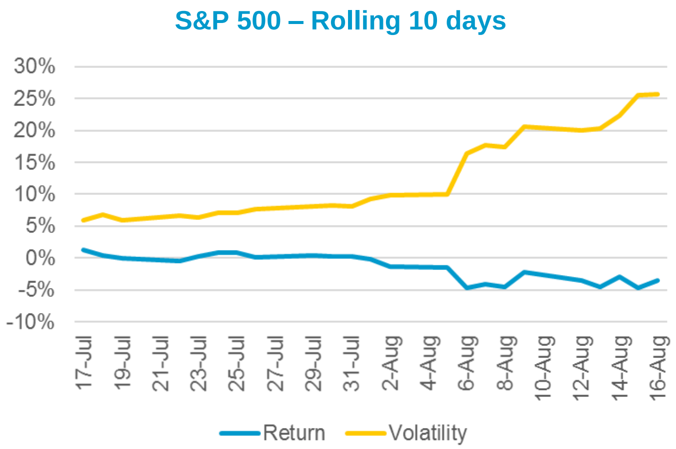
LGIMA's Multi-asset Market Update

August 2019

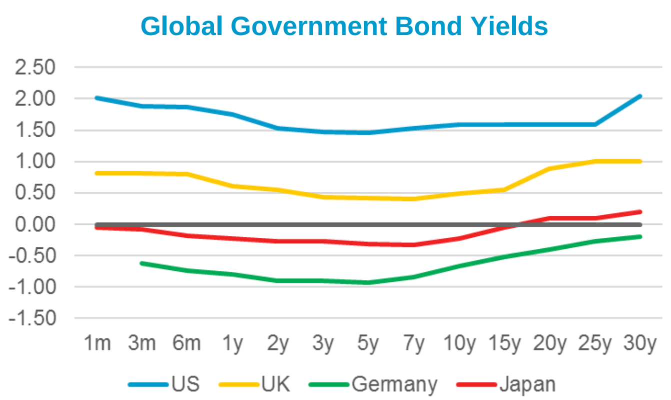
Equity market

Market moving headlines have come fast and furious over the last month. Trade tensions, Yuan fixings, Hong Kong protests, sagging Chinese growth data, 2Q19 earnings, Brexit, lack of a coalition government in Italy, Argentinian elections, global government bond yield changes (pause for breath) and mounting recession fears have whipsawed markets, leading to a recent streak of return-free risk. As if this smorgasbord of uncomfortable topics isn't enough, just as we set to writing this month's report we get an inversion in the US 2s10s yield curve and the We Work IPO filing.



Between publications, we cut our view on global equity to neutral. Our recession indicators have worsened and the fragility of the bull market has increased. We illustrate this through two main developments. First, the release of 2Q19 GDP included material downward revisions to corporate profits for the last five years. Robust margins and profits seemed to have been critical support for this bull market, remaining strong in the face of other economic weakness and potentially buffering inflation pressures of a tight labor market. Simply resetting this data lower—and future expectations modeled from it—means there is heightened vulnerability to shocks, which brings us to our second point: we believe that the effects of trade war escalation are the most obvious potential shock. This could be particularly problematic because of how it may affect confidence, spending and investment, plus the potential for disproportionate – that is to say, more than merely linear – negative effects from each marginal tariff increase.

Last month, we touched on the prospect of meaningfully lower rates in the US, and the 10-year Treasury yield is now 40 basis points lower. We expect the yield curve inversion to cause a flood of updated broker recession forecasts, and equity futures are down nearly 2% as we write. To simplify the difficult dynamics between rates, equities, and the myriad risks outlined above, we turn to a classic framework.



The dividend discount model (DDM) proposes that the price of a stock should be equal to its dividends discounted by the difference between a required risk-adjusted rate of return and the growth of those dividends. The model has plenty of critiques and rebuttals, and our application here is only meant to serve as an intentional simplification of a very complex problem. [1]

We utilize this approach to offer a simple but critical observation: the price of equities (e.g., the level of the S&P 500) can remain unchanged if the required return and growth decline in lockstep. Falling Treasury yields—as a proxy for the risk-free component of the required return—can therefore support equity prices even as expectations for future growth wane (e.g., recession fears increase).

$$P = \frac{D}{r - g}$$

Prices can also be more volatile, not only because we wouldn't expect rate and growth changes necessarily to occur in lockstep, but also because investors may adjust their required risk premium and/or uncertainty around that risk premium. In other words, as the aforementioned political risks (which are notoriously difficult to price) ebb and flow, investors will adjust how much compensation they require for taking that risk. The result could be much like what we have observed in the last couple of weeks: large day-to-day moves with little overall change.

$$P = \frac{D}{(r_f + ERP) - g}$$

Perversely, the model could also explain We Work and other loss-making companies. Equity prices can't be negative, and so the DDM typically isn't used for early-stage growth companies (to be fair, the use of "early-stage" and "growth" is applied a bit liberally to some of the other high profile stocks in this crowd). However, again using the model as a simplification mechanism, we can show that negative dividends or earnings can result in a high price—strictly speaking—if the risk-free rate is low enough. With a very low risk-free rate, the difference between the required return and expected growth could theoretically become negative, resulting in a high share price for a loss-making firm. We don't think investors are explicitly behaving in this way, but we still find something compelling about this relationship in a low rate environment.

We can apply the framework on a forward-looking basis, as well. Looking ahead, we are attuned to two issues highlighted by recent headlines. First, again, is trade. China is faced with deteriorating economic data and local political strife, yet it was the US that retreated from recent escalations only five days after the initial threat to call off a September meeting. We're not naïve enough to think that there has been an epiphany in the administration that tariffs are bad. So, we're left with greater worries about the fragility of the US economy when we consider together the downward revisions to corporate strength from 2Q19 GDP numbers, the market reaction to the escalation, and how quickly thereafter the threat was reduced. In other words, could markets be dominated by a repricing of growth, g?

The second issue is inflation. CPI data released August 13 showed a year-over-year increase in average prices, although not uncomfortably so and following a couple of softer prints earlier in the year. Yet Bloomberg highlighted on August 10 that a basket of goods at Walmart was 5.2% more expensive than a year earlier; another analysis shows that Walmart accounts for nearly 9% of all US consumer spending. We recognize that timing and

[1] For example, we could assume dividends and earnings are fungible (i.e., a 100% payout ratio) and that the model is appropriate for modeling the market such that the traditional CAPM expansion of the required risk-adjusted return naturally has a beta of 1, leaving us only to consider the risk-free rate and the equity risk premium. We have also set aside the potential for dividend cuts, which could be expected in a recession.

methodological differences between the two inflation numbers are significant. Nevertheless, the risk of higher headline inflation numbers in the future is palpable, as are the increased socioeconomic pressures of a potential stagflation-like environment leading into an election cycle. As we well know, the risk-free rate is the product of real yields (currently a whisker above zero for 10 years in the US) and inflation. To hold equity prices constant, rising inflation must be offset be further declines in real yields. This scenario opens a Pandora's box of further implications on nominal bond yields, pension funded status, risk-seeking behavior, and market volatility.

Hopefully this month's report does not feel like an obvious review of CFA Level 1 material. We hope to break down current market risk into the fundamental building blocks of cashflows, required rates of return, and expected growth rates to shear the variables institutional investors must consider to appropriately allocate or hedge their portfolios.

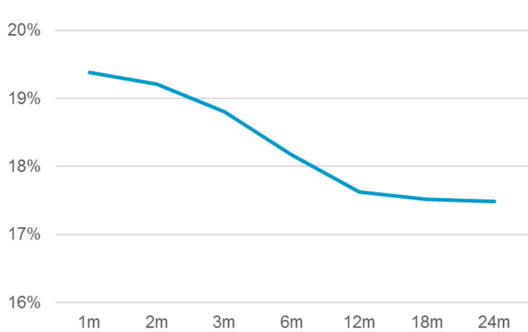
We'll close by repeating a familiar theme: hedge when you can, not when you must. Put spread collars still line up very well, and we have been very active implementing these for clients. At risk of stating the obvious (again), these are popular hedging structures because they help give institutional investors control of the range of possible outcomes. In other words, you are more directly able to price your required return for a given loss potential, rather than leaving that fate strictly to the markets.

Equity volatility

Volatility market conditions are more chaotic than would be typical of recent S&P 500 price action alone. Although the actual levels of implied and realized volatility are somewhere between "elevated" and "high," the option market is experiencing greater stress due to the extent of day to day moves (i.e., recent realized volatility).

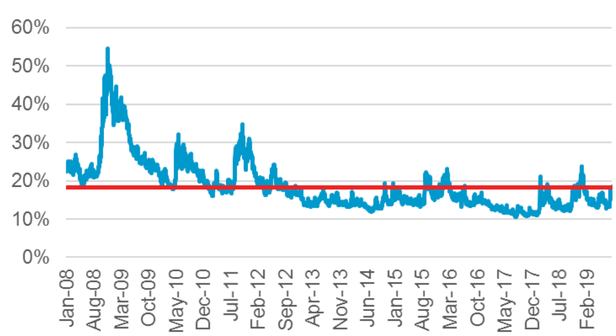
At the money implied volatility is fully inverted across the entire listed maturity curve two years out, a classic dynamic of market stress implying the expectation of sustained near-dated stress. Yet, six-month at the money implied volatility around 18% is still far from crisis.

S&P 500 ATM Implied Volatility Term Structure Yield



Source: Bloomberg, LGIMA

S&P 500 6m ATM Implied Volatility



Source: Bloomberg, LGIMA

Recent realized volatility, however, has generally exceeded implied, despite the S&P 500 price remaining somewhat range-bound since the initial 3% selloff on August 5 after the Chinese Yuan crossed 7 versus the US Dollar. For example, 10-day realized volatility spiked from below 10% in July to nearly 30%, encompassing two days of approximately 3% losses each—a point at which the convexity of losses to short volatility expand dramatically.

This stands in contrast to market behavior in May when the S&P 500 declined a similar ~6% over a short period of time. Then, realized volatility barely exceeded implied. Short volatility and carry trades, therefore, likely experienced only moderate losses.

The prevailing dynamic in the option community is 'short gamma' with particular attribution of this effect to short VIX calls. We have seen evidence of this in how volatile implied volatility itself has been (what traders call the 'vol of vol'). For example, despite a disastrous 4Q18 equity market, once implied volatility reset higher, it generally remained so. In the last two weeks, however, we have seen a very 'spot dependent' level of implied volatility. This means that on days when the S&P 500 rose, implied volatility declined dramatically, and vice versa. This means that not only do dealers have to 'buy high and sell low' in the stock market, but they must also do so in the volatility market.

Rates market

Over the past month the 30-year US Treasury rate has declined 60 basis points to new all-time lows, with 50 basis points of that move occurring in the first 10 trading days of August. The last time the US had a long end rally like this was in the summer of 2011 during the US debt-ceiling crisis. As has been the theme the past several months, these moves were driven by central bank actions, trade war escalations, and increasing fears of recessions looming in the near future, both in the US and abroad. The start of the move lower in rates was the July 31 FOMC meeting. The Fed, as widely expected, cut their target rate by 25 basis points, their first cut since the financial crisis. Additionally, they announced the end of their balance sheet runoff, two months ahead of the previously announced September end. None of this seemed to catch the market by surprise. However, the ensuing press conference had some unexpected sound bites. Chair Powell initially said that cut was "intended to insure against downside risk" but later pivoted to "think of the cut as a mid-cycle adjustment." There were also 2 voting members who dissented, arguing that the rate cut was not needed. After months of the Fed stressing they wanted to keep the economy going strong, many saw this cut of only 25 basis points, coupled with the resistance within the Fed to make this cut, as a wasted opportunity to ease recession concerns. In the wake of the Fed meeting the 30-year Treasury rate rallied to end the month at 2.52 while the 2yr rate sold off and the 2s30s curve flattened 8 basis points to 65.

The next day President Trump tweeted that he was imposing an additional 10% tariff on $300 billion of Chinese goods as retribution for a lack of progress in their recent trade negotiations. The President has been arguing that the Fed had raised rates too high too fast for the past few months, so it did raise some suspicions that the timing of this announcement was to try to push the Fed to act with more urgency going forward. The following day the German sovereign term structure went completely negative as the 30-year bund dipped below 0% yield for the first time. On Monday, China weakened their currency against the dollar and CNY traded through the psychological barrier of 7.00. Rates in the US plummeted nearly 14 basis points and the next day Treasury Secretary Mnuchin officially declared China to be a currency manipulator. By this point the US 30-year Treasury rate had rallied to 2.23. Later in the week central banks were surprisingly more dovish than expected with New Zealand cutting their benchmark rate by 35 basis points (and Governor Orr saying outright that they could use negative rates to spur on the economy), India cutting 35 basis points, and in a move almost no economists predicted, the Bank of Thailand cut rates by 25 basis points.

The next big move down in rates was on Monday, August 12. As Hong Kong protests reached a "critical juncture" (one that would eventually result in the airport closing for two days), the EM market experienced a shock as incumbent Argentinian President Macri surprisingly lost his primary to Alberto Fernández by a landslide, 48% to 32%. The Argentine peso depreciated by ~25% against the US dollar and the Merval stock index plummeted nearly 40% in the risk off move in EM. Long end rates in the US rallied another 12 basis points to close out the day at 2.13.

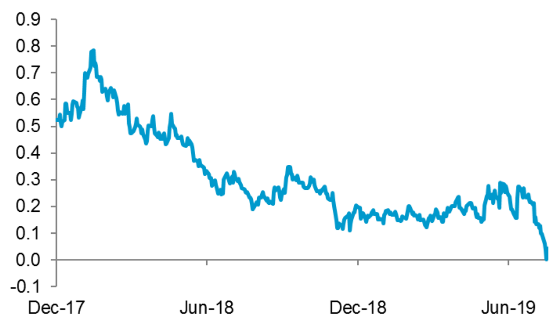
Later in the week concerns over Germany reaching a technical recession as their GDP growth slumped and weak industrial data out of China caused the US and UK 2s10s yield curve to invert - a potential harbinger of an impending recession. The rest of the week continued to spark volatility in the markets as the headlines kept coming. The Fed's Bullard also gave an interview where he discussed the possibility of negative rates in the US and said it was an alternative strategy the Fed was discussing. China continued the trade escalation by issuing a statement that the US had "seriously violated the consensus… of the Osaka meeting." And most importantly, the ECB's Olli Rehn stated that the ECB was ready to take "substantial and sufficient" action at their September meeting, noting that "it's often better to overshoot than undershoot." The markets took this as an incredibly dovish signal and global rates rallied as the US 30-year Treasury rate dipped as low as 1.91, its first time ever trading below 2.00%. Powell will speak at the Jackson Hole summit next week and will hopefully give some insight as to the path forward. With three FOMC meetings left on the calendar the market is pricing in a 60% of 75 basis points or more of cuts by the end of the year.

US Rate Environment

Index	08/15/2019	One-month ago	Three-months ago	One-year ago
Fed Funds Rate	2.25	2.50	2.50	2.00
2y	1.50	1.83	2.16	2.64
5y	1.42	1.84	2.15	2.77
10y	1.53	2.09	2.37	2.90
30y	1.97	2.61	2.82	3.07

Source: Bloomberg, LGIMA

2s/10s



Source: Bloomberg, LGIMA

Rates volatility

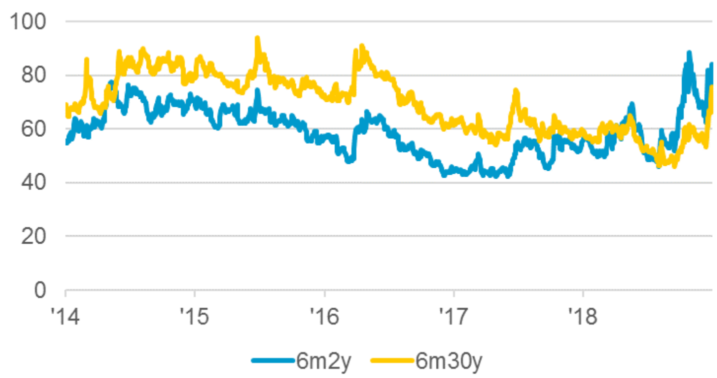
Implied volatility on short dated options has skyrocketed in August, which is not surprising given the 40-60 basis point rally across the curve. The run up in options has been fueled by high delivered volatility, uncertainty in the global economy, and continuing trade war escalation only being a tweet away. Short dated option volatility is up 10-33abpv while intermediates are up 4-12abpv and longer dated vega increased by 2-8abpv. The move was led by 30y tails, which richened the most over the past month. 1m30y implied volatility is now at 90.6abpv, slightly above the 87.4abpv in a 1m2y swaption. The past month has seen 2y swaps deliver 101.9 basis points of annualized volatility, the most volatile the front end has been since the financial crisis. The 30y swap rate delivered 85 basis points of annualized volatility, its highest level since the 2016 US elections. Part of the move this month was 30y tails catching up with 2y tails (options on 30y tails had been underperforming in prior months), but there was also a demand from real money accounts looking to protect against rates moving even lower. The long end had no problem crashing through the previous lows of 2.08 and then through the psychological barrier of 2.00. With the Fed and other central banks now actively discussing the possibility of negative rates (not to mention Germany's entire term structure now trading in negative territory), there's no telling how low rates in the US can go. On the other hand, any meaningful progress on the trade war front could help rates snap back to where they were 2 weeks ago, which would more than pay for the cost of owning a short-dated option. Dealer desks should be getting short longer dated volatility due to the dynamics of the callable portfolio, although these lower rates will lead to bonds being called and potentially an uptick in Formosa issuance.

Current implied volatility levels and change over 1 month

P/TAIL	1Y	CHANGE	2Y	CHANGE	5Y	CHANGE	10Y	CHANGE	30Y	CHANGE
1M	87.4	17.2	92.3	19	91.4	21.6	88.6	25.5	90.6	32.9
3M	83.1	14.8	84.2	13.4	82.5	13	79.7	15.7	79.7	20.6
6M	80.5	11.6	79.6	9.6	78.6	10.6	75.7	12.2	74.2	15.7
1Y	77.5	7.2	76.3	6.5	72.5	5.3	70.3	7	68	10.2
2Y	73.8	6	71.1	6.7	71.5	5.4	69.1	6.5	65.7	9.5
3Y	71.5	3.8	70.8	3.5	70.5	5.2	68.5	6.4	63.8	8.2
4Y	70.2	3.3	69.6	3	69.5	4.8	67.9	5.9	62.8	7.6
5Y	69.6	3.1	68.7	3	68.8	4.6	67.4	5.7	62.1	7.3
7Y	68.5	3.1	67.7	3	67.8	4.2	66.1	5	60.2	5.9
10Y	66.4	2	65.8	2.1	66.1	3.5	64.4	4.2	58.5	4.8

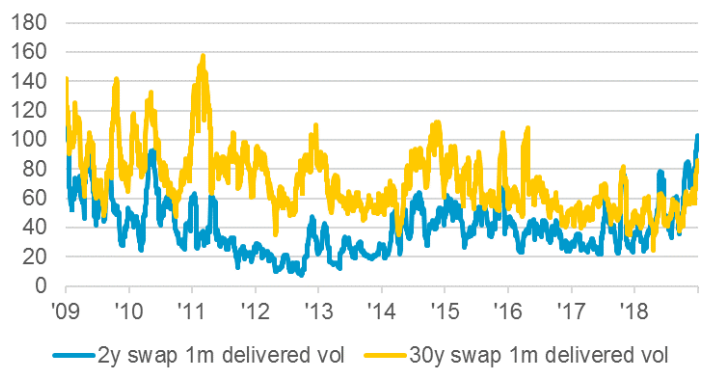
Source: Citi, LGIMA as of 8/16/19

6m2y and 6m30y implied volatility



Source: Citi, LGIMA as of 8/16/19

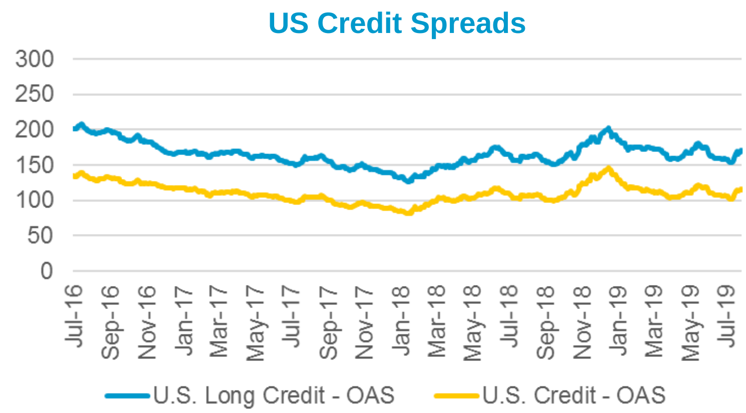
Realized swap volatility



Source: Citi, LGIMA as of 8/16/19

Credit market

We have seen a noticeable uptick in volatility for risk-assets throughout the first half of August, on the back of heightened US/China trade escalations, slowing global growth and an assortment of other geopolitical risks. As a result, risk-assets have sold off and the US Long Credit index has widened to 171 basis points (16 basis points wider MTD). Furthermore, fears of an increased risk of recession are prevalent as the 2s10s yield curve inverted for the first time since the financial crisis.



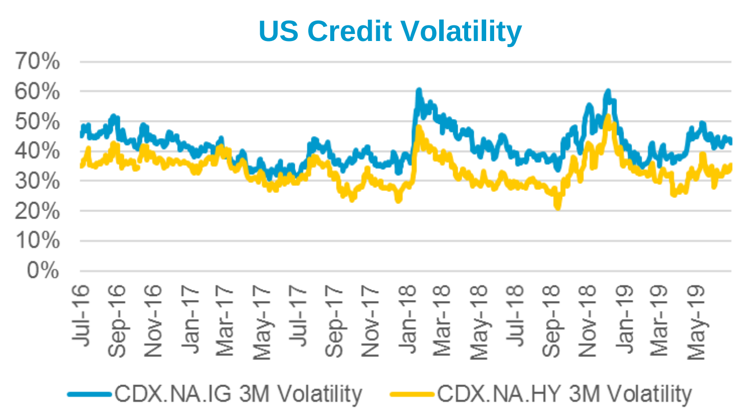
Source: Bloomberg

While recent global economic data in China and Europe (Germany) has recently disappointed, the US remains on solid footing as consumers are spending and labor markets remain strong. Geopolitical risks continue to complicate the macroeconomic situation, as the political unrest in Argentina caused the Argentine peso to devalue ~25% relative to the USD. Riots in Hong Kong have also impacted global markets, and a "No-Deal Brexit" continues to be a developing threat. Although President Trump delayed the additional 10% tariffs on $300 billion of Chinese goods to the middle of December, tensions continue to remain high between the two largest economies in the world.

From a Supply/ Demand perspective, issuers have been selectively coming to market amidst the heightened market volatility. Month-to-date supply currently stands at $62 billion, bringing year-to-date supply to $726 billion, approximately 7% lower than this time last year. As negative yielding global fixed income has reached a new record of over $15 trillion, foreign investors will likely continue to put downward pressure on long term US fixed income yields.

Credit volatility

The trend of risk-asset volatility throughout the month has continued in the credit universe, as both CDX.HY and CDX.IG have recently sold off. The 4-month implied volatility for CDX.IG has increased upwards of 10%, and it is currently sitting at its highest level over the past few years. With respect to the relationship between CDX.HY and CDX.IG, the spread ratio has compressed, as CDX.HY has experienced a relative underperformance of ~10 basis points. This underperformance is believed to be a result of the weakness in index distressed names, such as J.C. Penney and Dean Foods. Demand for tail risk hedging activity has also seemingly increased, as more investors have shown interest in out-of-the-money puts to capture value in the instance of a further market sell-off.



Source: Bloomberg

Scenario Based Asset Allocation

SCENARIO SUMMARIES

Name	Description	Risk Assets	Inflation	Rates	USD	Probability (last month)
Global Slowdown	• Dominated by fears of imminent recession, US growth below 1%, China faltering and below 5.5%, Europe flirting with recession • US & UK rate cuts • Commodities drop, political uncertainty contributes to slowdown	▼	▼	▼	—	20% (20%)
Roadmap Central Scenario	• Inflation print stays below central bank targets • US unemployment similar to current level and growth follows trend. Central banks increase accommodativion • Trade tensions simmer • 3-4 rate cuts in the US • China growth close to c.6%	▲	▼ / —	▼	▼ / —	20% (15%)
NO NAME - TO BE DISCUSSED	• *US gradually slows but is above trend for most of 2019* • *Steady Europe growth and inflation* • *China stimulus helps stabilize growth given trade war uncertainty* • *Fed cuts 1-2 and inflation back to target*	▲	▲	▲	▲	*25% (25%)*
Global Growth	• US growth remains strong, buoyed by 2-3 early cuts, strong consumer consumption and no material trade war escalation • China stimulus leads to an overshoot of 6.5%+ • Europe rebounds with EM growth • Other economic data does not point to material overheating	▲	▲	▲	▼ / —	10% (10%)
Rates Rebound Risk Off	• US inflation picks up rapidly, forcing the Fed to hike 2-3 times in the coming 12 months • Global government bond yields rise fuelled by rising rate and future expectations • Equity markets sell off on the back of higher yields	▼	▲	▲	▲	10% (15%)
Trumpilocks	• 2-3 rate cuts, in part for insurance against trade and slowing global growth • Trade tensions have less impact than expected and stimulus efforts reaccelerate growth	▲	▼ / —	—	▼ / —	15% (15%)

Contributors

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