Deutsche Bank
Research

Global

Strategy
Asset Allocation

Date
22 July 2019
Strategy Update

The Fed Is Cutting On Cue But ...

Binky Chadha
Chief Strategist
+1-212-250-4776

Parag Thatte
Strategist
+1-212-250-6605

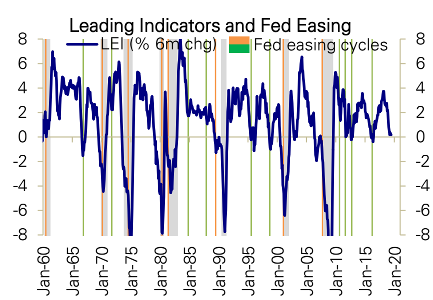
Christian Arita
Research Associate
+1-212-250-2964

With growth slowing globally beginning early last year and in the US later in the year, we are now in the third extended slowdown of this economic recovery cycle. But since the Fed relent back in December and pivot to cuts, followed by the ECB and other major central banks, risk assets have rallied broadly and strongly, almost unanimously pricing in a significant rebound in growth. The Fed is cutting on historical cue, once growth in leading indicators slowed sufficiently. Historically though, only half of Fed policy easing cycles proved to be mini easing cycles that did not end in full blown recessions and bear markets for risk assets. Mini easing cycles were distinguished by very quick turnarounds in growth (2-3 months) following the first cut. Such quick turnarounds in growth, which risk assets are currently already pricing in, suggests factors other than the easing of monetary policy played key roles in driving them. In our view, a resolution of the trade war remains key to a turn up in growth at the current juncture.

Fundamental themes

- Bond market priced in line, growth and risk assets for a significant rebound in growth
- Next up in the growth slowdown: earnings to disappoint globally
- The Fed always eased when the growth of leading indicators slowed sufficiently
- But Fed easing historically proved to be a mini cycle only half the time, with a very quick turn up in growth the distinguishing feature
- The trade war shock to growth is still unfolding. But with the Trump-bump to US manufacturing now completely wiped out, a descent into contraction will create pressure for de-escalation and a resolution

Figure 1:The Fed has always eased when growth slowed sufficiently



Source : Conference Board, FRB, Deutsche Bank Asset Allocation

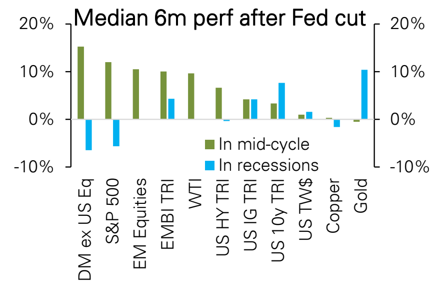
Asset allocation considerations

- A run up in growth and risk assets ahead of monetary policy easing is historically very unusual
- The performance of growth and risk assets is binary depending on whether Fed easing proves to be a mini cycle or not
- The 10y yield does not typically bottom until the Fed is done cutting

- Defensive equity sectors have not completely priced in the decline in yields that has already occurred

We are tactically overweight bonds over equities; overweight IG and EM debt and defensive equity sectors; and we recommend buying hedges for a pullback in risk assets. But be prepared to rotate on expectations of a trade deal

Figure 2: Performance of risk assets after Fed easing is binary



Source : Bloomberg Finance LP, Haver, DB Asset Allocation

Figure 3: Tactical Asset Allocation

	O/W	Neu	U/W
Cash	●		
Bonds	●		
IG	●		
EM bonds	●		
HY			●
Global equities			●
Cyclicals/defensives			●
Gold	●		
Oil			●
Copper			●

Source : Deutsche Bank Asset Allocation

The Fed Is Cutting On Cue But …

Fundamental themes

Bond market priced in line, growth and risk assets for a significant rebound in growth

US 10y bond yields have tracked growth indicators like the ISM Manufacturing index closely through this cycle (correlation 69%). The decline in yields since last November has been in line with the slowing in growth. Equities on the other hand, where the S&P 500 relative to its 200 day moving average (to normalize for trends) has been robustly correlated (63%) with growth indicators such as the manufacturing ISM over the last 20 years, has become increasingly disconnected since early June and looks now to be pricing in a significant rebound, from 51.7 currently back up to around 57. In price terms, this puts the S&P 500 around 10% above fair value based on current growth. While the S&P 500 has risen to new cycle highs even as earnings have stagnated for the last 10 months, credit spreads both IG and HY are well wide of their tights reached last year. Credit spreads are also closely correlated with indicators of growth (composite ISM correlations over the last 20 years are -78% for HG and -83% for HY). Credit spreads are tighter than levels implied by current growth and are also pricing in a significant rebound, albeit less than equities are. In commodities, as Gold has broken above its 7-year range it has become a focal point of market attention. On a relative basis, the ratio of Industrial to Precious Metals, which closely follows the ISM manufacturing (77%) and US 10y yields (85%), has moved in line.

Next up in the growth slowdown: earnings set to disappoint globally

With growth the main driver of earnings, we note that the global PMIs, especially in manufacturing, have been declining uninterruptedly since early 2018. In the US, the manufacturing ISM has been falling for the last 9 months, and is down from above 60 to 51.7. Export orders have been leading the ISM and point to an imminent dip in the manufacturing ISM below 50, i.e., into contractionary territory, as do other leading indicators like new orders. Growth in the LEIs is also on the cusp of turning negative. The next and critical read on growth comes from Q2 corporate earnings results reported over the next few weeks. In the US, the bottom-up consensus for Q2 has been cut by -2.9% since the end of Q1 earnings season, which is somewhat less than the typical -3.3% historically. But the cuts have lagged persistently negative macro data surprises, with which they are generally well correlated and we see the cuts as too little. Our top-down model for US earnings, incorporating US and global growth and the US dollar, also suggests that consensus estimates are too high. So we expect either continued downgrades into or disappointing results. Similarly, earnings estimates in Europe also look too optimistic and several companies have already issued negative guidance in recent weeks. Earnings estimates in Japan and in EM have fallen more significantly but remain vulnerable, with trends in growth and data surprises still headed downward.

The Fed always eased when the growth of leading indicators slowed sufficiently

Since the 1950s, the Fed has embarked on 19 easing cycles, including the unconventional easing measures adopted during the course of this economic recovery after rates hit zero. The Fed has always eased when the leading indicators (LEI) have declined over a 6 month period, even when the decline was small. The LEI has stalled since September 2018 and its 6-month growth has now fallen to zero, on the cusp of turning negative. So the Fed cutting rates this month as we expect and is widely priced in, would be exactly on cue. On average the Fed began easing around 8 months after the ISM peaked and had fallen to around 50, so the current pattern is also in line with the historical script. Typically though the Fed began cutting 4 months after the S&P 500 peaked. And by the time it did so, the market was down a median -12% from its peak. A rate cut with the S&P 500 close to or at a record high as is the case currently is a strong exception to this pattern, having happened only once previously, in 1995.

But Fed easing historically proved to be a mini cycle only half the time, with a very quick turn up in growth the distinguishing feature

Of the 19 Fed easing cycles in response to slowing growth, 9 or almost half, saw the economy eventually slip into recession. The episodes that ended in recession saw the ISM continue to weaken, eventually bottoming 8 months after the Fed began cutting at low levels (median 36). In these recession episodes, the S&P 500 saw a full bear market, typically falling -27% from peak to trough, with a bulk of the decline occurring after the Fed had started easing. Indeed, on average, the S&P 500 did not bottom until 5 months after the Fed started cutting. The distinguishing characteristic of the episodes that did not end in recessions was that after a moderate further decline in growth (to a median ISM 48), on average within 2-3 months after the Fed began easing, growth rebounded quickly. The equity market typically fell -7% after the Fed began easing, but bottomed quickly with growth. In mini easing cycle episodes, the S&P 500 ended above the pre-easing level within 6 months each and every time, rising a robust 12% on average. Such quick turnarounds in growth, which risk assets are currently already pricing in, suggests factors other than the easing of monetary policy played key roles in driving them. In our view, a resolution of the trade war remains key to a turn up in growth at the current juncture.

The trade war shock to growth is still unfolding but a contraction in manufacturing will create pressure for de-escalation and a resolution

- **Prior extended funks in growth saw the shocks that drove them either dissipate or get absorbed, but this one is still unfolding.** This is the third time in this economic recovery cycle that global and US growth have gone into an extended funk. The prior two episodes occurred following (i) the US debt downgrade in the summer of 2011 and the European financial crisis; (ii) the US dollar and oil shocks beginning with the ECB's move to negative rates in the summer of 2014. The drivers of recovery in those episodes were quite different, with in one case the shock itself dissipating and in the other the shock getting absorbed. In the first episode, the shock began to dissipate after ECB president Draghi's "whatever it takes" comments and market confidence returned. In the second episode, as we argued at the time, the shock was not the new higher level of the dollar but the speed with which it had risen, and it was absorbed with a lag as the magnitude of changes in the dollar dissipated. In the current episode, the slowdown in global growth began at around the time of the imposition of the first US tariffs in January 2018. While we would grant that global growth slowed for a variety of other reasons, in our view the trade war played a key role in exacerbating global growth in manufacturing and in preventing a recovery from these other factors. The shock in the form of uncertainty about whether the next series of tariffs on China will be implemented or whether they will be imposed on the EU or elsewhere remains unclear and is still unfolding.
- **With the Trump-bump to US manufacturing now completely wiped out, a**

descent into contraction will create pressure for de-escalation or resolution of the trade war. In October 2016, the month before the last presidential election, the ISM manufacturing index, in its early stages of recovery from the prior US dollar and oil shocks, printed 51.7. It then rose to 58-60 by the summer of 2017 and stayed there for about 15 months, in what was an unusually sustained period of very strong growth in US manufacturing, arguably the Trump-bump. Since US growth began to slow in November last year, the ISM manufacturing index has been falling sharply and is back down to 51.7. So the long Trump bump to manufacturing in the US has already been completely wiped out. Moreover, new export orders which have been leading the headline ISM are pointing to further declines, with the headline manufacturing ISM falling below 50. This in our view has the potential to change the narrative as it will be hard to spin as anything but a recession in manufacturing which is an important sector from both cyclical growth and political perspectives.

Asset allocation considerations

A run up in growth and risk assets ahead of monetary policy easing is historically very unusual

Historically, risk assets such as equities and HY, almost always declined going into Fed cuts, hurt by slowing growth which in itself is part of the reason for what prompts the Fed to ease in the first place. Indeed, US equities historically fell double digits before the Fed eased, while other developed and EM equities as well as HY bonds similarly saw steep declines. In strong contrast, risk assets have rallied hard across the board this year, despite clear signs of slowing growth both in the US and globally. Indeed, as noted above we estimate that US equities are about 10% above levels implied by current growth and have already priced in a rebound in US ISMs from under 52 presently back up to 57. Equities in the rest of the world and HY bonds also look extended, but arguably less so.

The performance of growth and risk assets is binary depending on whether Fed easing proves to be a mini cycle or not

The performance of growth and risk assets like equities and HY bonds, depends critically on whether growth rebounds or the cycle descends into a recession. In past mini easing cycles, risk assets rallied hard, posting gains every time. In past such episodes, equities delivered strong double digit median returns in the 6 months following the start of easing. However, in episodes which ended up in recessions, risk assets posted significant declines. In contrast, gold outperformed during recessions but underperformed in mini-easing cycles. Treasuries also strongly outperformed during recessions, but delivered positive returns even during mini-easing cycles. IG and EM bonds meanwhile delivered in both worlds, posting solid returns in either scenario, with movements in underlying rates and spreads offsetting each other. The US dollar, oil and other commodities like copper displayed no consistent pattern in either scenario.

The 10y yield does not typically bottom until the Fed is done cutting

The 10y yield has declined a 125bps since November last year, in line with the slowdown in growth, and on rising expectations of Fed rate cuts. With the market already pricing in almost 4 rate cuts before the Fed has yet to even begin, is it time for bond yields to go the other way? No. With growth likely to slow further in the near term, expectations of further Fed easing are unlikely to fade away soon. Moreover, historically the Fed has always followed leading indicators of growth when shifting towards easing, but lagging indicators to guide tightening cycles. Bond yields in turn have always bottomed only when or even after the Fed stopped cutting rates.

Defensive equity sectors have not completely priced in the decline in yields that has already occurred

The performance of cyclical equity sectors relative to the defensive sectors typically tracks macro growth and bond yields closely. This year however, the cyclicals have massively outperformed the defensives, and much like the broader equity market are already pricing in a strong macro rebound. On the cyclical side however, much of the outperformance has been driven by Technology related stocks which have been in a strong secular uptrend relative to the S&P 500 for several years, and only modestly impacted by cyclical growth. In contrast other cyclical sectors like the Financials and Industrials have underperformed severely, in line with declining macro growth and yields, while Energy and Materials continue to be in secular downtrends. The defensive sectors, which also tend to be bond like, have by and large underperformed the market, despite support from falling yields and slowing growth. Consumer Staples, Real Estate and Utilities all look to have room to outperform even if yields stay at current levels. Healthcare has been the worst performer across sectors this year, but is often driven by idiosyncratic considerations beyond the state of the cycle.

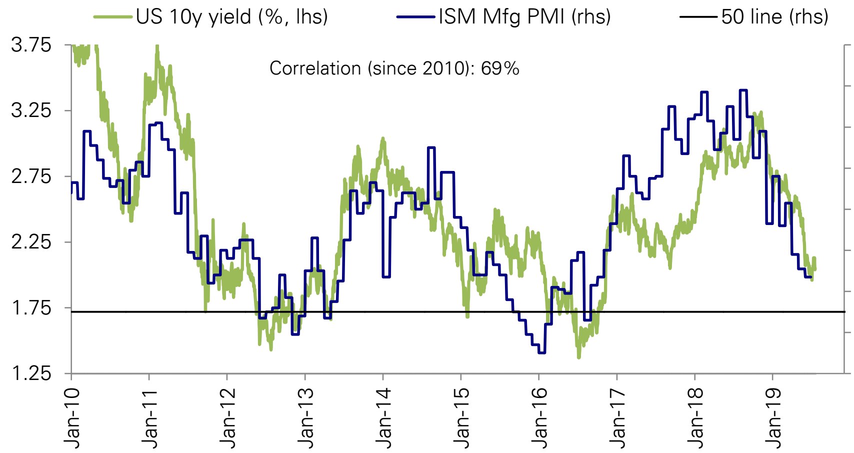
Asset allocation

Tactically overweight bonds over equities; overweight IG and EM debt and defensive equity sectors; buy hedges for a pullback in risk assets

But be prepared to rotate on expectations of a trade deal. Our tactical asset allocation is driven by two considerations: a) navigating the considerable uncertainty regarding the path of growth in the near term; b) identifying asset classes which are mispriced currently regardless of the path of growth. As noted above, IG and EM bonds have in the past rallied after Fed cuts regardless of whether growth bottomed or fell further. EM central banks are likely to ease further in response to Fed cuts, supporting EM bonds. Meanwhile the defensive equity sectors have underperformed despite declining rates.

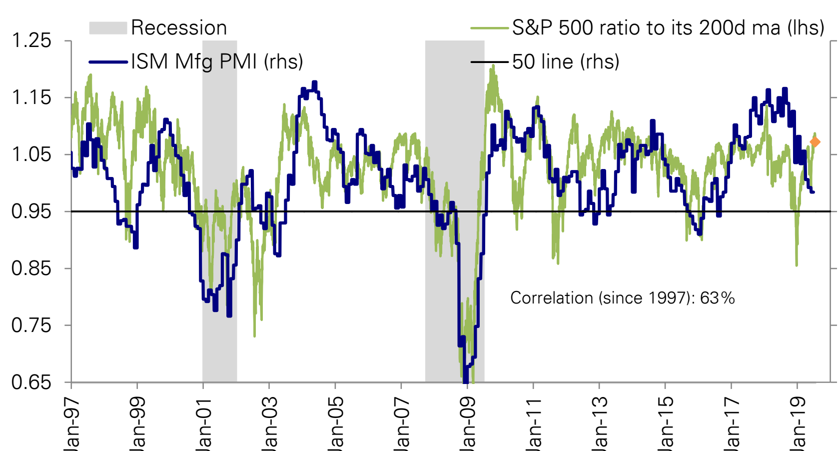
- **Buy hedges for a pullback in risk assets.** In our base case that things need to get worse for them to get better, a sharp decline in equities is possible and should be followed by the administration relenting on trade policy, allowing the rally to eventually resume. With volatility still quite low, downside puts are relatively cheap. A 10% down put on the S&P 500 for example costs 0.6% of spot (35th percentile over the last 5 years).
- **But be prepared to rotate on expectations of trade deal.** If a trade deal materializes, we expect growth to rebound as there are no significant imbalances in the economy. Equities more broadly but especially outside the US should rally, as should HY bonds. Rebounds, measured for example by up cycles in the ISM Manufacturing last a long time, typically 15 months and see equities go up by 30%, affording ample chance to get in on the risk rally after the bottom in growth is in.

Figure 4: The 10y yield has fallen in line with the slowdown in growth



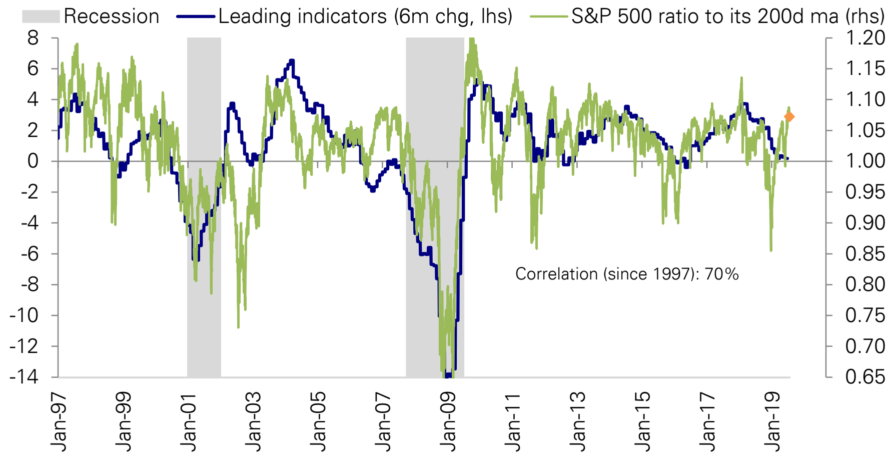
Source : ISM, Haver, Deutsche Bank Asset Allocation

Figure 5: US equities are pricing in a significant rebound in the ISM...



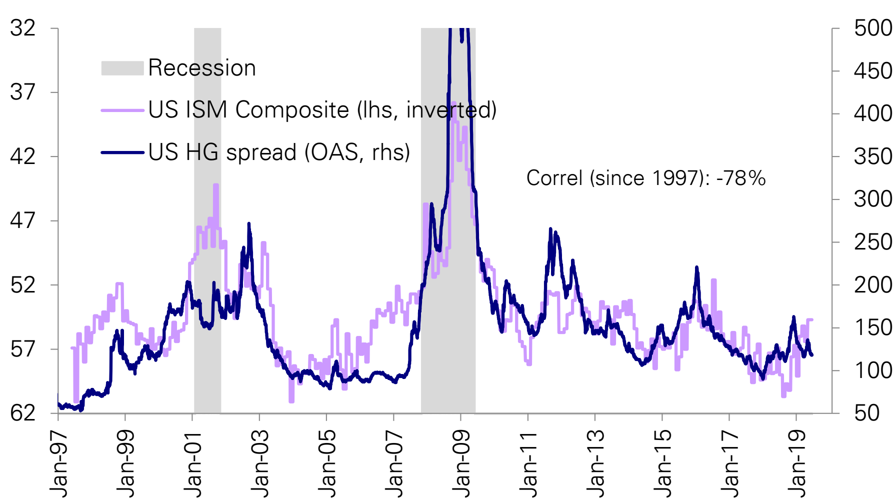
Source : Haver, Deutsche Bank Asset Allocation

Figure 6: ... and the LEI



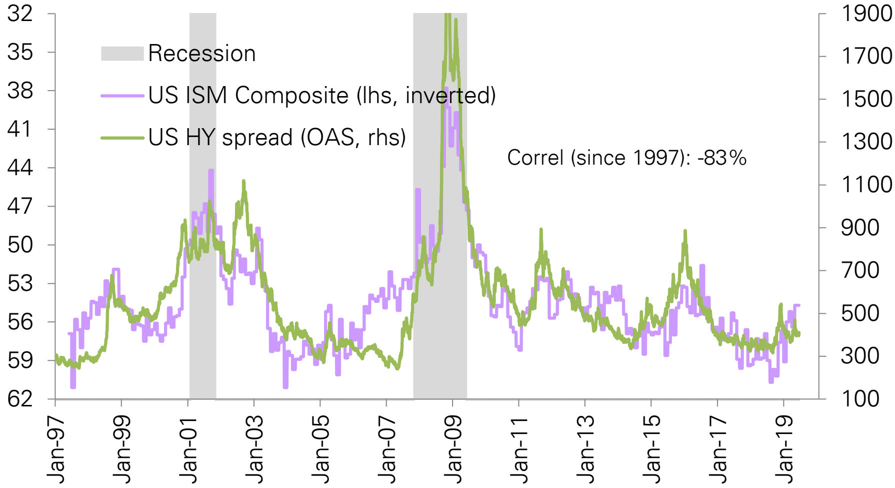
Source : Conference Board, Haver, Deutsche Bank Asset Allocation

Figure 7: HG credit spreads are tighter than implied by current growth...



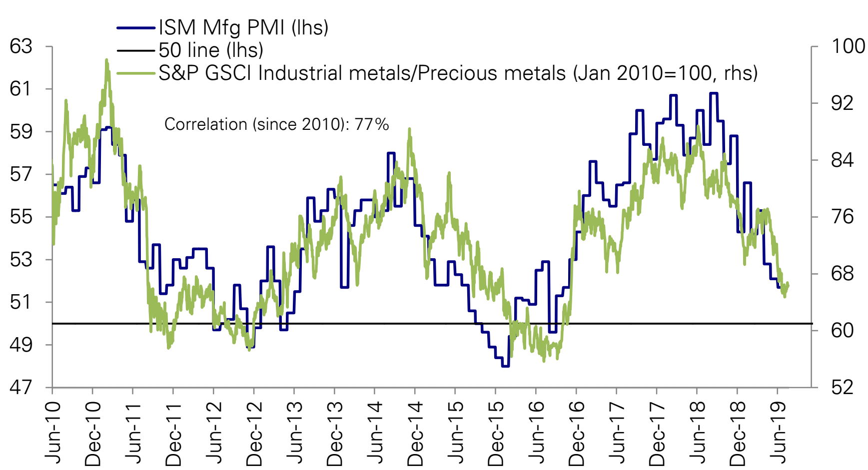
Source : Bloomberg Finance LP, Haver, Deutsche Bank Asset Allocation

Figure 8: ... as are HY spreads



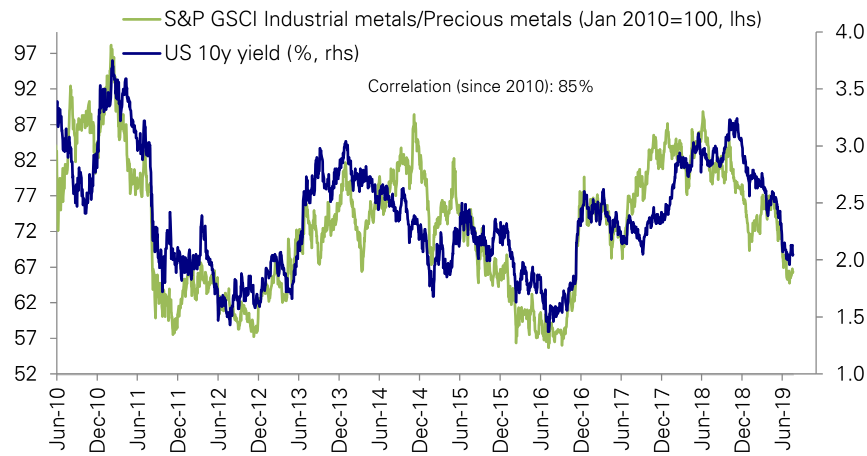
Source : Bloomberg Finance LP, Haver, Deutsche Bank Asset Allocation

Figure 9: The ratio of industrial to precious metals is strongly correlated to and has fallen in line with growth...



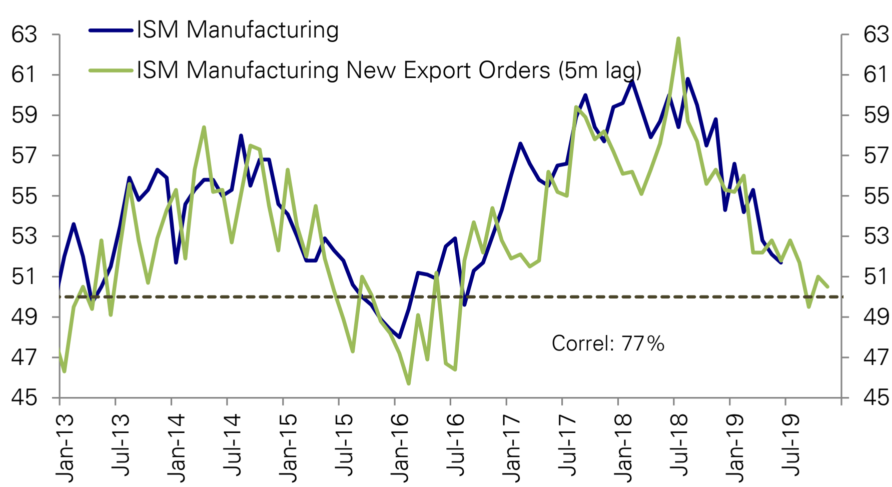
Source : ISM, S&P GSCI, Haver, Deutsche Bank Asset Allocation

Figure 10: ...and the 10y yield



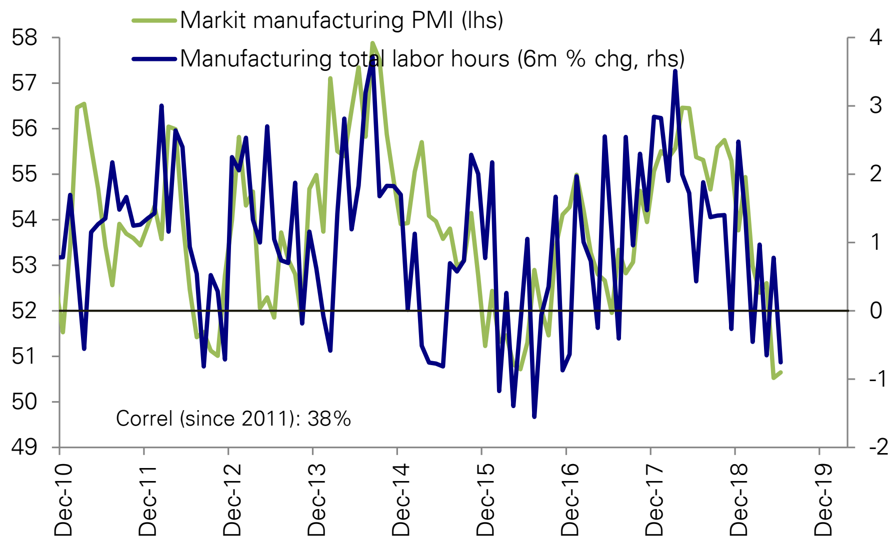
Source : ISM, S&P GSCI, Haver, Deutsche Bank Asset Allocation

Figure 11: New export orders, hit by the trade war, are pointing to the ISM manufacturing falling below 50 into contraction



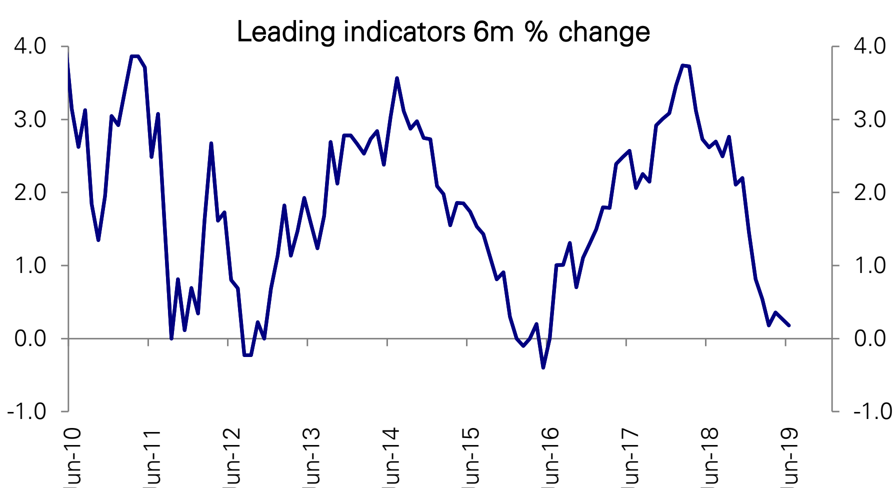
Source : ISM, Haver, Deutsche Bank Asset Allocation

Figure 12: Growth in manufacturing labor hours has already turned negative and is poised to fall further



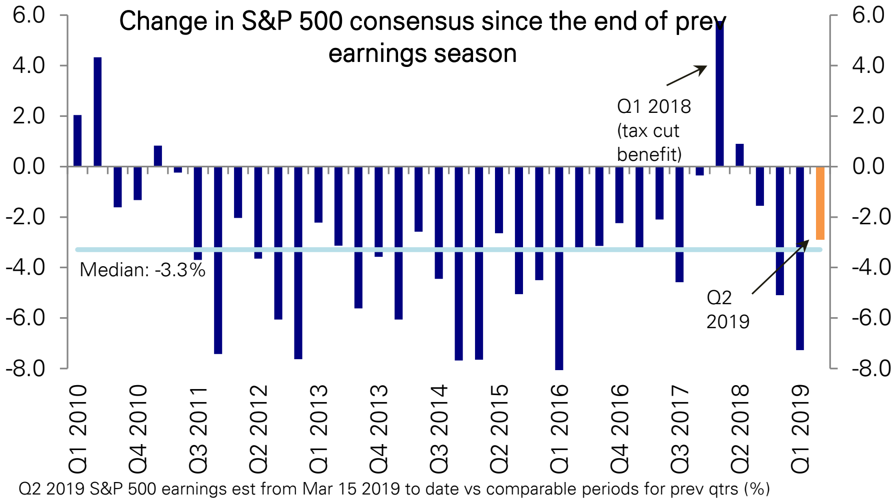
Source : BLS, Markit, Haver, Deutsche Bank Asset Allocation

Figure 13: Growth in leading indicators, too, has rapidly slowed and is on the cusp of turning negative



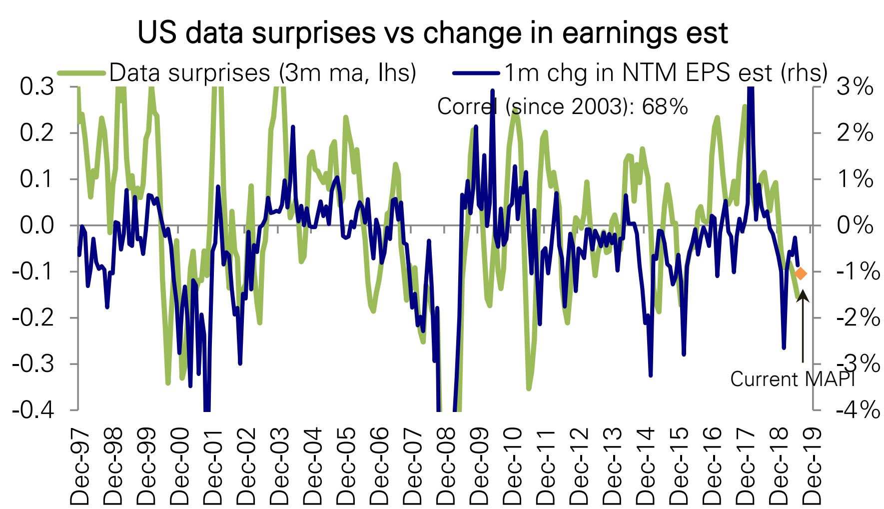
Source : Conference Board, Haver, Deutsche Bank Asset Allocation

Figure 14: The consensus estimate for Q2 has been cut somewhat less than typical



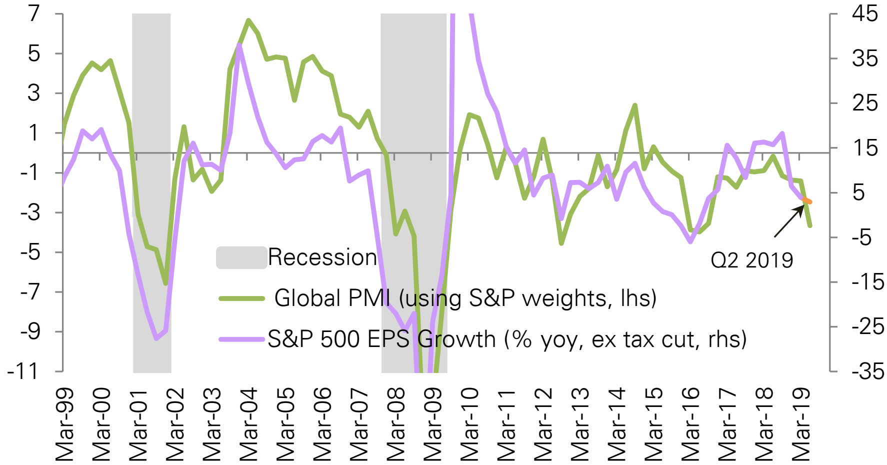
Source : Bloomberg Finance LP, Haver, Deutsche Bank Asset Allocation

Figure 15: Earnings estimates look too optimistic relative to data surprises in the US but have been catching down



Source : Bloomberg Finance LP, IBES, Datastream, Deutsche Bank Asset Allocation

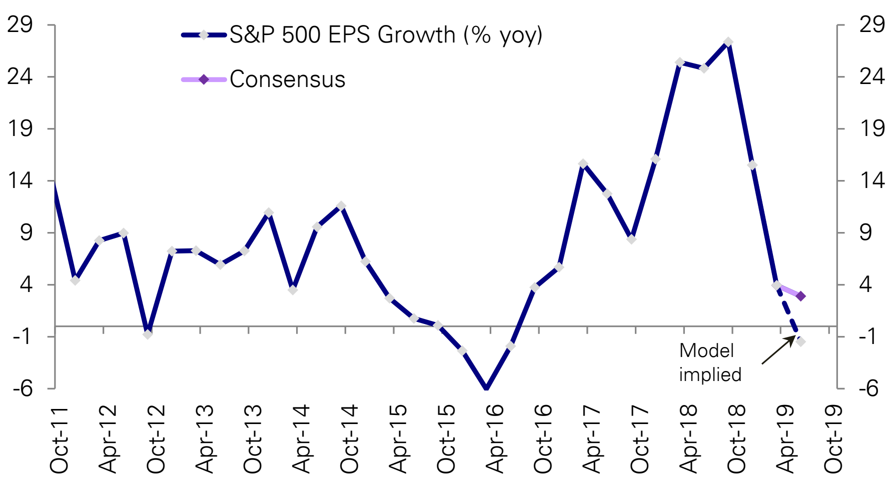
Figure 16: Growth is the primary driver of S&P 500 earnings growth…



Q2 growth consensus assumes cos that are to report beat at historic beat rate of 3.4%

Source : Markit, ISM, Haver, Bloomberg Finance LP, Deutsche Bank Asset Allocation

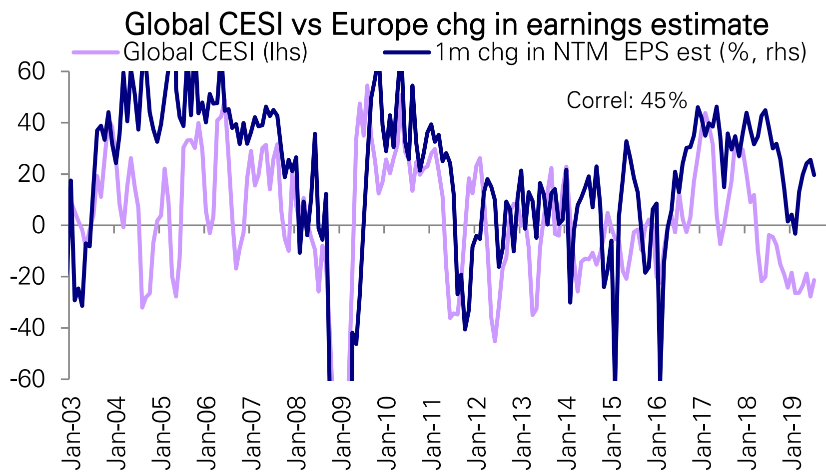
Figure 17: … and our model for earnings growth using US, global growth and the dollar suggests the consensus is too high and Q2 earnings season likely to disappoint



Q2 growth consensus assumes cos that are to report beat at historic beat rate of 3.4%

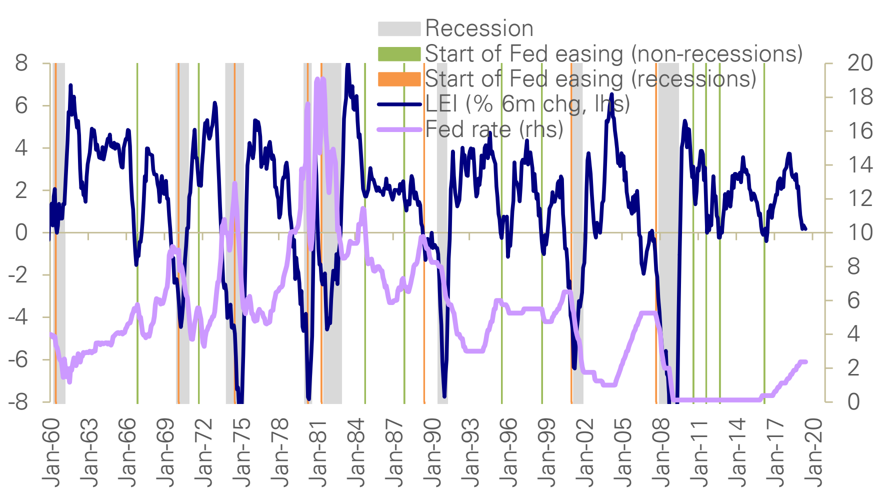
Source : FRB, Markit, ISM, Haver, Bloomberg Finance LP, Deutsche Bank Asset Allocation

Figure 18: Estimates for other regions also look too high relative to data surprises



Source : Bloomberg Finance LP, IBES, Datastream, Deutsche Bank Asset Allocation

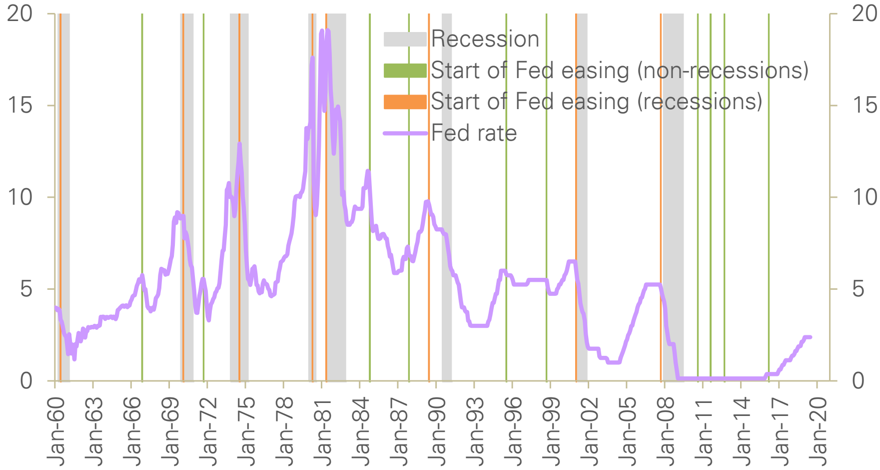
Figure 19: The Fed has always eased on signs of growth slowing, such as the 6-month change in LEI turning negative



*Includes QE2 (2010), calendar guidance (2011), QE3 (2013) and deferring hikes (2016)

Source : Conference Board, FRB, Haver, Deutsche Bank Asset Allocation

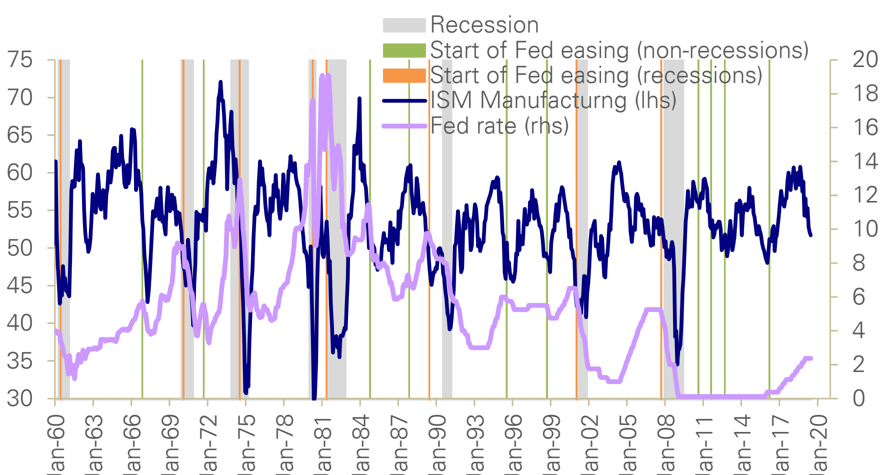
Figure 20: There have been 19 easing cycles since the 1950s, 9 of which eventually ended in recessions



*Includes QE2 (2010), calendar guidance (2011), QE3 (2013) and deferring hikes (2016)

Source : FRB, Haver, Deutsche Bank Asset Allocation

Figure 21: The episodes which did not end up in recessions saw growth (ISM) rebound very quickly, typically in 2-3 months; those in recessions took longer, 8-9 months



*Includes QE2 (2010), calendar guidance (2011), QE3 (2013) and deferring hikes (2016)

Source : ISM, FRB, Haver, Deutsche Bank Asset Allocation

Figure 22: Episodes that did not end in recessions saw equities bottom quickly after the Fed began easing

Growth and equities in Fed easing cycles

Start of easing cycle	S&P 500 peak to start of easing (# months)	ISM Peak to start of easing (# months)	Start of easing to S&P bottom (# months)	Start of easing to ISM bottom (# months)	S&P peak to start of easing	Start of easing to S&P bottom	S&P peak to trough
Nov-57	4	15	-1	1	-19%	NA	-21%
Jun-60	10	5	5	8	-5%	-10%	-14%
Nov-66	10	9	-2	4	-14%	NA	-20%
Feb-70	15	5	3	8	-20%	-20%	-36%
Sep-71	4	NA	3	NA	-5%	-9%	-14%
Jul-74	18	8	3	6	-28%	-28%	-48%
Apr-80	2	21	0	1	-14%	NA	-17%
May-81	6	1	14	11	-6%	-23%	-27%
Oct-84	9	10	-3	7	-3%	NA	-11%
Nov-87	2	-1	1	4	-26%	-10%	-33%
Jun-89	-12	11	16	19	NA	-9%	-19%
Jul-95	10	9	-7	6	16%	NA	-6%
Sep-98	2	15	0	2	-11%	-9%	-19%
Jan-01	9	14	21	9	-12%	-42%	-49%
Sep-07	-1	1	18	14	NA	-55%	-57%
Aug-10	4	6	0	0	-13%	-1%	-14%
Aug-11	1	6	2	2	-13%	-6%	-19%
Sep-12	5	5	-3	2	3%	NA	-10%
Feb-16	3	18	0	-1	-12%	-1%	-13%
Median	4	8	1	5	-12%	-10%	-19%
Recession Median	6	8	5	8	-14%	-23%	-27%
No-recession Median	4	9	0	2	-12%	-7%	-14%

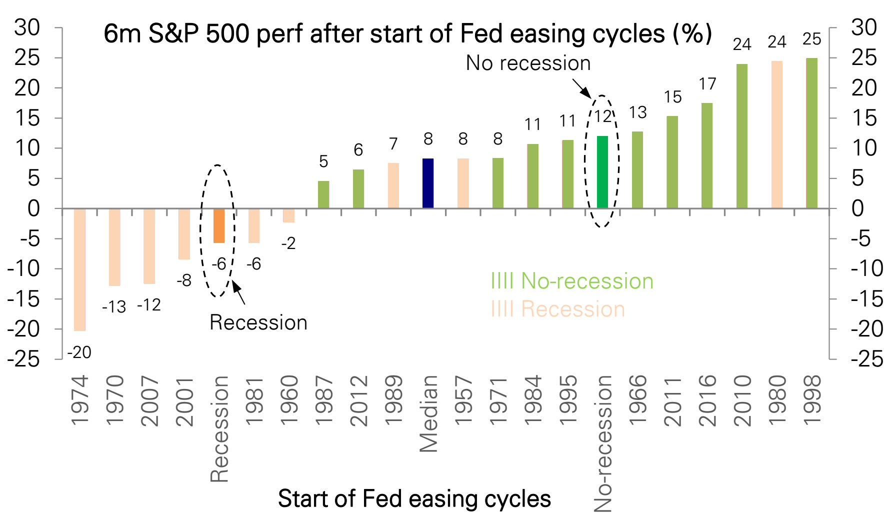
Easing cycles associated with recessions

Non-recessionary easing cycles

Start of easing cycle is the date of first rate cut or QE/calendar easing announcement

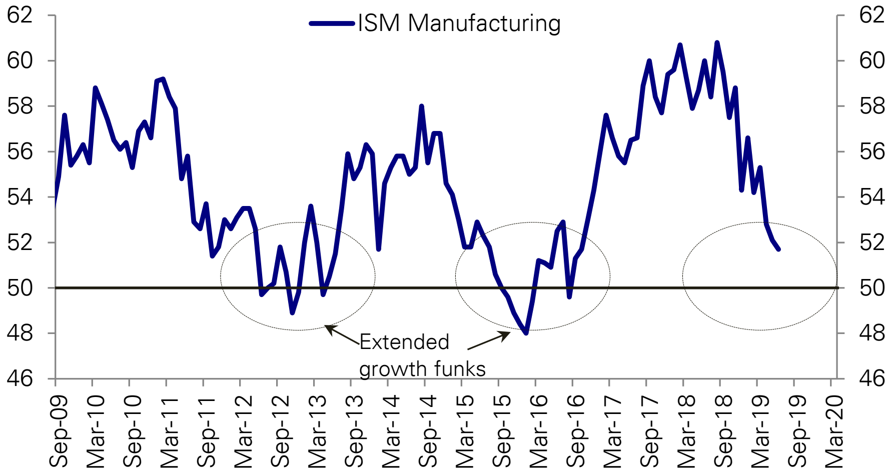
Source : FRB, ISM, Haver, Deutsche Bank Asset Allocation

Figure 23: In recession episodes the S&P 500 remained down (-6%) even 6 months after the start of Fed easing while in the no-recession episodes it was up strongly every time (+12%)



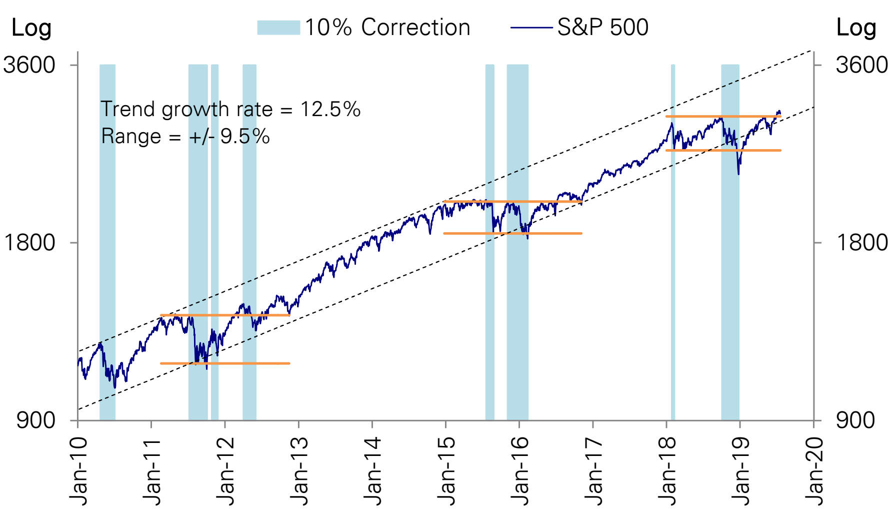
Source : Haver, Deutsche Bank Asset Allocation

Figure 24: This is the third extended growth slowdown of this economic recovery cycle so far…



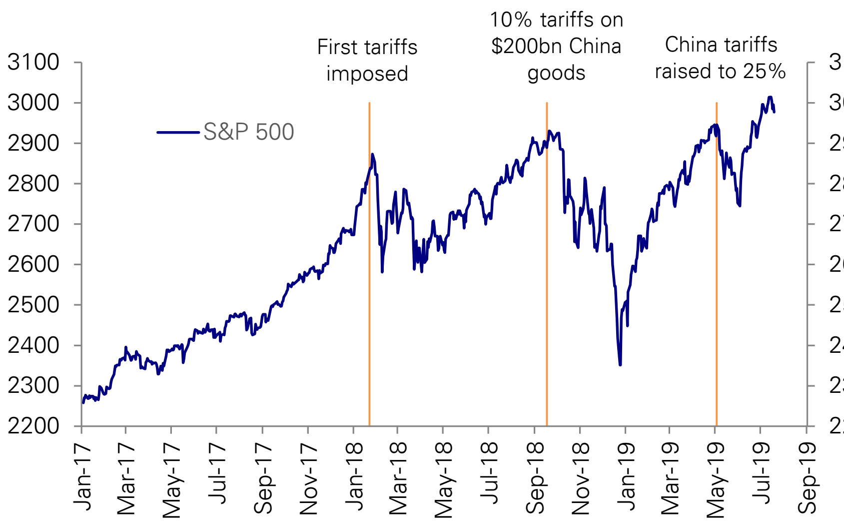
Source : ISM, Haver, Deutsche Bank Asset Allocation

Figure 25: … and S&P 500 stayed range-bound for prolonged periods in each of the three



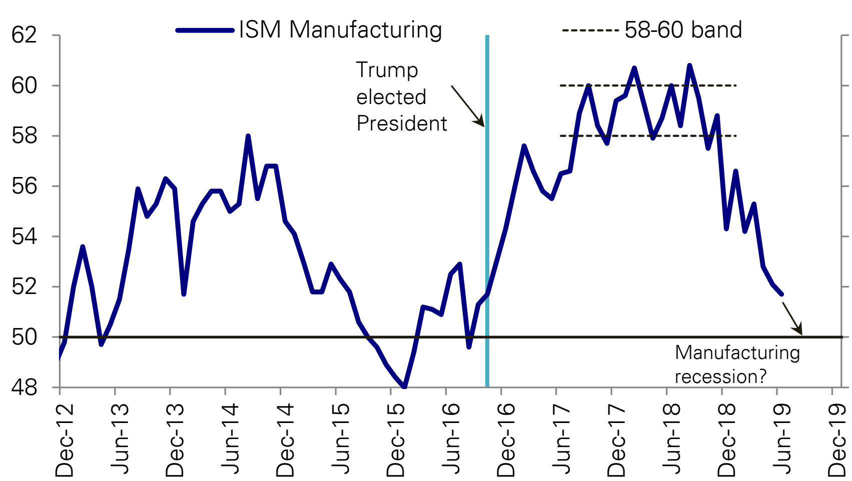
Source : Haver, Deutsche Bank Asset Allocation

Figure 26: In our reading the trade war played the key role in slowing growth and in engendering the range-bound behavior of equities



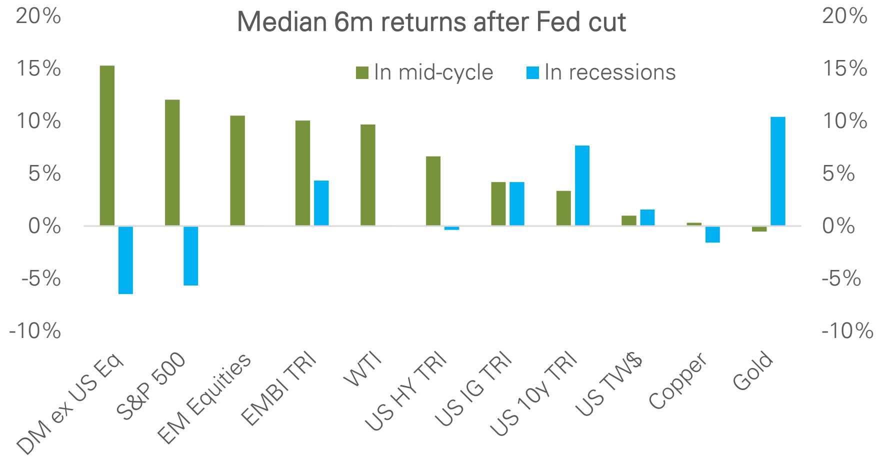
Source : Haver, Deutsche Bank Asset Allocation

Figure 27: With the Trump-bump to manufacturing completely wiped out, a descent into contraction will create pressure for de-escalation and resolution of the trade war



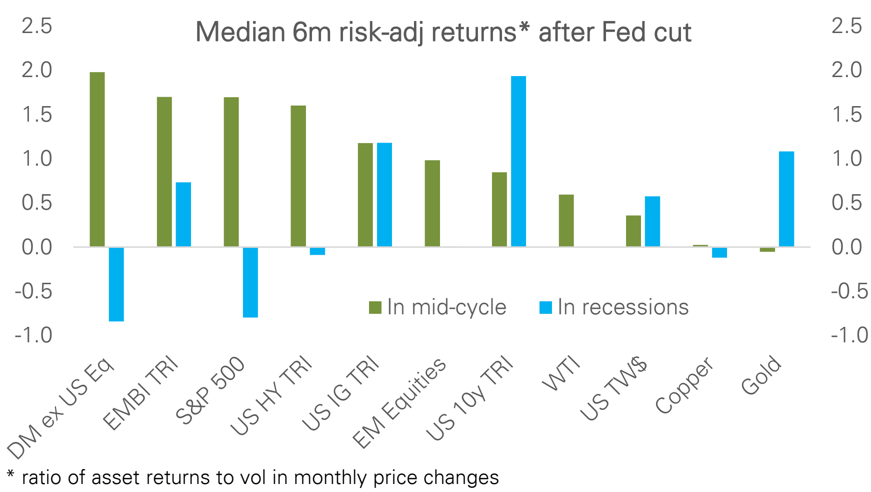
Source : ISM, Haver, Deutsche Bank Asset Allocation

Figure 28: Performance of risk assets in Fed easing cycles depends on whether they end up being mini cycles or recessions



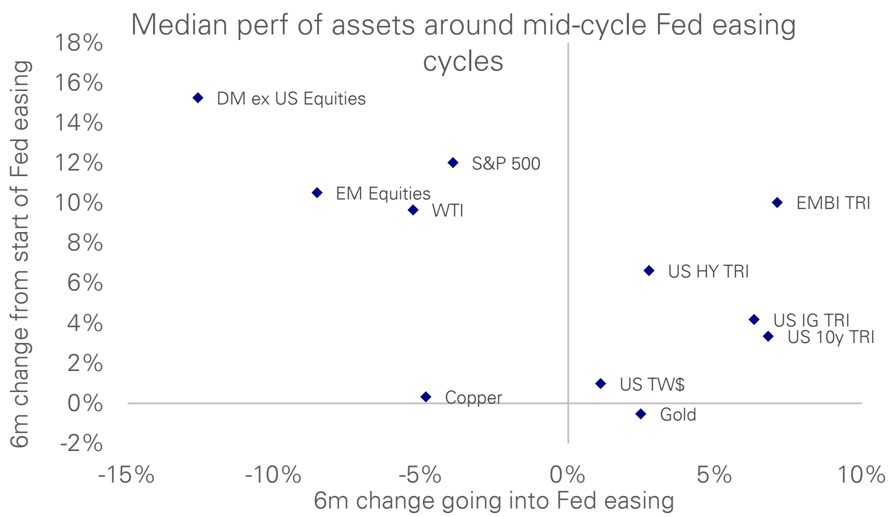
Source : FRB, Bloomberg Finance LP, Haver, Deutsche Bank Asset Allocation

Figure 29: Risk adjusted returns for Treasuries, IG and EM bonds are strong in recessions as well as in mid-cycle easings



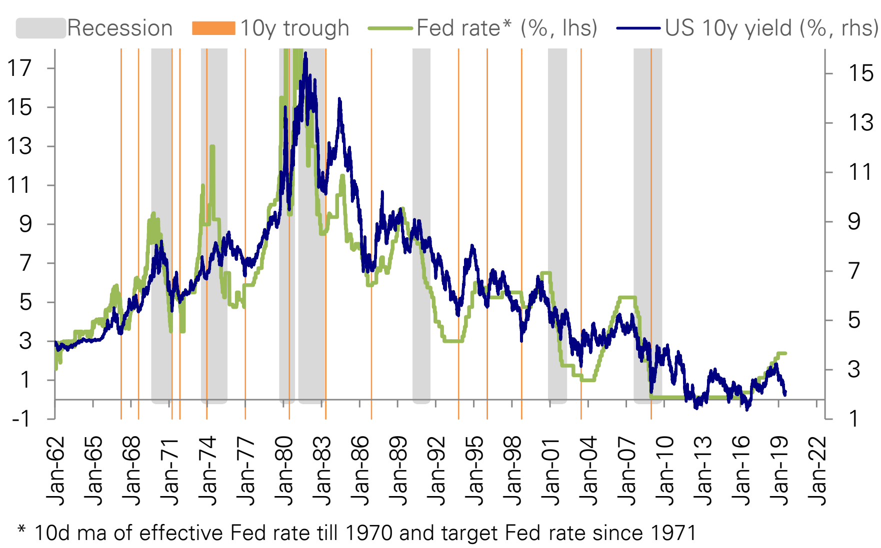
Source : FRB, Bloomberg Finance LP, Haver, Deutsche Bank Asset Allocation

Figure 30:Risk assets usually decline sharply going into even mini easing cycles



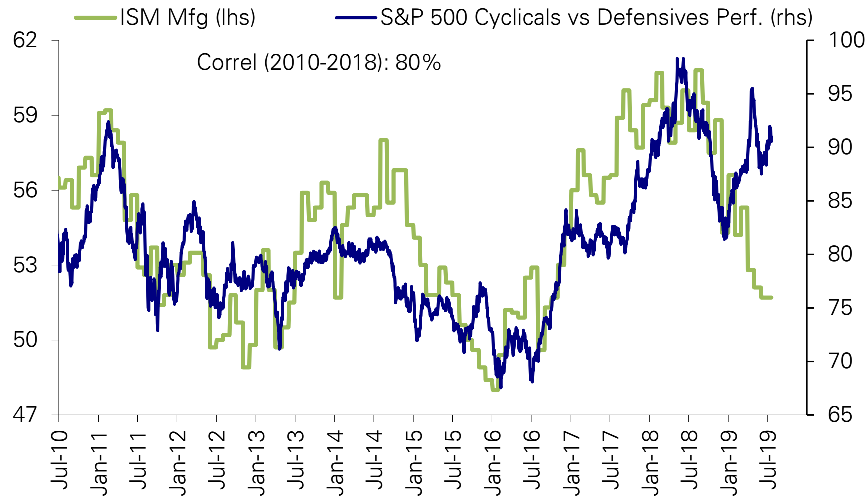
Source : FRB, Bloomberg Finance LP, Haver, Deutsche Bank Asset Allocation

Figure 31: The 10y yield typically does not bottom until the Fed is done cutting



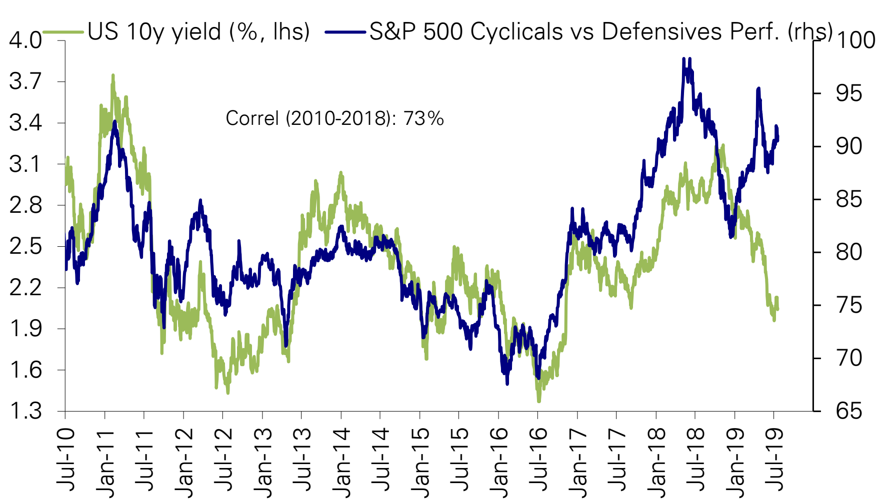
Source : FRB, Haver, Deutsche Bank Asset Allocation

Figure 32: Cyclicals relative to Defensive sectors have not priced in the decline in growth…



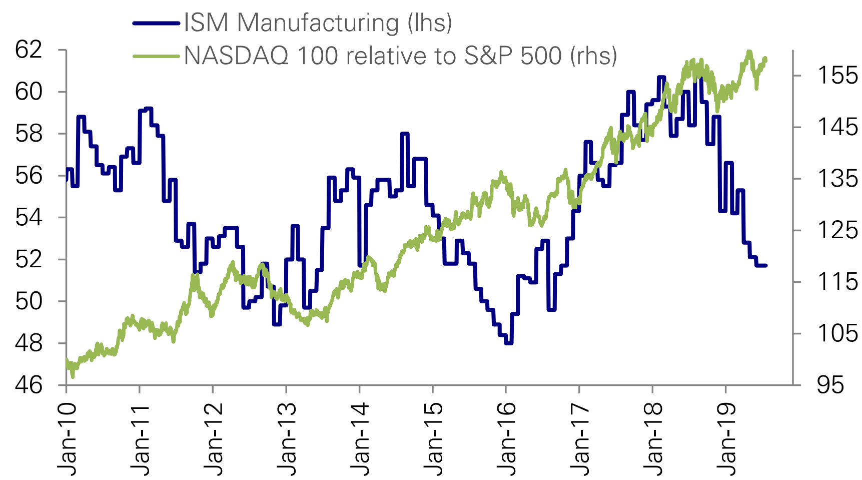
Source : ISM, Haver, Deutsche Bank Asset Allocation

Figure 33:… and yields



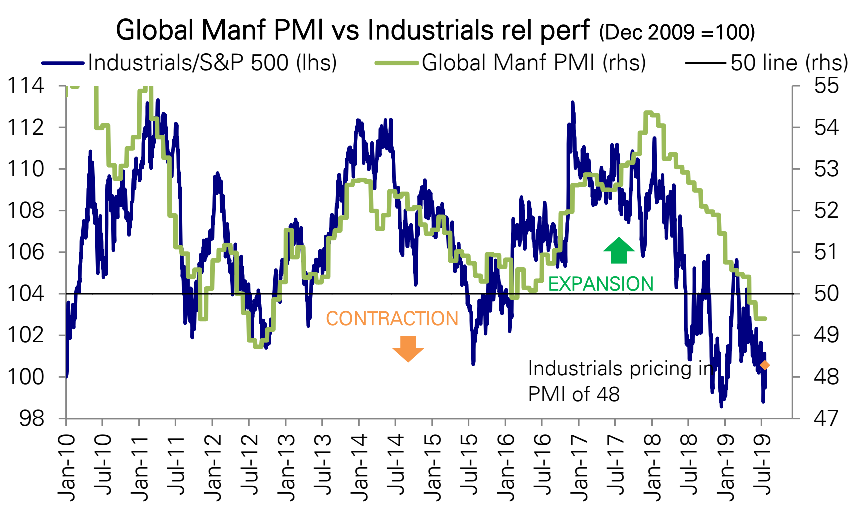
Source : FRB, Haver, Deutsche Bank Asset Allocation

Figure 34: Much of the cyclical sector outperformance has been driven by Tech stocks that have been in a secular uptrend in this cycle so far…



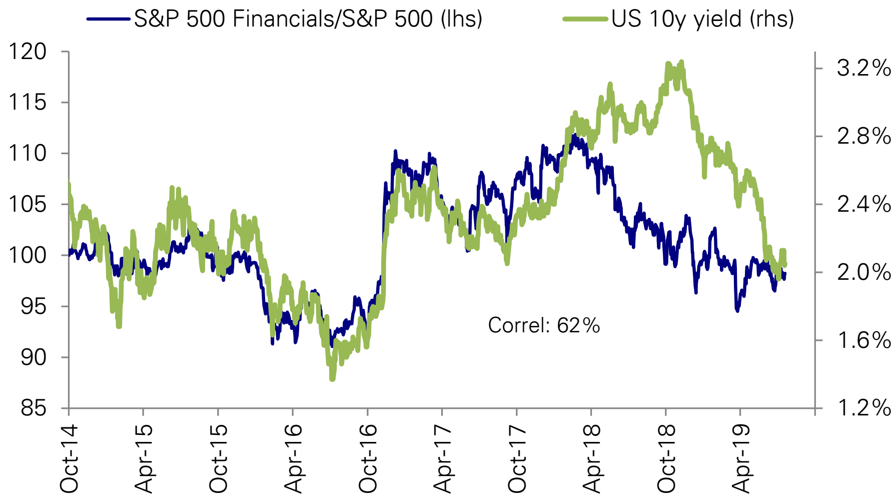
Source : ISM, Haver, Deutsche Bank Asset Allocation

Figure 35:… while declining growth and rates have driven the severe underperformance of Industrials…



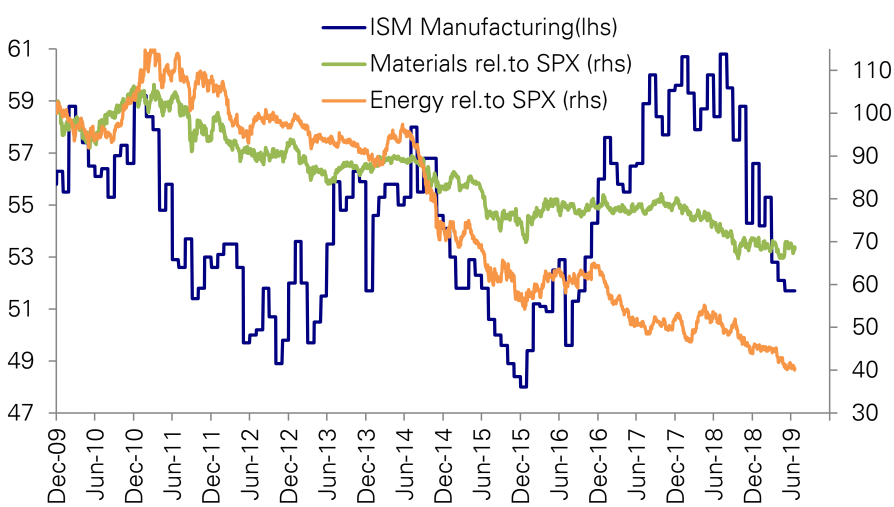
Source : Markit, Haver, Deutsche Bank Asset Allocation

Figure 36:... and Financials



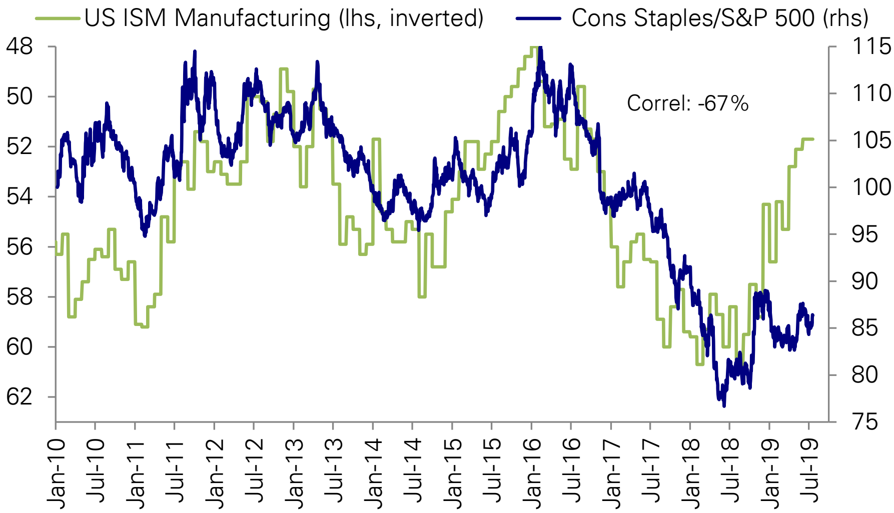
Source : FRB, Haver, Deutsche Bank Asset Allocation

Figure 37: Energy and Materials continue to be in secular downtrends this cycle



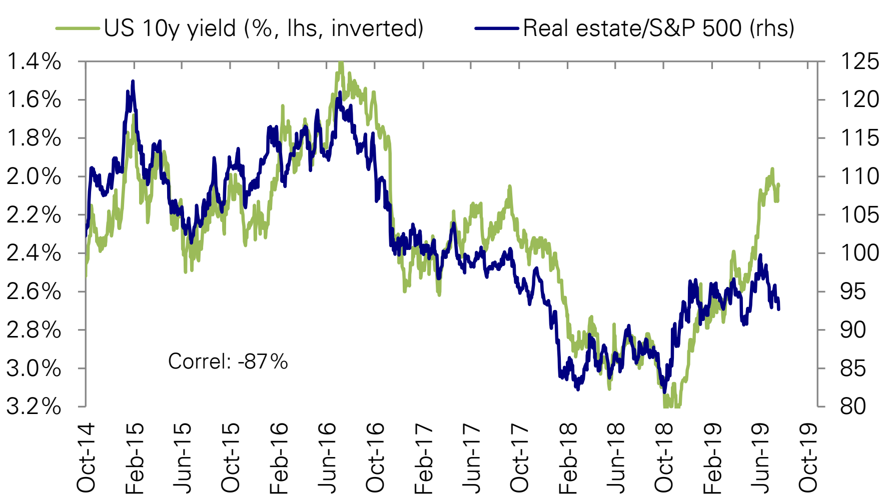
Source : ISM, Haver, Deutsche Bank Asset Allocation

Figure 38: Defensives such as Consumer Staples have not outperformed even as growth has slowed



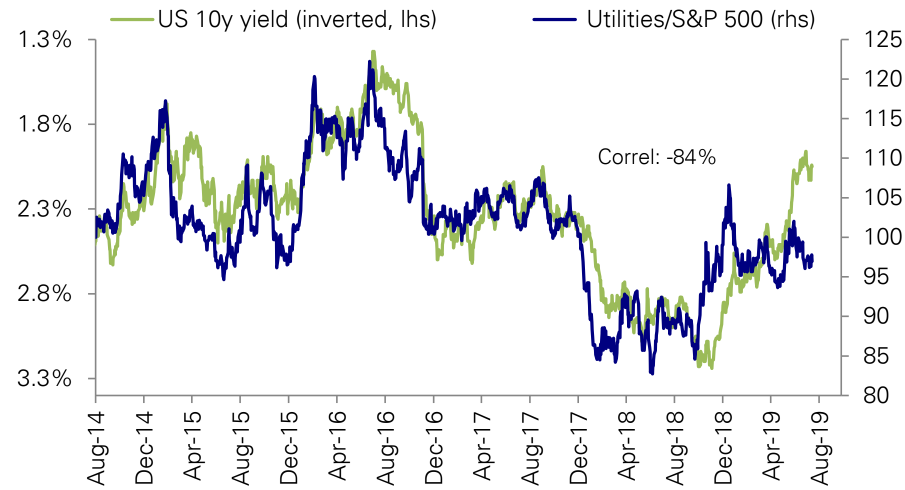
Source : ISM, Haver, Deutsche Bank Asset Allocation

Figure 39: Bond like Real Estate has room to catch up to bond yields...



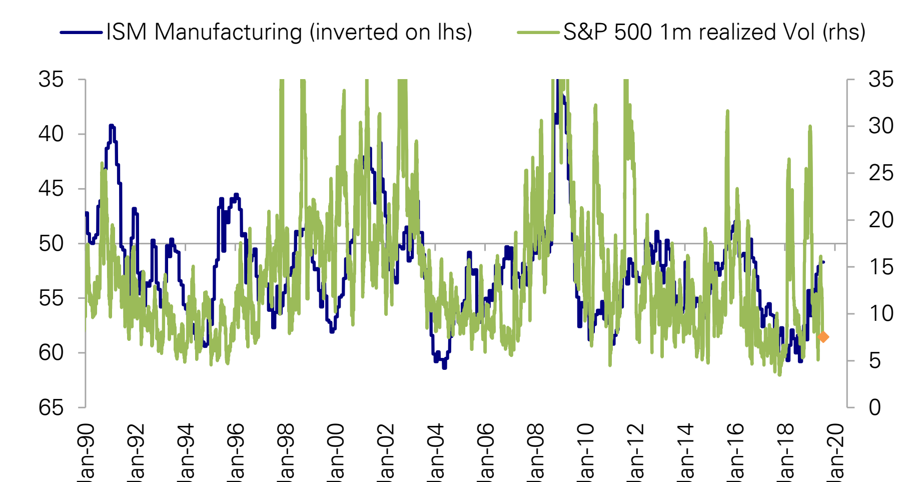
Source : FRB, Haver, Deutsche Bank Asset Allocation

Figure 40:… as do Utilities



Source : FRB, Haver, Deutsche Bank Asset Allocation

Figure 41: Hedging against equity downside is attractive as vol is unusually low despite the decline in growth



Source : ISM, Haver, Deutsche Bank Asset Allocation

Figure 42: Tactically overweight bonds over equities; overweight IG and EM debt and defensive equity sectors

Tactical Asset Allocation

	O/W	Neu	U/W	Comments
Cash	●			Uncertainty over the path of growth remains high but bias is to the downside
Bonds	●			Growth likely to slow further and take yields down; no turn till Fed stops cutting
IG	●			Best of both worlds - strong returns in recession as well as mid-cycle easing
EM bonds	●			Strong returns in recession as well as mid-cycle easing; EM Central banks to cut
HY			●	Spreads will widen much further if growth slows
Global equities			●	Already pricing in growth rebound; systematic strategies are very long
Cyclicals/defensives			●	Defensives have not outperformed in line with the drop in growth and yields
Gold	●			Upside as growth and yields fall; break out of 7 year range can go further
Oil			●	Neutral valuation, positioning; dollar the key; other central banks following Fed
Copper			●	Downside as growth falls

Source :Deutsche Bank Asset Allocation

Appendix 1

Important Disclosures

*Other information available upon request

*Prices are current as of the end of the previous trading session unless otherwise indicated and are sourced from local exchanges via Reuters, Bloomberg and other vendors . Other information is sourced from Deutsche Bank, subject companies, and other sources. For disclosures pertaining to recommendations or estimates made on securities other than the primary subject of this research, please see the most recently published company report or visit our global disclosure look-up page on our website at https://research.db.com/Research/Disclosures/CompanySearch. Aside from within this report, important risk and conflict disclosures can also be found at https://research.db.com/Research/Topics/Equities?topicId=RB0002. Investors are strongly encouraged to review this information before investing.

Analyst Certification

The views expressed in this report accurately reflect the personal views of the undersigned lead analyst(s). In addition, the undersigned lead analyst(s) has not and will not receive any compensation for providing a specific recommendation or view in this report. Binky Chadha, Parag Thatte, Christian Arita.

Equity Rating Key

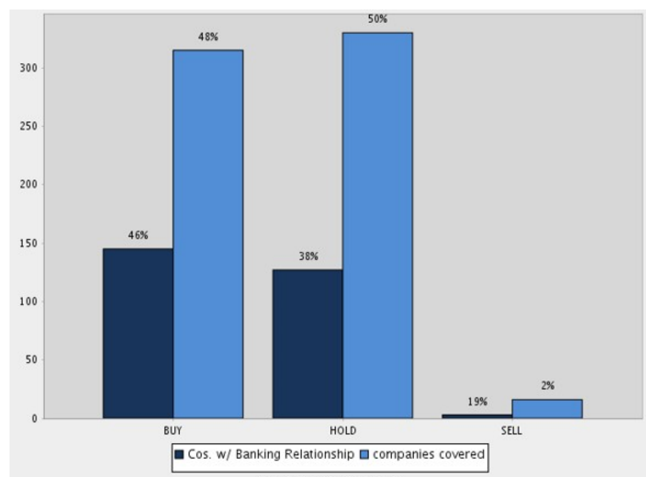
Buy: Based on a current 12- month view of total share-holder return (TSR = percentage change in share price from current price to projected target price plus pro-jected dividend yield) , we recommend that investors buy the stock.

Sell: Based on a current 12-month view of total share-holder return, we recommend that investors sell the stock.

Hold: We take a neutral view on the stock 12-months out and, based on this time horizon, do not recommend either a Buy or Sell.

Newly issued research recommendations and target prices supersede previously published research.

Equity rating dispersion and banking relationships



Additional Information

The information and opinions in this report were prepared by Deutsche Bank AG or one of its affiliates (collectively 'Deutsche Bank'). Though the information herein is believed to be reliable and has been obtained from public sources believed to be reliable, Deutsche Bank makes no representation as to its accuracy or completeness. Hyperlinks to third-party websites in this report are provided for reader convenience only. Deutsche Bank neither endorses the content nor is responsible for the accuracy or security controls of those websites.

If you use the services of Deutsche Bank in connection with a purchase or sale of a security that is discussed in this report, or is included or discussed in another communication (oral or written) from a Deutsche Bank analyst, Deutsche Bank may act as principal for its own account or as agent for another person.

Deutsche Bank may consider this report in deciding to trade as principal. It may also engage in transactions, for its own account or with customers, in a manner inconsistent with the views taken in this research report. Others within Deutsche Bank, including strategists, sales staff and other analysts, may take views that are inconsistent with those taken in this research report. Deutsche Bank issues a variety of research products, including fundamental analysis, equity-linked analysis, quantitative analysis and trade ideas. Recommendations contained in one type of communication may differ from recommendations contained in others, whether as a result of differing time horizons, methodologies, perspectives or otherwise. Deutsche Bank and/or its affiliates may also be holding debt or equity securities of the issuers it writes on. Analysts are paid in part based on the profitability of Deutsche Bank AG and its affiliates, which includes investment banking, trading and principal trading revenues.

Opinions, estimates and projections constitute the current judgment of the author as of the date of this report. They do not necessarily reflect the opinions of Deutsche Bank and are subject to change without notice. Deutsche Bank provides liquidity for buyers and sellers of securities issued by the companies it covers. Deutsche Bank research analysts sometimes have shorter-term trade ideas that may be inconsistent with Deutsche Bank's existing longer-term ratings. Some trade ideas for equities are listed as Catalyst Calls on the Research Website (https://research.db.com/Research/) , and can be found on the general coverage list and also on the covered company's page. A Catalyst Call represents a high-conviction belief by an analyst that a stock will outperform or underperform the market and/or a specified sector over a time frame of no less than two weeks and no more than three months. In addition to Catalyst Calls, analysts may occasionally discuss with our clients, and with Deutsche Bank salespersons and traders, trading strategies or ideas that reference catalysts or events that may have a near-term or medium-term impact on the market price of the securities discussed in this report, which impact may be directionally counter to the analysts' current 12-month view of total return or investment return as described herein. Deutsche Bank has no obligation to update, modify or amend this report or to otherwise notify a recipient thereof if an opinion, forecast or estimate changes or becomes inaccurate. Coverage and the frequency of changes in market conditions and in both general and company-specific economic prospects make it difficult to update research at defined intervals. Updates are at the sole discretion of the coverage analyst or of the Research Department Management, and the majority of reports are published at irregular intervals. This report is provided for informational purposes only and does not take into account the particular investment objectives, financial situations, or needs of individual clients. It is not an offer or a solicitation of an offer to buy or sell any financial instruments or to participate in any particular trading strategy. Target prices are inherently imprecise and a product of the analyst's judgment. The financial instruments discussed in this report may not be suitable for all investors, and investors must make their own informed investment decisions. Prices and availability of financial instruments are subject to change without notice, and investment transactions can lead to losses as a result of price fluctuations and other factors. If a financial instrument is denominated in a currency other than an investor's currency, a change in exchange rates may adversely affect the investment. Past performance is not necessarily indicative of future results. Performance calculations exclude transaction costs, unless otherwise indicated. Unless otherwise indicated, prices are current as of the end of the previous trading session and are sourced from local exchanges via Reuters, Bloomberg and other vendors. Data is also sourced from Deutsche Bank, subject companies, and other parties.

The Deutsche Bank Research Department is independent of other business divisions of the Bank. Details regarding our organizational arrangements and information barriers we have to prevent and avoid conflicts of interest with respect to our research are available on our website (https://research.db.com/Research/) under Disclaimer.

Macroeconomic fluctuations often account for most of the risks associated with exposures to instruments that promise to pay fixed or variable interest rates. For an investor who is long fixed-rate instruments (thus receiving these cash flows), increases in interest rates naturally lift the discount factors applied to the expected cash flows and thus cause a loss. The longer the maturity of a certain cash flow and the higher the move in the discount factor, the higher will be the loss. Upside surprises in inflation, fiscal funding needs, and FX depreciation rates are among the most common adverse macroeconomic shocks to receivers. But counterparty exposure, issuer creditworthiness, client segmentation, regulation (including changes in assets holding limits for different types of investors), changes in tax policies, currency convertibility (which may constrain currency conversion, repatriation of profits and/or liquidation of positions), and settlement issues related to local clearing houses are also important risk factors. The sensitivity of fixed-income instruments to macroeconomic shocks may be mitigated by indexing the contracted cash flows to inflation, to FX depreciation, or to specified interest rates – these are common in emerging markets. The index fixings may – by construction – lag or mis-measure the actual move in the underlying variables they are intended to track. The choice of the proper fixing (or metric) is particularly important in swaps markets, where floating coupon rates (i.e., coupons indexed to a typically short-dated interest rate reference index) are exchanged for fixed coupons. Funding in a currency that differs from the currency in which coupons are denominated carries FX risk. Options on swaps (swaptions) the risks typical to options in addition to the risks related to rates movements.

Derivative transactions involve numerous risks including market, counterparty default and illiquidity risk. The appropriateness of these products for use by investors depends on the investors' own circumstances, including their tax position, their regulatory environment and the nature of their other assets and liabilities; as such, investors should take expert legal and financial advice before entering into any transaction similar to or inspired by the contents of this publication. The risk of loss in futures trading and options, foreign or domestic, can be substantial. As a result of the high degree of leverage obtainable in futures and options trading, losses may be incurred that are greater than the amount of funds initially deposited – up to theoretically unlimited losses. Trading in options involves risk and is not suitable for all investors. Prior to buying or selling an option, investors must review the 'Characteristics and Risks of Standardized Options", at http://www.optionsclearing.com/about/publications/character-risks.jsp. If you are unable to access the website, please contact your Deutsche Bank representative for a copy of this important document.

Participants in foreign exchange transactions may incur risks arising from several factors, including the following: (i) exchange rates can be volatile and are subject to large fluctuations; (ii) the value of currencies may be affected by numerous market factors, including world and national economic, political and regulatory events, events in equity and debt markets and changes in interest rates; and (iii) currencies may be subject to devaluation or government-imposed exchange controls, which could affect the value of the currency. Investors in securities such as ADRs, whose values are affected by the currency of an underlying security, effectively assume currency risk.

Unless governing law provides otherwise, all transactions should be executed through the Deutsche Bank entity in the investor's home jurisdiction. Aside from within this report, important conflict disclosures can also be found at https://research.db.com/Research/ on each company's research page. Investors are strongly encouraged to review this information before investing.

Deutsche Bank (which includes Deutsche Bank AG, its branches and affiliated companies) is not acting as a financial adviser, consultant or fiduciary to you or any of your agents (collectively, "You" or "Your") with respect to any information provided in this report. Deutsche Bank does not provide investment, legal, tax or accounting advice, Deutsche Bank is not acting as your impartial adviser, and does not express any opinion or recommendation whatsoever as to any strategies, products or any other information presented in the materials. Information contained herein is being provided solely on the basis that the recipient will make an independent assessment of the merits of any investment decision, and it does not constitute a recommendation of, or express an opinion on, any product or service or any trading strategy.

The information presented is general in nature and is not directed to retirement accounts or any specific person or account type, and is therefore provided to You on the express basis that it is not advice, and You may not rely upon it in making Your decision. The information we provide is being directed only to persons we believe to be financially sophisticated, who are capable of evaluating investment risks independently, both in general and with regard to particular transactions and investment strategies, and who understand that Deutsche Bank has financial interests in the offering of its products and services. If this is not the case, or if You are an IRA or other retail investor receiving this directly from us, we ask that you inform us immediately.

In July 2018, Deutsche Bank revised its rating system for short term ideas whereby the branding has been changed to Catalyst Calls ("CC") from SOLAR ideas; the rating categories for Catalyst Calls originated in the Americas region have been made consistent with the categories used by Analysts globally; and the effective time period for CCs has been reduced from a maximum of 180 days to 90 days.

United States: Approved and/or distributed by Deutsche Bank Securities Incorporated, a member of FINRA, NFA and SIPC. Analysts located outside of the United States are employed by non-US affiliates that are not subject to FINRA regulations.

Germany: Approved and/or distributed by Deutsche Bank AG, a joint stock corporation with limited liability incorporated in the Federal Republic of Germany with its principal office in Frankfurt am Main. Deutsche Bank AG is authorized under German Banking Law and is subject to supervision by the European Central Bank and by BaFin, Germany's Federal Financial Supervisory Authority.

United Kingdom: Approved and/or distributed by Deutsche Bank AG acting through its London Branch at Winchester House, 1 Great Winchester Street, London EC2N 2DB. Deutsche Bank AG in the United Kingdom is authorised by the Prudential Regulation Authority and is subject to limited regulation by the Prudential Regulation Authority and Financial Conduct Authority. Details about the extent of our authorisation and regulation are available on request.

Hong Kong: Distributed by Deutsche Bank AG, Hong Kong Branch or Deutsche Securities Asia Limited (save that any research relating to futures contracts within the meaning of the Hong Kong Securities and Futures Ordinance Cap. 571 shall be distributed solely by Deutsche Securities Asia Limited). The provisions set out above in the 'Additional Information' section shall apply to the fullest extent permissible by local laws and regulations, including without limitation the Code of Conduct for Persons Licensed or Registered with the Securities and Futures Commission.

India: Prepared by Deutsche Equities India Private Limited (DEIPL) having CIN: U65990MH2002PTC137431 and registered office at 14th Floor, The Capital, C-70, G Block, Bandra Kurla Complex Mumbai (India) 400051. Tel: + 91 22 7180 4444. It is registered by the Securities and Exchange Board of India (SEBI) as a Stock broker bearing registration no.: INZ000252437; Merchant Banker bearing SEBI Registration no.: INM000010833 and Research Analyst bearing SEBI Registration no.: INH000001741. DEIPL may have received administrative warnings from the SEBI for breaches of Indian regulations. Deutsche Bank and/or its affiliate(s) may have debt holdings or positions in the subject company. With regard to information on associates, please refer to the "Shareholdings" section in the Annual Report at: https://www.db.com/ir/en/annual-reports.htm.

Japan: Approved and/or distributed by Deutsche Securities Inc.(DSI). Registration number - Registered as a financial instruments dealer by the Head of the Kanto Local Finance Bureau (Kinsho) No. 117. Member of associations: JSDA, Type II Financial Instruments Firms Association and The Financial Futures Association of Japan. Commissions and risks involved in stock transactions - for stock transactions, we charge stock commissions and consumption tax by multiplying the transaction amount by the commission rate agreed with each customer. Stock transactions can lead to losses as a result of share price fluctuations and other factors. Transactions in foreign stocks can lead to additional losses stemming from foreign exchange fluctuations. We may also charge commissions and fees for certain categories of investment advice, products and services. Recommended investment strategies, products and services carry the risk of losses to principal and other losses as a result of changes in market and/or economic trends, and/or fluctuations in market value. Before deciding on the purchase of financial products and/or services, customers should carefully read the relevant disclosures, prospectuses and other documentation. 'Moody's', 'Standard Poor's', and 'Fitch' mentioned in this report are not registered credit rating agencies in Japan unless Japan or 'Nippon' is specifically designated in the name of the entity. Reports on Japanese listed companies not written by analysts of DSI are written by Deutsche Bank Group's analysts with the coverage companies specified by DSI. Some of the foreign securities stated on this report are not disclosed according to the Financial Instruments and Exchange Law of Japan. Target prices set by Deutsche Bank's equity analysts are based on a 12-month forecast period.

Korea: Distributed by Deutsche Securities Korea Co.

South Africa: Deutsche Bank AG Johannesburg is incorporated in the Federal Republic of Germany (Branch Register Number in South Africa: 1998/003298/10).

Singapore: This report is issued by Deutsche Bank AG, Singapore Branch or Deutsche Securities Asia Limited, Singapore Branch (One Raffles Quay #18-00 South Tower Singapore 048583, +65 6423 8001), which may be contacted in respect of any matters arising from, or in connection with, this report. Where this report is issued or promulgated by Deutsche Bank in Singapore to a person who is not an accredited investor, expert investor or institutional investor (as defined in the applicable Singapore laws and regulations), they accept legal responsibility to such person for its contents.

Taiwan: Information on securities/investments that trade in Taiwan is for your reference only. Readers should independently evaluate investment risks and are solely responsible for their investment decisions. Deutsche Bank research may not be distributed to the Taiwan public media or quoted or used by the Taiwan public media without written consent. Information on securities/instruments that do not trade in Taiwan is for informational purposes only and is not to be construed as a recommendation to trade in such securities/instruments. Deutsche Securities Asia Limited, Taipei Branch may not execute transactions for clients in these securities/instruments.

Qatar: Deutsche Bank AG in the Qatar Financial Centre (registered no. 00032) is regulated by the Qatar Financial Centre Regulatory Authority. Deutsche Bank AG - QFC Branch may undertake only the financial services activities that fall within the scope of its existing QFCRA license. Its principal place of business in the QFC: Qatar Financial Centre, Tower, West Bay, Level 5, PO Box 14928, Doha, Qatar. This information has been distributed by Deutsche Bank AG. Related financial products or services are only available only to Business Customers, as defined by the Qatar Financial Centre Regulatory Authority.

Russia: The information, interpretation and opinions submitted herein are not in the context of, and do not constitute, any appraisal or evaluation activity requiring a license in the Russian Federation.

Kingdom of Saudi Arabia: Deutsche Securities Saudi Arabia LLC Company (registered no. 07073-37) is regulated by the Capital Market Authority. Deutsche Securities Saudi Arabia may undertake only the financial services activities that fall within the scope of its existing CMA license. Its principal place of business in Saudi Arabia: King Fahad Road, Al Olaya District, P.O. Box 301809, Faisaliah Tower - 17th Floor, 11372 Riyadh, Saudi Arabia.

United Arab Emirates: Deutsche Bank AG in the Dubai International Financial Centre (registered no. 00045) is regulated by the Dubai Financial Services Authority. Deutsche Bank AG - DIFC Branch may only undertake the financial services activities that fall within the scope of its existing DFSA license. Principal place of business in the DIFC: Dubai International Financial Centre, The Gate Village, Building 5, PO Box 504902, Dubai, U.A.E. This information has been distributed by Deutsche Bank AG. Related financial products or services are available only to Professional Clients, as defined by the Dubai Financial Services Authority.

Australia and New Zealand: This research is intended only for 'wholesale clients' within the meaning of the Australian Corporations Act and New Zealand Financial Advisors Act, respectively. Please refer to Australia-specific research disclosures and related information at https://australia.db.com/australia/content/research-information.html Where research refers to any particular financial product recipients of the research should consider any product disclosure statement, prospectus or other applicable disclosure document before making any decision about whether to acquire the product. In preparing this report, the primary analyst or an individual who assisted in the preparation of this report has likely been in contact with the company that is the subject of this research for confirmation/clarification of data, facts, statements, permission to use company-sourced material in the report, and/or site-visit attendance. Without prior approval from Research Management, analysts may not accept from current or potential Banking clients the costs of travel, accommodations, or other expenses incurred by analysts attending site visits, conferences, social events, and the like. Similarly, without prior approval from Research Management and Anti-Bribery and Corruption ("ABC") team, analysts may not accept perks or other items of value for their personal use from issuers they cover.

Additional information relative to securities, other financial products or issuers discussed in this report is available upon

David Folkerts-Landau
Group Chief Economist and Global Head of Research

Pam Finelli
Global Chief Operating Officer
Research

Michael Spencer
Head of APAC Research

Steve Pollard
Head of Americas Research
Global Head of Equity Research

Anthony Klarman
Global Head of
Debt Research

Kinner Lakhani
Head of EMEA
Equity Research

Joe Liew
Head of APAC
Equity Research

Jim Reid
Global Head of
Thematic Research

Francis Yared
Global Head of Rates Research

George Saravelos
Head of FX Research

Peter Hooper
Global Head of
Economic Research

Andreas Neubauer
Head of Germany Research

Spyros Mesomeris
Global Head of Quantitative
and QIS Research

International Production Locations

Deutsche Bank AG
Deutsche Bank Place
Level 16
Corner of Hunter & Phillip Streets
Sydney, NSW 2000
Australia
Tel: (61) 2 8258 1234

Deutsche Bank AG
Equity Research
Mainzer Landstrasse 11-17
60329 Frankfurt am Main
Germany
Tel: (49) 69 910 00

Deutsche Bank AG
Filiale Hongkong
International Commerce Centre,
1 Austin Road West,Kowloon,
Hong Kong
Tel: (852) 2203 8888

Deutsche Securities Inc.
2-11-1 Nagatacho
Sanno Park Tower
Chiyoda-ku, Tokyo 100-6171
Japan
Tel: (81) 3 5156 6770

Deutsche Bank AG London
1 Great Winchester Street
London EC2N 2EQ
United Kingdom
Tel: (44) 20 7545 8000

Deutsche Bank Securities Inc.
60 Wall Street
New York, NY 10005
United States of America
Tel: (1) 212 250 2500