (see Edgerton above).

- Modest GDP contraction
- Unemployment rising to roughly 7%,
- Home prices decline ~12%
- CRE values decline ~15%
- Yield curve flattens with short-end bounded by zero and 10YT at 75bp
- Corporate and mortgage spreads widen
- Debt Capital Markets dislocate while deposit funding remains relatively stable

Given the breadth of our coverage, we expect a wide range of outcomes. The key factors determining performance will be credit performance and funding access. In period of economic uncertainty value will become tethered to book or theoretical liquidation values. We would expect shares of many companies to trade at substantial discounts to book.

Table 1: Summary of coverage

Second column from right shows lowest level of market to book ratio

		Public through GFC	Trough Multiple	Trough Date
Consumer Finance				
Credit Card				
AXP	Prime charge and credit card	X	1.17x	2/23/2009
COF	Full spectrum card, auto & commercial	X	0.30x	3/6/2009
DFS	Prime/near-prime credit card	X	0.43x	3/5/2009
SYF	Full spectrum private label card			
Student Lending				
NAVI	FFELP & servicing	*	0.73x	3/9/2009
SLM	Private student loans	*	0.73x	3/9/2009
Auto Finance				
ALLY	Prime / near-prime auto loans			
SC	Sub-prime/near-prime auto			
Other				
OMF	Unsecured & auto secured sub-prime			
Mortgage				
Residential MREIT				
AGNC	Agency MBS	X	0.70x	1/21/2016
MFA	Agency / Non-Agency MBS	X	0.63x	10/13/2005
TWO	Agency / Non-Agency MBS / MSR		0.70x	6/30/2015 1/25/2016
Hybrid MREIT				
NLY	Agency MBS, 1st Lien CRE	X	0.72x	
Commercial MREIT				
ABR	Low balance, CRE & agency orgins	X	0.05x	3/2/2009
ACRE	Middle market, 1st lien CRE lender			
ARI	Large 1st and mezz. CRE loans			
BXMT	Large, 1st lien, floating CRE loans	X	0.04x	3/10/2009
GPMT	Middle market, 1st lien CRE lender			
KREF	Large, 1st lien, floating CRE loans			
LADR	CRE lender with active conduit business			
TRTX	Mid to large, 1st lien CRE loans			
PMI				
ESNT	Private mortgage insurance			
BDCs				
AINV	Middle market, leveraged loans	X	0.21x	3/20/2009
ARCC	Middle market, leveraged loans	X	0.27x	2/23/2009
BKCC	Middle market, leveraged loans	X	0.21x	3/5/2009
CGBD	Middle market, leveraged loans			
FSIC	Middle market, leveraged loans			
OCSL	Middle market, leveraged loans	X	0.42x	10/10/2008
PNNT	Middle market, leveraged loans	X	0.23x	11/13/2008
SLRC	Middle market, leveraged loans			
TSLX	Middle market, leveraged loans			
WHF	Middle market, leveraged loans			

Source: J.P. Morgan estimate and Bloomberg.

Roughly half of our coverage universe experienced and survived the GFC as public companies. While the crisis was about credit, we believe the existential factor was liquidity/access to capital.

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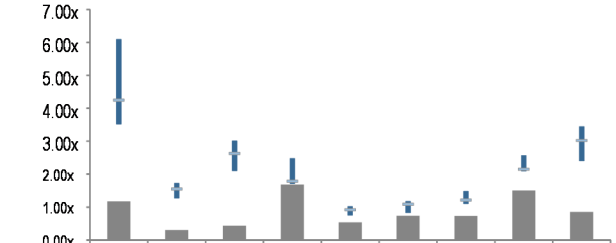
Consumer finance

- **Sector Risk:** High due to concentrated credit risk to U.S. consumer
- **Highest Risk:** COF, OMF, SC, SYF due to higher concentration of non-prime credit risk
- **Safest Havens:** NAVI due to limited credit risk on FFELP portfolio due to government guarantee

Figure 1: P/TB Analysis for consumer finance companies

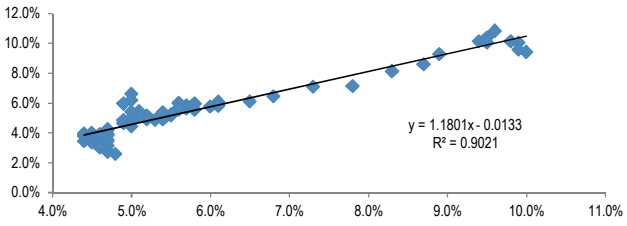


	AXP	COF	DFS	SYF	ALLY	SC	NAVI	SLM	OMF
Trough Multiple	1.17x	0.30x	0.43x	1.69x	0.54x	0.74x	0.73x	1.51x	0.85x
12M High	6.10x	1.72x	3.01x	2.48x	1.02x	1.17x	1.48x	2.57x	3.45x
12M Low	3.52x	1.27x	2.10x	1.72x	0.75x	0.83x	1.11x	2.09x	2.40x
Current Multiple	4.24x	1.54x	2.63x	1.78x	0.91x	1.08x	1.21x	2.15x	3.02x

Source: S&P Capital IQ

In the event of a downturn, we expect Consumer Finance companies to be impacted first. This is because consumers tend to have limited savings, and consequently are more sensitive to changes in conditions. The most influential factor is employment, followed by asset price/collateral declines. Historically, the correlation between labor markets and consumer credit has been extremely high (particularly for credit card and unsecured lenders).

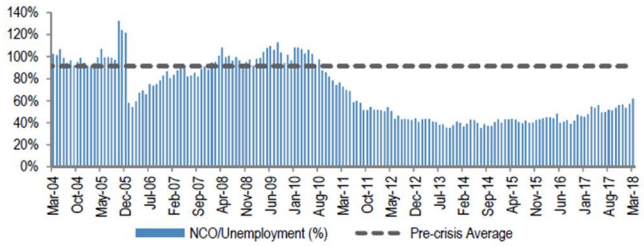
Figure 2: Unemployment vs. pre-crisis CC net charge-offs (NCOs)



Source: Company reports and J.P. Morgan estimates.

Post-crisis, this relationship has weakened as net charge-offs (NCOs) have been lower than the historical relationship would have predicted. We attribute this primarily to "burn out," tighter underwriting, and reduced consumer leverage. We note that the relationship between NCOs and the unemployment rate is slowly reverting to the historical norm.

Figure 3: NCOs as % of unemployment rate



Source: Bloomberg, Bureau of Labor Statistics, Company Reports, J.P. Morgan estimates

In our base downturn scenario (7% unemployment rate), we would expect credit card industry losses to more than double from current levels due to a combination of higher unemployment and convergence back to the 1:1 relationship between NCOs and the unemployment rate. We note that sensitivity to the credit cycle (i.e., "credit beta") is tied to borrower quality. Consequently, we expect losses for issuers with more non-prime exposure to see an even sharper increase in losses.

In this scenario, we expect that **card issuers would remain modestly profitable** on an annual basis. We estimate that **profits will decline between 70% and 95%** across the industry. In this scenario, we would expect stocks to trade as a function of tangible book value. Based on our outlook for a "normal" downturn and more robust capital structures that should reduce concerns of existential risk, we believe that stocks would be unlikely to revisit crisis multiples. In our view, the **most likely scenario would be ~50% downside risk among credit card stocks.**

The most defensive name in the consumer finance group is student lender Navient. The combination of government interest subsidies (i.e., floor income) and credit guarantees on FFELP loans means the company is liability sensitive and has reduced credit risk. While we note that the FFELP portfolio is in permanent run-off mode, we believe a recession would extend portfolio duration. Finally, we believe that NAVI's growing third-party servicing business would be able to grow and continue to scale during an economic slowdown.

One area where we would be incrementally cautious into the next recession would be auto finance. Specifically, we believe that in the next recession used car prices (and consequently recovery values) will be "lower for longer" when compared to the GFC. Figure 4 illustrates our explanation of volume and pricing trends

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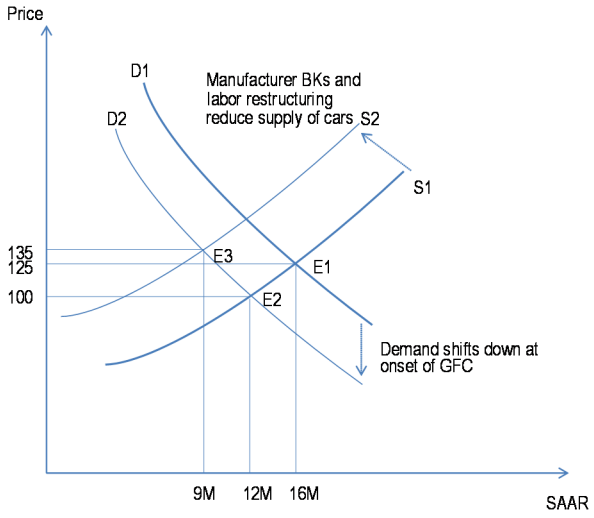
during the GFC in the context of supply/demand equilibrium. Prior to the crisis, US car sales were roughly 16 million pa (Figure 4 S1/D1). As consumers faced the crisis, the demand curve experienced a parallel shift down (D2). Because the manufacturers were stuck with labor contracts and fixed costs at the 16 million level, pricing fell sharply. This is consistent with prior cycles and has historically lead to sustained pricing declines as manufacturers were forced to artificially stimulate demand in order to meet fixed overhead.

However, during the crisis, GM and Chrysler entered bankruptcy and other manufacturers and original equipment manufacturers (OEMs) were able to renegotiate labor contracts. This allowed the industry to reduce fixed cost overhead and cut production (Figure 4 S2). Almost immediately equilibrium was reestablished (Figure 4 S2/D2) with volumes down and prices back to pre-crisis levels (Figure 4 E3).

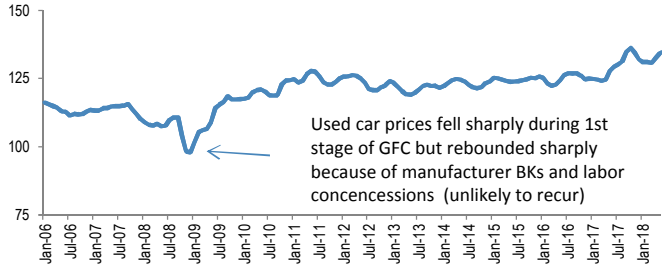
Figure 4: Auto supply/demand during GFC



Source: J.P. Morgan estimates. (Not to scale)

As a result of the sharp rebound in used car prices (Figure 5), loss frequencies and severities declined on auto loans and auto lending profits rebounded quickly.

Figure 5: Manheim used vehicle value index



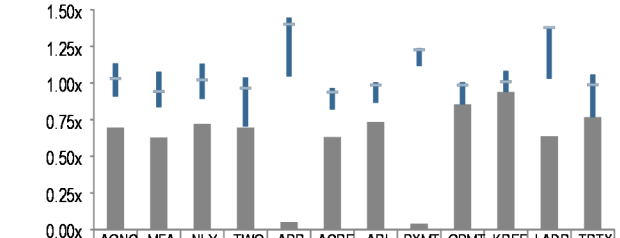
Source: Manheim & Bloomberg

In the next downturn, we believe that loss severities on defaulted auto loans could reach 65% to 75%. If loss frequencies follow the expected path of credit cards, NCOs on Prime auto loans would likely peak at 5-6%. Sub-prime losses could rise into the low 20s (consistent with performance in the 2002-2003 time frame when used car prices remained persistently low). **We believe downside risk in in a recession is 30-40% for ALLY (mostly prime) and 60-70% for SC (mostly sub-prime).**

Mortgage finance

- **Sector Risk:** Agency MREITs should outperform in a recessionary environment.
- **Highest Risk:** Commercial MREITs with less seasoned portfolios (KREF, TRTX) or subordinate risk (ARI).
- **Safest Havens:** Resi MREITs with higher percentage of agency MBS (AGNC, NLY).

Figure 6: P/TB analysis for mortgage finance companies



	AGNC	MFA	NLY	TWO	ABR	ACRE	ARI	BXMT	GPMT	KREF	LADR	TRTX
Trough Multiple	0.70x	0.63x	0.72x	0.70x	0.05x	0.63x	0.73x	0.04x	0.85x	0.94x	0.64x	0.77x
12M High	1.13x	1.08x	1.13x	1.04x	1.45x	0.96x	1.00x	1.24x	1.01x	1.08x	1.38x	1.06x
12M Low	0.91x	0.83x	0.89x	0.70x	1.05x	0.82x	0.87x	1.12x	0.85x	0.94x	1.03x	0.77x
Current Multiple	1.03x	0.94x	1.02x	0.96x	1.40x	0.94x	0.98x	1.23x	0.98x	1.01x	1.38x	0.99x

Source: S&P Capital IQ
Note: BXMT trough multiple reflects precedent entity Capital Trust

The divergence in performance of MREITS during the GFC is a fascinating paradox. Over time, perception of the GFC has been distilled and it is remembered as "The Mortgage Crisis." To an extent this is true, and the number of residential and commercial mortgage lenders that were liquidated or merged away is breathtaking. Many of these companies were sub-prime originators that failed when the primary and secondary markets collapsed. Others were balance sheet lenders that incurred massive credit losses as collateral values collapsed. Finally, it was a liquidity crisis, and even companies with sound assets were unable to finance these viable assets.

What is forgotten is that several MREITs were among the best performing financial stocks during the period. Specifically, residential MREITs that held agency MBS generally traded at premiums to tangible book value (TBV) throughout the crisis.

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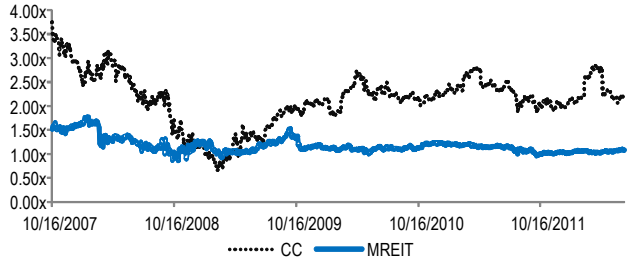
Figure 7 highlights the non-correlated behavior of agency MREITs over the cycle (in context of P/TB). The explanation is fairly simple: agency MREITs own "flight-to-quality assets" that investors target in periods of dislocation due to the government guarantee. In addition, because of the structure of the balance sheet (funding five- to seven-year assets with 30- to 360-day repo financing), agency MREITs benefit from lower short-term rates.

Figure 7: Relative P/TB multiple CC vs. agency MREIT (during GFC)



Source: S&P Capital IQ.

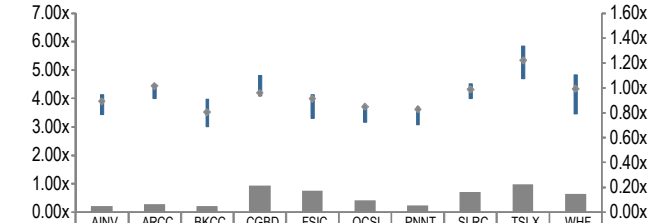
It is worth noting that the trough in Agency MREITs multiples was in January 2016 based upon expectations of higher rates and unwind of the Fed agency portfolio. During an economic slowdown we would expect book value growth (from mark-to-market accounting on agency securities) and book multiple expansion (potentially trading near 10-15% premiums to TBV). In addition declines in repo rates may lead to dividend increases. **Our favorite recession stocks are AGNC and NLY.**

We are less sanguine about the prospects for commercial MREITs in the next recession. While we do not believe the sector faces the same degree of existential risk as it did entering the GFC, we would expect margin compression (portfolios are indexed to LIBOR and the balance sheets are asset sensitive). Depending on the severity of the downturn, and asset class exposure, we would expect book value declines of 5-10% and multiple compression. In our view, companies with seasoned portfolios (BXMT, ABR, LADR) face 20-30% downside risk. Commercial MREITs with higher concentration of late vintage originations (KREF, TRTX, GPMT, ACRE) may face 30-40% downside, depending on the depth of the downturn and regional impacts. Despite portfolio seasoning, we see similar downside risk at ARI given the higher concentration of mezzanine loans. Mitigating factors for the commercial MREIT space are lower LTVs, reduced balance sheet leverage, and more reliable forms of financing.

Business development companies (BDCs)

- **Sector Risk:** High due to direct exposure to middle market and PE-sponsored credit. Lenders with higher % of exposure to cyclical businesses face higher risk.
- **Highest Risk:** BDCs with higher leverage and lower NAV multiples due to reduced opportunity to benefit from market dislocation (AINV, FSIC, PNNT).
- **Safest Havens:** Lenders with balance sheet capacity and access to capital to opportunistically invest if spreads widen (ARCC, SLRC, TSLX).

Figure 8: P/TB Analysis for business development companies



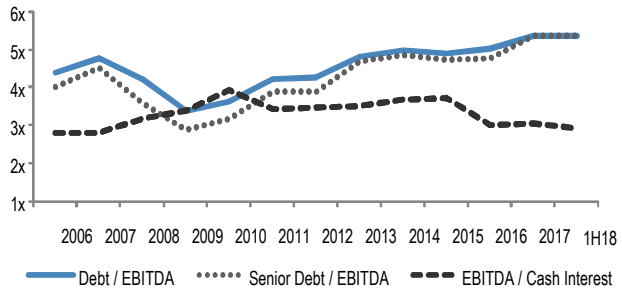
	AINV	ARCC	BKCC	CGBD	FSIC	OCSL	PNNT	SLRC	TSLX	WHF
Trough Multiple	0.21x	0.27x	0.21x	0.94x	0.75x	0.42x	0.23x	0.70x	0.97x	0.63x
12M High	0.95x	1.02x	0.91x	1.10x	0.95x	0.85x	0.85x	1.03x	1.34x	1.11x
12M Low	0.79x	0.92x	0.69x	0.94x	0.75x	0.72x	0.70x	0.92x	1.08x	0.79x
Current Multiple	0.89x	1.02x	0.81x	0.96x	0.91x	0.85x	0.83x	0.99x	1.22x	0.99x

Source: S&P Capital IQ

Post-crisis BDCs have benefited from an extended period of low defaults. In June, the default rate on the S&P/STA leveraged loan index fell to 1.95% (from 2.12% in May). This is above the cycle trough of 1.36% but well below the long-term historical average of 3%.

While credit losses remain low, we are seeing an increased incidence of late-cycle behavior (e.g., higher leverage, tighter spreads, and higher % of cov-lite transactions).

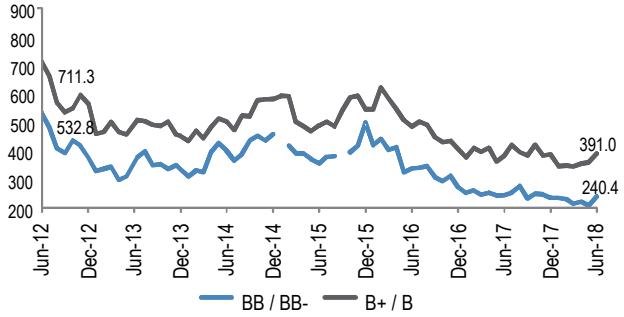
Figure 9: Middle market leverage



Source: S&P Leveraged Commentary & Data

We note that over the past five years, leverage ratios have increased by almost a full turn while spreads have compressed by more than 300bp.

Figure 10: "All-in" Institutional loan spreads



Source: S&P Leveraged Commentary & Data

Against the backdrop, we believe that BDCs would be highly exposed in an economic downturn. It is worth noting that during the crisis, well managed BDCs experienced peak non-accruals of 5-10% (there were outliers in the high teens, though they no longer exist as independent companies). In a more modest recession, we would expect non-accruals of 4-7%. We do not see this posing an existential risk for any of the companies that we follow.

Based on that outlook, we do not expect BDCs to revisit crisis multiples. More likely, we would expect BDCs to trade at 65-80% of NAV at the trough, with book value down 5-10%. This implies 25-35% downside risk in a recession from current levels.

While we would not expect any BDCs to deliver attractive absolute returns in this scenario, we believe that BDCs that have proven access to capital (ARCC and TSLX) and low leverage (SLRC) would be relative outperformers. BDCs that have limited access to capital (due to NAV discounts) and higher leverage would be relative underperformers in a downturn. We include AINV, FSIC, and PNNT in this category.

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Global Equity Research
J.P. Morgan Perspectives
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Real estate performance in the next recession

- **We think real estate should demonstrate less downside in the next recession compared to the experience in 2008/2009. In fact, we think it could even be a relative outperformer and behave in a manner more akin to the early 2000s downturn.**
- **The main difference between the current state of play and conditions prior to the last downturn is that there is far less leverage in the system. Thus to the extent the next recession is characterized by a more broad-based economic pullback and not a capital markets/liquidity meltdown, the more defensive attributes (cash flow, contractual leases, and tangible assets) of real estate should shine.**
- **Publicly traded REIT equities should fare better than other areas of the stock market if investors are seeking defense. On the debt side, REIT bond investors may initially overreact on the downside over skepticism that "this time is different," though not as dramatically as the last downturn. We would then expect—as in prior cycles—a strong rebound.**
- **In terms of property types, cash flows from office and retail assets could be focal points. Demand has been arguably more muted in these areas this cycle despite the strong economy. Changing space usage in office and the shift to online in retail have been the headwinds, which would be more prominent in an environment without an economic tailwind.**

Real estate, both residential and commercial, sat at the epicenter of the U.S. recession and global financial crisis of 2008/2009, and this was driven by high levels of leverage against these assets, diminished underwriting standards, and expectations of future cash flow and/or value growth that protracted off peak economic conditions and inflated levels of liquidity. Obviously, it ended badly.

Much has been written and covered on the residential side, so we'll focus a bit more on commercial real estate (CRE) here. On this front, leading up to the 2008/2009 recession and financial crisis, CMBS issuance ballooned, and in the public markets, net debt-to-EBITDA levels at REITs rose while fixed charge coverages declined.

Figure 1: Annual CMBS issuance and total CMBS outstanding (2004-2010)

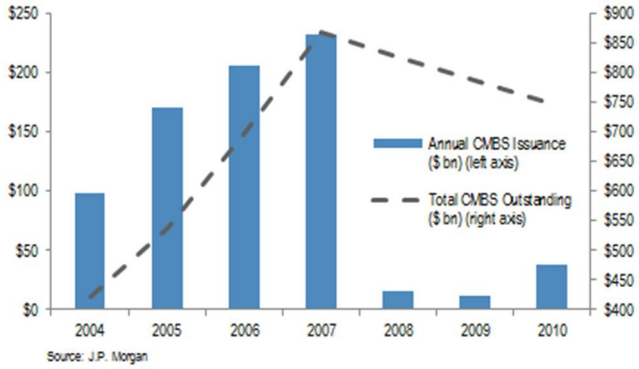
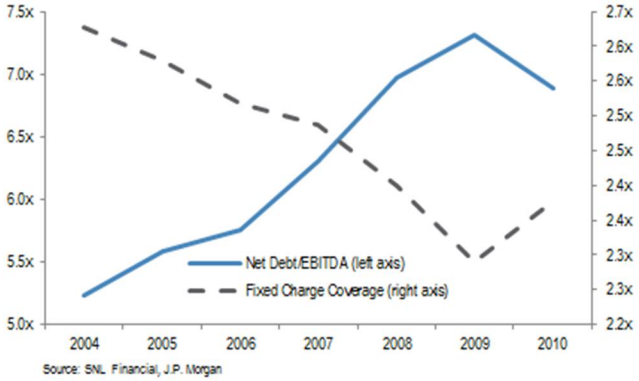


Figure 2: Net debt/EBITDA and fixed charge coverage ratios for REITs (2004-2010)



The liquidity offered up to CRE investors leading up to the financial crisis allowed for minimal equity in deals, and the usage of other people's money created further hazards as sponsor fees exceeded sponsor equity in some instances—deals became free call options for some sponsors. With so much capital in the system, asset pricing moved up dramatically, and it was not uncommon to see transactions underwritten in a way that necessitated significant cash flow growth or interest reserves just to carry debt in the earlier years of a holding period. As a result, the majority of the expected equity return needed to come from residual gains rather than current cash flow. This was a stark contrast to expected CRE returns historically being derived mostly from current income. A look at cap rates (first year ROAs in CRE parlance) relative to 10-year Treasury yields shows how asset prices moved to levels that compressed risk spreads.

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In the midst and aftermath of the financial crisis, the cash flow diminution at the asset level and liquidity on the capital side resulted in significant reductions in asset values and losses on both the debt and equity components of the capital stack.

Where we stand today

Since the downturn, the cycle has gradually worked its way back to prior peaks as it relates to the amount of transactions being completed in commercial real estate annually in the U.S., and cap rates have also come down to historically low levels.

But despite the high levels of liquidity and low cap rate levels, several important elements exist that leave us far less concerned about the state of play if another recession were to come about. First, as shown below, cap rate *spreads* (Figure 3) are not narrow. The low cap rates are largely a function of lower interest rates—not something specific to CRE. Second, there is far less leverage in the system. CMBS is less of a factor in financing CRE, REITs are less leveraged, and underwriting by banks, insurance companies, and foreign institutions (all large debt providers that have stepped up in recent years) is far more conservative. And third, the CRE industry continues to become more "institutional" with larger, well-capitalized longer term investors; think large global financial institutions and money managers, sovereign wealth funds, public REITs, and major private equity franchises. Also, as it relates to the publicly traded REITs, the sector owns higher quality real estate today that should hold-up better in a downturn, and the industry's earnings quality is significantly better than it was 10 years ago.

Figure 3: U.S. CRE Cap rates versus 10-Year Treasury

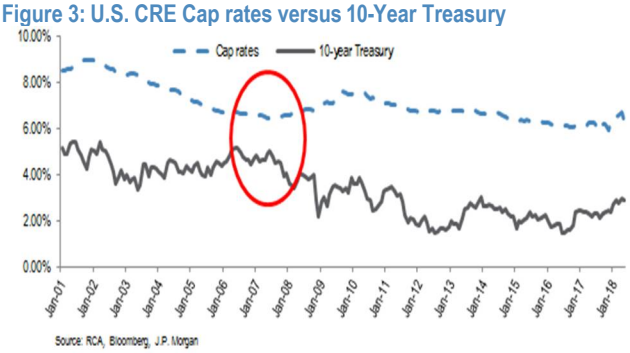


Figure 4: Yearly U.S. CRE transaction volume & cap rates

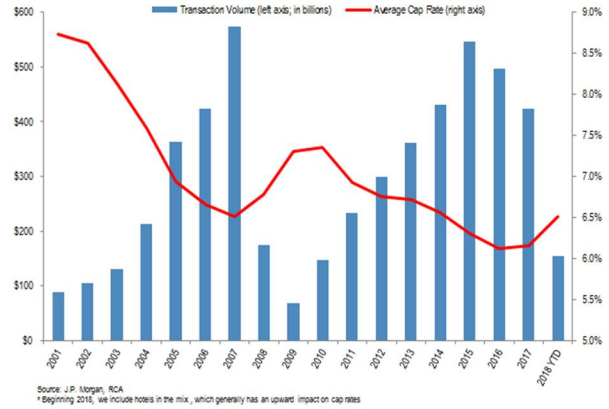


Figure 5: Annual CMBS Issuance and total CMBS outstanding (2011-2018 YTD)

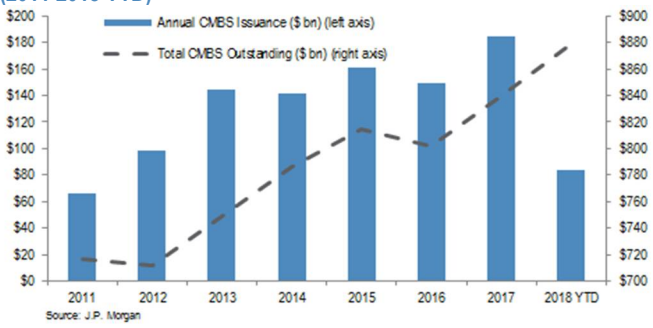
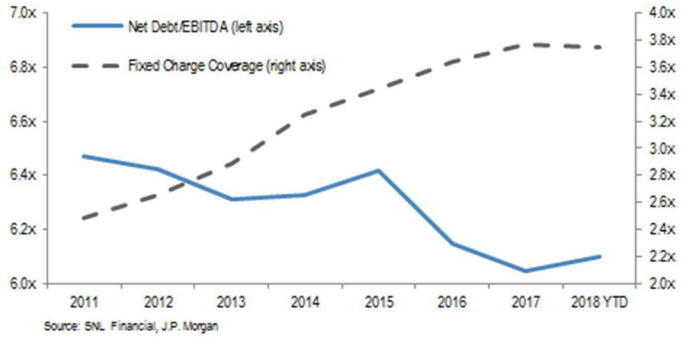


Figure 6: Net debt/EBITDA and fixed charge coverage ratios for REITs (2011-2018 YTD)



We thus think the next recession looks more like 2001 for real estate than 2009

We think about CRE trends from two vantage points: property-level cash flows and asset values. While these two items are certainly related (values should reflect the net present value of future cash flows), shorter term trends in each can be unrelated or take on very different magnitudes of change. For instance, property-level cash flows were naturally pressured during the 2001-2003 downturn as the U.S. experienced job losses and demand

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for space pulled back. Yet over the same time, property values were stable to higher. The dynamic was that interest rates moved lower and, importantly, investors rotated into real assets and away from technology and other "high-growth" investments that defined the preceding run-up to the early 2000s downturn. In the stock market during that time, REIT equities outperformed the broader equity markets as they were "less bad" than other equity alternatives. Put differently, in that more defensive environment that ensued in the early 2000s, investors were far less worried about a few years of low or slightly negative cash flow growth coming from commercial real estate compared to the attractiveness of a tangible investment with solid absolute yields.

As we think about how commercial real estate broadly may fare in the next recession, the setup to us looks a lot more like the one in the late 1990s leading into the 2001 recession rather than the recession and financial crisis of 2008—or the early 1990s S&L crisis, for that matter. Where we would watch for potential outsized risks would be in the property-level cash flows of office and retail assets. We say this because demand for space in each property type has seen headwinds in an up economic cycle—in office commercial space, the reduction in the amount of square footage/employee, and in retail commercial space, the shift in sales to online from brick & mortar stores and the downfall of a number of leveraged, legacy, retail brands. These headwinds—when taking out the positive economic backdrop—could be more dramatic than currently appreciated.

Publicly traded real estate equities (i.e., REITs) in the next recession. We think the stocks can perform relatively well in comparison to the broader U.S. equity market. Interest rates are typically lower in a recession, and investors seek defense and relative safety. REIT stocks offer higher current income (dividends) than most equities, and embedded contractual revenue streams (leases) provide better than average earnings visibility. Balance sheets are in better shape than they were heading into the last downturn, so unless the next recession is marked by severe liquidity issues or a financial crisis, this should be less of a factor. Today's REIT portfolios are also of significantly higher quality than they were heading into the last recession, and the group's earnings quality is much better. Both factors should reduce risk. While we would expect cash flows to be pressured, the downside to earnings should be "less bad" in comparison to other industries.

REIT bonds in the next recession. To look forward, we need to look back. REIT bonds exhibited extreme volatility during the GFC. For perspective, our JULI high grade bond index peaked at 560bp in November 2008 while our REIT subset peaked at 1,229bp one month later. Fast forward to 2018 where our REIT index trades were basically on top of the overall market (~145bp for each). While no equity REITs with investment grade ratings and standard covenants defaulted (either in the last recession or since the early 1990s rebirth of the sector), the REIT bond market tends to "sell first and ask questions later" when it comes to a major economic downturn. If the drivers of the next recession cause investors to seek refuge in the cash flow stability of commercial real estate, perhaps the downward price pressure on REIT bonds won't be as severe. Our best guess is that, during the next recession, the bond market will overreact (at least at first), but not nearly to the same degree as the 4Q 2008 overreaction when quality investment grade rated REIT bonds were available at yields of 10-20%. Keep in mind, after being the worst industry performer in 2008, REIT bonds generated top sector performance for several years thereafter as the market realized how oversold the sector had become.

A word on residential real estate. On the residential side, in a nutshell we see the same downside mitigating dynamics—less leverage in the system—in our next recession scenario when compared to the housing bust experienced last cycle. In addition, another downside-mitigating factor we see is that new home construction has been muted this cycle in comparison to household growth and normal asset obsolescence—we are not oversupplied. To be sure, one can also look at existing home sales data that continues to run below a level that would be suggested by historical housing turnover rates applied to the current population. Housing, while no longer discounted, does not appear to be overheated when looked at from these vantage points.

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Global FX Strategy
J.P. Morgan Perspectives
04 September 2018

J.P.Morgan

Is it really coming home? Contingency planning in FX for the next recession

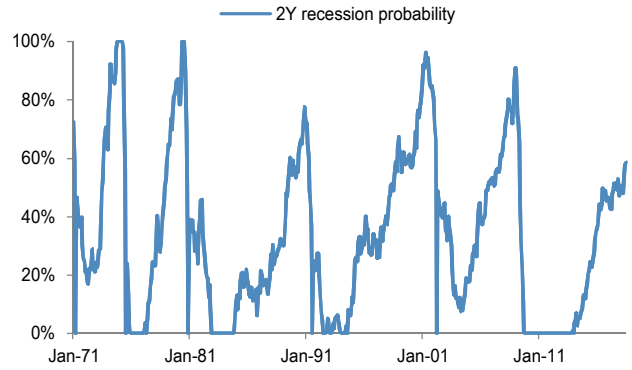
- **In recessions, creditors ask their money back. Which side of this transaction a country lies on determines whether its currency behaves as a safe-haven (net creditor) or a recessionary basket case (net debtor).**
- **The best performing recessionary hedges in FX are CHF, SGD, USD, and JPY based on the experience of the last five recessions. Three of these are currencies of major net creditors; the fourth, USD, is the world's default funding currency.**
- **Of currencies most vulnerable to recessions, EM is a clear stand-out (an index of EM currencies depreciated on average by 17% in the 24 months centered on the start of the recession). In G-10, NZD is by far and away the worst performer when economic times get tough, shedding an average 7-8%.**
- **JPY is the cheapest of the recessionary hedges, SGD the least attractive. Many high-beta currencies are also cheap, and hence somewhat better insulated to a downturn than previously. NZD is a notably expensive exception.**

Reviewing the recessionary playbook in FX

For much of the Trump presidency, a fair portion of the top-down analysis on FX markets has concerned itself with detailing the escalating threat of protectionism. That threat is becoming reality now that the U.S. and China have unleashed the first salvo of tariffs. In this note, which was first published in *FX Markets Weekly*, 6 July, 2018, **we take time out from tracking the minutiae of trade policy to consider the bigger picture impact on exchange rates from a potential political miscalculation that tips the U.S. or global economies into recession.** Admittedly such a grievous macro scenario seems quite far-fetched at present given that the U.S. economy is pushing 4% growth. But then again, investors are cognizant of the already advanced nature of the business cycle (the global recovery is entering its 10th year) and are not oblivious to warning signals from developments such as the inexorable flattening in the U.S. yield curve and the double-digit losses in EM FX (the fourth-worst performance since the GFC).

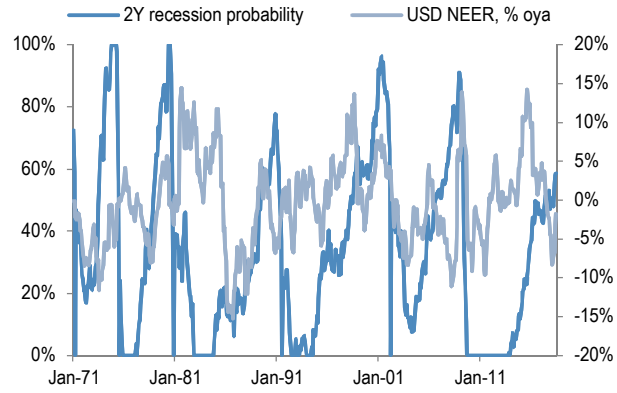
J.P. Morgan's own model based on a range of lead indicators puts the probability of a recession within a two-year time frame at just under 60% (Figure 1, and Edgerton, above). The last time this indicator was at these levels, a recession ensued just four months later at the end of 2007, albeit the lead-time to a full-blown downturn was a rather less concerning 18 months in the case of the 2001 recession and 24 months in 1991. This setup may not warrant launching the recessionary lifeboats; it does though justify reviewing the contingency plans for how to position in FX for such a worst-case macro scenario.

Figure 1: The probability of a U.S. recession within 2 years stands at just under 60%. Similar readings were followed by recessions within 4 months (2007), 18 months (2001), and 24 months (1991)
Probability of U.S. recession beginning within two years (Recession risk model update, Edgerton).



Source: J. P. Morgan

Figure 2: There is positive albeit rather loose correlation between the performance of the USD index and the probability of recession (a monthly correlation of 9% over a 30Y period)
Probability of U.S. recession beginning within two years vs USD index, % oya



Source: J. P. Morgan

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The stylized facts—currencies of external creditors plus USD do well in recessions

In this section we summarize the stylized performance of currencies into and through a recession. In the following section we consider more carefully the issue of timing to determine whether some recessionary hedges are better to own than others when visibility around the timing of a recession is low. In the final section we consider the idiosyncrasies that may cause currencies to deviate from their typical recessionary trajectories when the next downturn strikes (which, for the record, we assume will not be in 2019).

The stylized performance of exchange rates around U.S. recessions is detailed in Figure 3. For this analysis, we use Nominal Effective Exchange Rates and the NBER's dating of recessions. The table provides average statistics for the last three recessions (2007, 2001, and 1990) and the last five (adding in 1980 and 1981). The performance of currencies is shown for the 12 months preceding the recession, the 12 months following, and the combined change from one year before to one year after. The final three rows provide what can be regarded as a recessionary information ratio, in other words, the average change in an exchange rate over the last five recessions divided by the standard deviation of its performance across those individual recessions. This provides a gauge of the consistency with which a currency adjusts during a downturn, which should matter as much if not more for the selection of an FX hedge than the average performance over recessions (recessions differ in their causes and so too, potentially, their significance for exchange rates).

The best performing currencies over the last three recessions were JPY, USD, CHF, and SGD. There is very little to choose between them in terms of their absolute performance with all four posting an average appreciation of 7-9% in the 24 months centered on the start of the recession, whose significance for exchange rates can differ depending on the cause of the downturn.

There is more differentiation in the performance of these relative safe havens once the twin recessions of the early 1980s are included. In this case, USD's absolute performance is elevated to 12% compared to 8% for SGD and 6% apiece for CHF and JPY. But the dollar's superior average performance also masks a greater variability across the individual recessions, and once we adjust for this variability, the best recessionary hedges, i.e., those with the highest information ratios across recessions, turn out to be CHF (a recessionary Sharpe ratio of 1.6) and SGD (1.3). The U.S. dollar slips to third place on this metric (1.0) followed by JPY (0.6).

Turning to those currencies most susceptible to recessions, EM is a clear stand-out (an index of EM currencies depreciated on average by 17% in the 24 months centered on the start of the recession**). In G-10, NZD is far and away the worst performer when economic times get tough, shedding an average 7-8%.** In volatility-adjusted terms, the currencies most vulnerable to recessions of those included in this study are BRL (recessionary Sharpe ratio of -2.4), TRY (-2.0), followed by KRW and NZD (-1.1).

The ordinal ranking of recessionary hedges may be a little surprising in that the dollar does not necessarily occupy the top slot (Figure 4), but there is no surprise that three of the top four currencies to own during a recession are those of countries that boast extremely strong external positions. This is defined not so much by a country's current account surplus (although this helps), more so it's positive Net International Investment Position (NIIP). The dominant response of investors to the asset price deflation that accompanies recessions is to delever and de-risk their portfolio. In the case of creditor countries this leads to repatriation by domestic investors of offshore investments, and it is this flow that causes the exchange rate to appreciate. The converse holds for net international debtors.

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Figure 3: The most consistent pattern in FX the year ahead of a recession is depreciation in EM NEERs. SGD is a notable stand-out, having consistently appreciated before and during recessions. USD appreciates around recessions, most reliably once the recession has begun. JPY tends to rally only once the U.S. is contracting. The most reliable recession hedge is CHF - the NEER appreciates before and during recessions with least variability over the various episodes

NEERs, % change before and during U.S. recessions. Information ratio = average FX change / standard deviation of FX change over the last 5 recessions

	USD	CAD	BRL	MXN	JPY	AUD	NZD	KRW	SGD	TWD	EUR	NOK	SEK	CHF	GBP	TRY	EM
Average last 3 recessions																	
Year before recession started	2.1%	3.9%	-91.1%	-3.9%	-4.1%	-0.8%	-0.3%	-6.0%	4.4%	-2.5%	5.1%	2.4%	-3.2%	4.0%	-1.1%	-19.6%	-11.4%
Year after recession started	5.6%	-5.0%	-33.9%	-3.5%	13.4%	-4.4%	-6.5%	-10.2%	2.6%	-0.9%	-0.7%	-3.7%	-3.9%	3.2%	-7.1%	-25.5%	-6.5%
1Y before to 1Y after	7.8%	-1.3%	-94.1%	-7.2%	8.7%	-5.1%	-6.8%	-15.5%	7.2%	-3.4%	4.4%	-1.4%	-6.9%	7.3%	-8.2%	-40.1%	-17.2%
Average 5 recessions																	
Year before recession started	5.0%	2.8%	-86.5%	-1.4%	-5.0%	1.4%	-2.7%	-5.6%	5.1%	0.8%	1.3%	1.6%	-1.1%	2.8%	1.2%	-24.3%	-9.4%
Year after recession started	6.7%	-3.7%	-34.5%	-11.2%	12.0%	-2.5%	-6.0%	-10.4%	3.3%	-1.5%	-1.7%	-1.1%	-3.7%	3.1%	-1.0%	-30.0%	-8.5%
1Y before to 1Y after	12.0%	-1.0%	-91.2%	-12.4%	6.5%	-1.1%	-8.5%	-15.4%	8.6%	-0.7%	-0.4%	0.4%	-4.8%	6.0%	0.2%	-47.1%	-17.1%
Std. dev. over 5 recessions																	
Year before recession started	8.3%	6.0%	42.0%	4.3%	8.4%	8.7%	5.3%	1.8%	3.6%	5.3%	7.8%	1.8%	4.5%	4.4%	6.5%	22.2%	11.4%
Year after recession started	4.5%	7.4%	27.7%	21.7%	15.4%	11.0%	10.2%	14.5%	3.1%	3.1%	3.2%	7.9%	5.8%	5.5%	12.3%	11.1%	6.1%
1Y before to 1Y after	11.9%	5.5%	37.4%	20.8%	16.0%	9.5%	7.8%	14.1%	6.8%	4.9%	6.7%	6.5%	7.1%	3.7%	17.9%	24.0%	14.4%
Information ratio, 5 recessions																	
Year before recession started	0.60	0.47	**-2.06**	-0.31	-0.59	0.16	-0.50	**-3.06**	**1.42**	0.15	0.17	0.85	-0.24	0.64	0.19	**-1.10**	-0.82
Year after recession started	**1.50**	-0.50	**-1.25**	-0.52	0.78	-0.23	-0.58	-0.72	**1.07**	-0.47	-0.52	-0.14	-0.64	0.57	-0.08	**-2.71**	**-1.39**
1Y before to 1Y after	**1.01**	-0.18	**-2.44**	-0.60	0.40	-0.12	**-1.08**	**-1.09**	**1.26**	-0.13	-0.05	0.07	-0.68	**1.62**	0.01	**-1.96**	**-1.19**

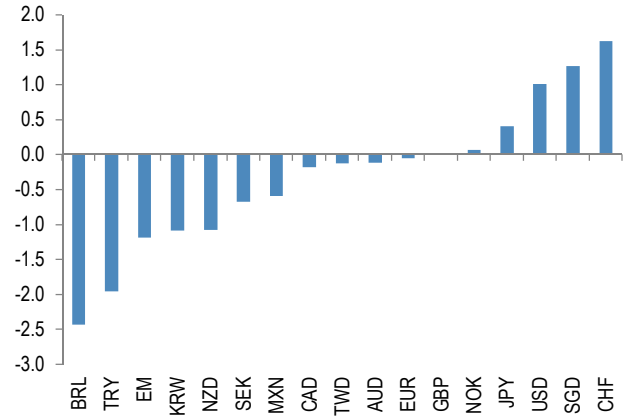
Source: J. P. Morgan

Now this may be a relatively straightforward framework for thinking about the relative sensitivity of exchange rates to recessions, but it is supported by the data. In particular, as Figure 5 details, there's a decent positive relationship between a country's NIIP position and the volatility-adjusted change in its currency during downturns. **Recessions are when creditors get to ask for their money back. Which side of this transaction a country lies on determines whether its currency behaves as a safe haven (net creditor) or a recessionary basket case (net debtor)**.

The one exception to this framework is USD, which functions as a safe haven even though the U.S. has a negative NIIP, albeit a small one. The explanation for this seeming anomaly rests with the dominant role that the dollar plays in international financing. The dollar has been and remains the principal source of offshore funding for the bulk of countries, especially in EM, which means that the rest of the world (ROW) is short of USD even though the U.S. as a country is a net borrower from the ROW. The U.S.'s negative NIIP position is therefore not a reliable proxy for the way in which the ROW has structural net liabilities in USD (the "global dollar shortage") and so has a need to buy back USD whenever corporate and bank balance sheets are delevered during recessions.

Figure 4: Ranking currencies by their sensitivity to recessions. CHF, SGD, and USD are the cleanest recessionary hedges, fragile EM the most vulnerable. NZD is the worst within G-10

Average change in NEERS around the last 5 recessions / standard deviation over those 5 episodes. Change is calculated from 1Y before recession starts to 1Y after



Source: J. P. Morgan

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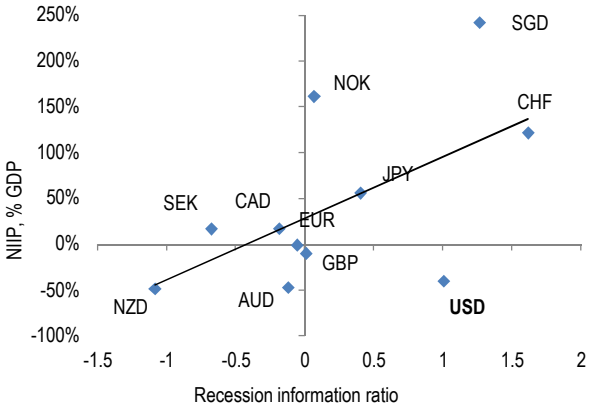
Figure 5: The sensitivity of a currency to recessions depends primarily on a country's external position (flow and stock). Net foreign creditors tend to appreciate and debtors depreciate. The main exception is USD since the dollar is the world's funding currency (especially EM) and so benefits from deleveraging in a recession even though the U.S. has a negative NIIP position
Recessionary information ratio (see Figure 4 for description) plotted vs Net International Investment Positions (% GDP).



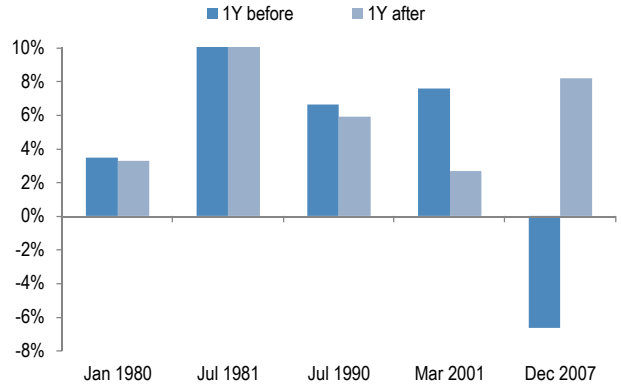
Source: IMF; J. P. Morgan

Timing matters less for some recession hedges (USD, SGD, and CHF) than others (JPY)

Timing is an important consideration for those investors who are looking to hedge recessionary risks in FX. **The message from this study is that not all safe haven currencies are created equally insofar as some currencies perform better ahead of a recession than others and so may be regarded as better hedges when the visibility on the timing of a recession is low** (this is surely a given—if recessions were predictable they wouldn't be so impactful for markets).

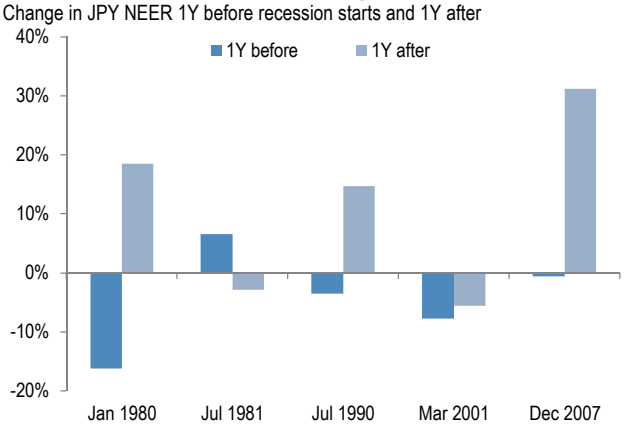
Of the hedges we have identified, SGD is the most consistent as the NEER appreciated in the 12 months leading up to each of the last five recessions. The U.S. dollar appreciated in four of the five examples, while for CHF it was three out of five. The safe haven where timing is most critical is JPY as the currency depreciated in the lead-up to four of the last recessions. JPY is a viable hedge for an eventual downturn, but patience is required for JPY to begin to perform only once the U.S. has actually gone into recession (Figure 6-8). On the flipside, getting the timing of recession right appears to be a less pressing consideration for hedging vulnerable high-beta currencies. EM FX, for instance, depreciated in the run-up to four of the last five recessions (and consolidated ahead of the 2007 episode), while NZD depreciated ahead of three of the last five.

Figure 6: The precise timing of the recession has mattered less for USD as it has tended to appreciate both in the lead-up to recession (mainly vs EM) and during recession (2007 was an exception).
Change in USD NEER 1Y before recession starts and 1Y after



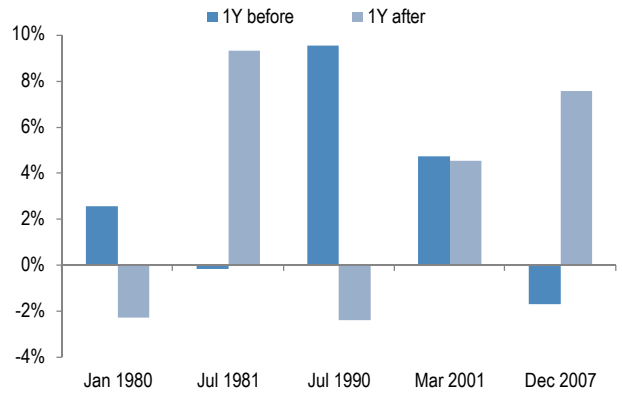
Source: J. P. Morgan

Figure 7: Timing is more relevant for JPY. Owning JPY a year ahead of a recession has been a losing proposition.
Change in JPY NEER 1Y before recession starts and 1Y after



Source: J. P. Morgan

Figure 8: CHF is as likely to appreciate ahead of a recession as during one
Change in CHF NEER 1Y before recession starts and 1Y after



Source: J. P. Morgan

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Recessions rhyme, they may not repeat

An analysis of past recessionary episodes is useful for identifying certain regularities that can be exploited when planning how to manage currency exposures for the coming recession. But we need to recognize that recessions can and do differ in terms of their causes as well as the imbalances that are responsible for transmitting stress through financial markets, including exchange rates. The GFC provided the starkest illustration of this as the near-death experience for the global financial system exposed the hitherto unimaginable interconnectedness of national banking systems and the disruptive consequences for exchange rates of the forced refinancing and eventual contraction of banks' cross-border positions.

Perhaps the key question for exchange rates for the coming recession is whether the past decade of unconventional monetary policy has encouraged renewed excessive risk taking, particularly through the accumulation again of currency mismatches between assets and liabilities (either actual mismatches or contingent ones reflecting a maturity mismatch between FX assets and liabilities) that could be exposed by a future downturn. It's too early to come to definitive conclusions as to what this might mean for FX, but we refer readers to a range of useful papers from the BIS on this broad issue[1],[2]. The second of these papers is particularly relevant for JPY as it highlights the emergence of Japanese banks as the dominant foreign holder now of USD assets (US$2.5 trillion compared to less than US$1.5 trillion before the GFC) as European banks have delevered.

On a more prosaic level, the starting position for currencies going into the next recession may very well differ from past recessions, and in this sense currency valuation is an important conditioning factor that could influence the performance of recessionary hedges. This is particularly so for JPY, which was never as cheap as it is now on the cusp of a recession (Figure 9). The JPY REER is currently 23% below its 40Y average compared to an average 8% overvaluation ahead of the last three recessions. JPY is the cheapest of the four potential recessionary hedges, so whereas its historic performance is less impressive than USD, SGD or CHF, we would argue that JPY should nevertheless form a central part of any recessionary hedge. An economic downturn after all could serve to disrupt and potentially reverse the tide of domestic capital outflows that has conspired to push the yen to what are now very cheap levels from a historical perspective. On the other hand, SGD screens as the most expensive of the potential anti-cyclical hedges with a REER that's 9% richer than its 40Y average. Given that SGD was invariably undervalued going into past recessions, its current valuation could well suggest that the performance of SGD in the next recession may fall short of its historical standard.

Figure 9: JPY has never been this cheap ahead of a recession. SGD is the most expensive recessionary hedge

Currency valuation 12 months before the onset of a recession. Valuation is proxied by the deviation of the REER from its 40Y average

	USD	JPY	SGD	CHF	EUR
Average last 3 recessions	0.6%	8.1%	-7.2%	-6.9%	-0.8%
Average last 5 recessions	-2.0%	0.4%	-5.9%	-2.2%	3.1%
Min	-6.1%	-20.1%	-12.5%	-8.9%	-12.7%
Max	5.9%	2.9%	-2.9%	9.9%	10.0%
Current	3.0%	-22.9%	8.8%	5.7%	-7.7%

Source: J. P. Morgan

The conclusion from a similar historic comparison of cyclical currencies is that many of the usual recessionary victims are now quite cheap, which could afford them a degree of protection if a recession does indeed take hold. This is especially true for SEK (REER 26% cheaper than the 40Y average) and MXN (-24%), although we would be reluctant to characterize TRY as being functionally cheap despite a similar level of its REER due to Turkey's growing macro vulnerabilities. BRL is trading on the weak side of its long-term average but no more so than is usual a year ahead of a recession. **The one cyclical currency that stands out as being expensive and therefore atypically vulnerable to a full-blown recession is NZD. This is 10% above its long-term average, a level that has not been exceeded a year prior to a recession** (Figure 10).

Figure 10: Many cyclical currencies are very cheap by comparison with pre-recession periods, especially SEK, MXN, and TRY. BRL is comparably valued, while NZD is the stand-out as being historically overvalued if indeed a recession is nigh

Currency valuation 12 months before the onset of a recession. Valuation is proxied by the deviation of the REER from its 40Y average

	BRL	TRY	KRW	NZD	SEK	MXN
Average last 3 recessions	-0.6%	-0.9%	7.8%	-2.4%	1.3%	6.3%
Average last 5 recessions	-5.0%	8.6%	9.0%	-2.4%	10.5%	8.1%
Min	-21.0%	-20.0%	-6.1%	-15.5%	-7.0%	-9.5%
Max	7.6%	47.8%	14.9%	9.5%	24.6%	17.8%
Current	-8.6%	-19.9%	-1.8%	9.8%	-25.5%	-24.0%

Source: J. P. Morgan

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Companies Discussed in This Report (all prices in this report as of market close on 31 August 2018)
AGNC Investment Corp. (AGNC/$19.02/Neutral), Annaly Capital (NLY/$10.62/Neutral), Capital One (COF/$99.09/Overweight), Navient (NAVI/$13.64/Underweight), OneMain Holdings (OMF/$36.70/Underweight), Santander Consumer (SC) (SC/$21.58/Neutral), Synchrony Financial (SYF/$31.67/Overweight)

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