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Framework Review: One small step for the Fed

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- The Fed is reviewing whether "makeup" strategies, which attempt to make up for past inflation shortfalls rather than treating them as "bygones," would better help meet its inflation goal. Given broad-based concerns about persistently low inflation, we believe a shift in the framework is likely, with the Fed setting policy accordingly.
- We examine the implications for the rates market of the Fed's adopting some form of makeup strategy, modelling scenarios of a healthy economy and in the next downturn. Using a small-scale economic model, we argue that a credible strategy can significantly alter the dynamics of the rates market, especially given low expectations.
- In a favorable economy under the makeup framework, we argue that the market would need to reflect a higher probability of not only easier Fed policy for years, but also a medium-term overshoot. This should lead to steeper curves, such as 5s30s, at higher long-term yield levels, which contrasts sharply with what followed the insurance eases in the mid-90s under the bygones framework.
- In the next downturn, regardless of the framework, rates investors should price in the Fed to remain at the zero lower bound (ZLB) for at least a few years, due to the current proximity to the lower bound and neutral rates potentially declining further. Under a makeup framework, however, investors need to consider seriously the possibility of the Fed staying at the ZLB for many more years.
- In the next downturn, the Fed's adopting short- to medium-tenor "yield caps" in order to strengthen forward guidance should therefore not surprise investors. However, for this reason, only those beyond the medium tenor would provide incremental stimulus and be consistent with the makeup framework, in our view.
- Typical trading strategies ahead of a downturn, such as 2s10s curve steepeners, will probably disappoint, as 10y yields are likely to fall materially as well. We believe a useful guide would be the yield curve control (YCC) experiment in Japan, in which most of the yield curve steepness and volatility moved to beyond 10y tenors.
- Our analysis also suggests that the new regime should reshape the vol surface as well. With the same level of underlying macro volatility, we believe that a "makeup" framework should result in higher rates market volatility in mid expiries and 10y+ tenors. We also find that the new framework should lead to a more volatile curve.
- Assuming a makeup framework, the implied term premium up to the intermediate sector would be modestly negative but at the long end deeply negative; the former is still reasonable, the latter looks stretched. At current levels, belly-long end curve steepeners, in outright and conditional forms, look attractive, in our view. We also recommend buying forward volatility on long tails, as well as buying curve volatility.

PLEASE SEE ANALYST CERTIFICATIONS AND IMPORTANT DISCLOSURES STARTING AFTER PAGE 21

Introduction

What a difference a year makes! Coming into 2019, market participants and the Fed itself expected to raise policy rates two more times and here we are, one year later, with the Fed having delivered three rate cuts instead. Bond yields have followed suit with 10y Treasury yields having fallen more than 100bp, even before the COVID-19 outbreak. With the Fed on hold until there is a material change in the outlook, the rates market should be uneventful. However, in the background, the Fed is undergoing a policy framework review, which has the potential to completely alter the dynamics of the rates market, in our view.

The Fed's framework review is wide-ranging, from whether the current strategy remains best suited for meeting the dual mandate, to whether its existing policy tools and communication practices are sufficient or should the toolkit be expanded. The motivation appears to be inflation or lack thereof; despite the unemployment rate being at a 50-year low, there are no signs of inflationary pressures. While low inflation does not seem like something one should have to worry about, persistently low inflation could result in expectations getting anchored below 2%. This in turn makes it hard for the Fed to reach its inflation target in good times thus starting a vicious cycle with every downturn. This is particularly worrisome with low neutral rates pulling nominal rates towards the zero lower bound. Hence, the Fed is reviewing whether "makeup" strategies, which attempt to make up for past inflation shortfalls rather than treating them as "bygones", would help meet its inflation goal better.

In this report, we look at how bond markets should price in such a shift in the reaction function. For instance, in 1995 and 1998 after the Fed delivered "insurance eases", a quick turnaround in data resulted in sharp selloff in the bond market. Would that repeat under the new framework? Or should the market price the Fed to remain on hold for a prolonged period instead as it aims to push inflation above 2%? What are the intended and unintended consequences? Would that simply help re-anchor inflation expectations at 2% (good) or would that also increase the risk of a medium-term overshoot, thus raising volatility and term premium (bad). Alternatively, if the economy falls into a recession, what should the market price in for how long the Fed will maintain its policy rate at the ZLB and what tools does it deploy? Would a forward guidance spanning a few years and asset purchases suffice? Or should the market brace for new tools such as "yield-caps", like BoJ did in 2016?

We aim to answer these questions. The report is structured as follows:

First, we take a brief look at how the debate around the framework review is shaping up and what key Fed officials have said on this topic. We also use text analysis to show that there is indeed a growing focus on inflation and rising worries about its persistent shortfall.

Second, we use a small-scale model of the economy to illustrate how the markets should price in for the path of policy rates in various scenarios and under different frameworks. We highlight the intended and unintended consequences of adopting makeup strategies.

Third, we look at the implication for yield levels, the shape of curves as well as level of implied volatility and judge whether the bond markets are indeed priced for any change in strategy. We draw from historical episodes as well as the YCC experiment in Japan.

Finally, we highlight trading opportunities that offer attractive risk-reward over the coming months. As more information about the framework review become available, even as the finer details may not be forthcoming soon, the markets should begin to price in any shift.

Framework Review: Key Takeaways

In late 2018, the Fed announced that it would conduct a wide-ranging review of its policy framework, which would conclude sometime in the middle of 2020. As we are getting closer to the end of the review period, various Fed officials have been speaking about how they see the policy framework evolving. In Figure 1, we list key statements Fed speakers have made on this topic (in chronological order, the most recent first).

Recent Fed commentary suggests that while some form of average inflation targeting (AIT) seems to be gaining acceptance, the Fed is fully aware of the challenges that come with it, particularly around communication and credibility

We believe these quotes show that while some form of average inflation targeting (AIT) seems to be gaining acceptance, the Fed is fully aware of the challenges that come with it, particularly around communication and credibility. For instance, Fed Governor Brainard recently proposed a flexible form of AIT that can be easily communicated. She gave an example, noting that "Following several years when inflation has remained in the range of 1-1/2 to 2 percent, the Committee could target inflation outcomes in a range of 2 to 2-1/2 percent for a period to achieve inflation outcomes of 2 percent, on average, overall." Still, to tackle the issue of credibility, Fed Chair Powell has noted that just stating that the Fed has a new strategy is not enough; it would need to be followed up for years. Still, concerns about interactions with financial stability linger. At the January FOMC meeting, "Several participants noted that a communications strategy could include the possible use of financial instability escape clauses". However, Powell recently noted that "Given the necessary focus of monetary policy on the dual mandate goals, financial stability risks are best addressed using macro- and micro prudential supervisory and regulatory tools that increase the resiliency of financial markets." This sentiment has been echoed by other Fed governors, such as Brainard, suggesting that such concerns are not insurmountable.

Further, it seems that Fed participants are indeed getting more worried about persistently low inflation. In Figure 2, we plot inflation sentiment as derived from the text analysis of Fed speeches and the FOMC meeting minutes. We measure sentiment by looking at how positive or negative descriptions of developments are, parsing sentences to detect the context as well (see *Introducing our FOMC Sentiment Indicators*, September 2019). For example, a "decline in uncertainty" gets a positive score, while a "decline in employment" receives a negative score. We adjust our approach to account for complexities in speech. In the current context, we specifically look at sentiment in paragraphs discussing inflation. While inflation sentiment was positive in 2017/2018, it has fallen sharply since then. We believe this likely reflects the decline in inflation and inflation expectations, even as the labor market has improved.

Overall, a "makeup" strategy may begin to, if it hasn't already, inform policy decisions well before the next downturn

Finally, the summary of economic projections (SEPs) suggests that some Fed participants may already be operating under a framework where they believe it is appropriate to push inflation above 2%. Figure 3 shows the upper end of the range and central tendency of y/y core PCE inflation forecast in out years. The upper end of the range has been above 2% for a while, suggesting that at least one Fed participant thinks it is appropriate to pursue monetary policy to push inflation above 2%. However, recently even the upper end of the central tendency has risen above 2%, suggesting this group is expanding, perhaps due to insurance eases put in place. In fact, at the December press conference, the Fed chair noted that a number of participants wrote down overshoots of inflation as appropriate. While the median member still believes it is appropriate to keep inflation at 2%, that may change.

Overall, it appears that the framework review is unlikely to end up maintaining the status quo, with the Fed instead shifting to targeting somewhat above 2% inflation for a period of time and setting policy to achieve that goal. If that is indeed the case, then what are the implications for rates investors?

FIGURE 1

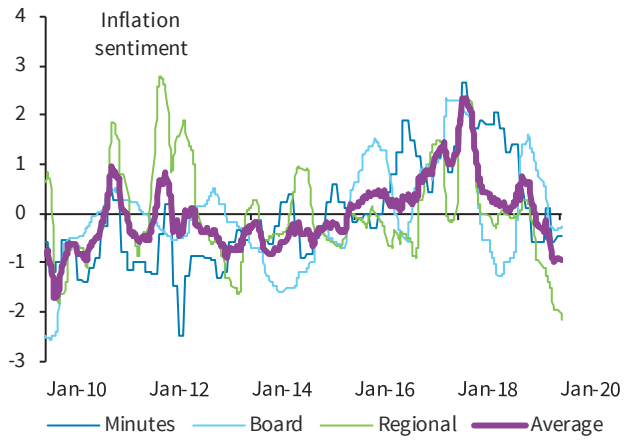
What have Fed officials said about adopting "makeup" strategies?

Speaker	Date	Statement
Brainard	Feb 2020	"I prefer flexible inflation averaging that would aim to achieve inflation outcomes that average 2 percent over time…It is important to emphasize that for monetary policy to be effective, it will be key for policymakers to communicate their strategy clearly in advance to the public, to act early and decisively, and to commit to providing the requisite accommodation until full employment and target inflation are sustainably achieved."
Williams	Jan 2020	"Much has been made about whether central banks can credibly commit to future actions and outcomes, but the experience with inflation targeting gives me encouragement. Inflation-targeting central banks have proved beyond a doubt that they could bring inflation down and keep it low and stable. This was not a foregone conclusion, and initially there were doubts about whether inflation targeting would succeed."
Clarida	Nov 2019	"Central banks are generally believed to have effective tools for preventing persistent inflation overshoots, but the ELB on interest rates makes persistent undershoots more of a challenge. Persistent inflation shortfalls carry the risk that longer-term inflation expectations become anchored below the stated inflation goal"
Brainard	Nov 2019	"To be successful, formal makeup strategies require that financial market participants, households, and businesses understand in advance and believe, to some degree, that policy will compensate for past misses. I suspect policymakers would find communications to be quite challenging with rigid forms of makeup strategies, because of what have been called time-inconsistency problems. […] I prefer a more flexible approach that would anchor inflation expectations at 2 percent by achieving inflation outcomes that average 2 percent over time"
Daly	Aug 2019	"While [alternative strategies such as average inflation targeting are] no magic bullet, these makeup approaches recognize that we'll need to be intentional – rather than opportunistic – about offsetting inflation overruns."
Powell	Jun 2019	"Research on makeup strategies has begun to grapple more seriously with the credibility questions. But important questions remain. To achieve buy-in by households and businesses, a comprehensible, credible, and actionable makeup strategy will need to be followed by years of central bank policy consistent with that strategy"
Brainard	May 2019	"They have not yet been implemented in practice. There is some skepticism that a central bank would in fact prove able to support above-target inflation over a sustained period without becoming concerned that inflation might accelerate and inflation expectations might rise too high."
Mester	May 2019	"Although these frameworks have theoretical appeal, none of them is without implementation challenges"
Rosengren	Apr 2019	"My own preference is for the Federal Reserve to adopt an inflation range that explicitly recognizes the challenge of the effective lower bound. We might be forced to accept below-2-percent inflation during recessions, but we would commit to achieving above-2-percent inflation in good times, so as to provide more policy space to counteract the next recession."
Powell	Mar 2019	"By the time of the crisis, there was a well-established body of research suggesting that some kind of makeup policy could be beneficial. […] For makeup strategies to achieve their stabilizing benefits, households and businesses must be confident that the "makeup stimulus" is really coming."

Source: Federal Reserve, Barclays Research

FIGURE 2

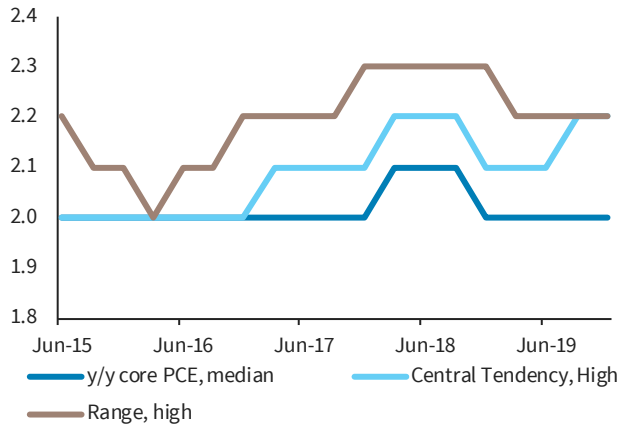
Inflation sentiment from different Fed texts has broadly deteriorated since 2018



Source: Federal Reserve, Barclays Research

FIGURE 3

Summary of economic projections show greater support for above-target inflation (%)



Source: Federal Reserve, Barclays Research

Framework shift and policy expectations embedded in yields

We use a small-scale model of the economy to estimate policy expectations under different economic scenarios and policy frameworks

In order to illustrate how a shift in the policy framework can reverberate across the yield curve, we use a small-scale model of the economy to estimate policy expectations over different tenors. Briefly, the model links the unemployment gap, inflation rate and policy rate to each other through a set of equations which can be used to generate a path of policy rates under different economic scenarios and policy frameworks (see Box 1 for details). We can then evaluate the expectation component in yields; for instance, for the 2y yield, we take the average of the fed funds rate over two years (and for the 10y yields, the average over ten years). Finally, we overlay our views on term premium.

While using a stylized economic model has its limitations, we believe this exercise gives us intuition on how to price yield levels across scenarios and policy strategies.

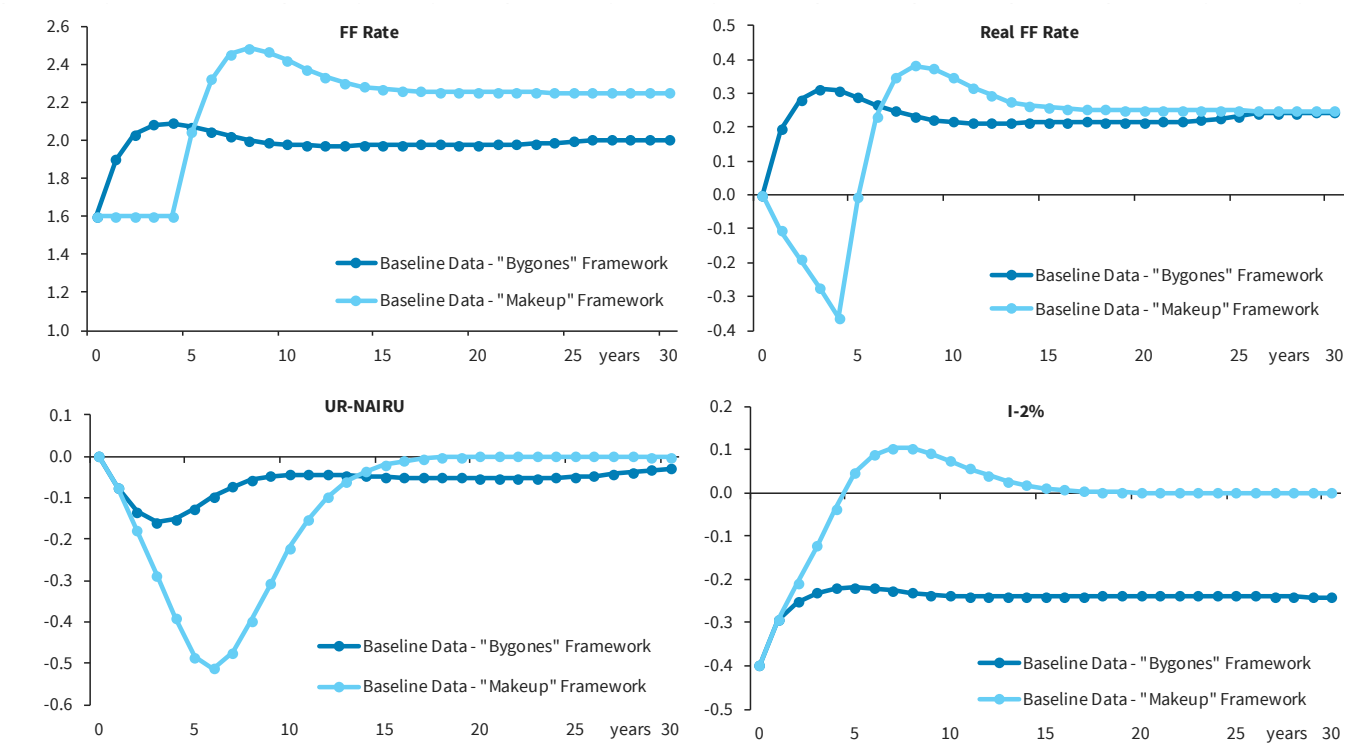
Modelling expectations while the economy is "Still in a good place"

In Figure 4 we illustrate how policy rates could evolve under the two frameworks ("bygones" vs "makeup") while the economy is in a good place. The figure shows the path of funds rate, in nominal and real terms, the unemployment gap (UR-NAIRU) and the inflation gap (I-2%). We assume that the unemployment gap is currently 0 (the SEPs suggest otherwise, but key Fed speakers, including Chair Powell, have repeatedly stressed that the labor market is not tight). We also assume that inflation expectations are anchored below 2% (see Box 2 for details). The dark blue lines show the evolution of key variables under the "bygones" framework.

To begin with, in this scenario current easy monetary policy (top right chart of Figure 4) allows for the economy to grow modestly above trend, thus leading to a decline in the unemployment rate (bottom left chart) and in turn to somewhat higher but below 2%

FIGURE 4

Modelling expectations while the economy is "Still in a good place" (%)



Note; See Box 1 for the methodology. Source: Barclays Research

inflation (bottom right chart). Since under the current framework the Fed is simply aiming to minimize the deviation from the dual mandate, it begins to raise rates towards a neutral policy stance (top left chart) thus preventing a significant tightening of the labor market. In the steady state, the labor market is modestly tight, but inflation remains stuck below 2%. This is not materially different from how the Fed approached the latest hiking cycle, which began with inflation below 2%.

What could the Fed do if it aims to average inflation at 2% over time? In this scenario, we envisage the Fed could adopt and follow policy, which, after stretches of low inflation, would target inflation above 2% for a period

What could the Fed do if it aims to average inflation at 2% over time? In this scenario, we envisage the Fed could adopt and follow policy, which, after stretches of low inflation, would target inflation above 2% for a period. Simply stating that it has a different strategy would not suffice, the Fed's commitment would need to be perceived as credible. Hence, to ensure "time consistency" we generate the policy path, which not only minimizes the loss function but also requires that inflation average 2%. Under such a credible commitment, we assume inflation expectations over time do rise to 2%. While the Fed may follow a flexible AIT framework for the benefit of ease of communication, we believe that underlying modelling dynamics are similar. Figure 4 (light blue lines) shows the alternative path of evolution of these variables. A few things stand out:

First, instead of hiking, the Fed remains on hold. The Fed could choose to ease as well, particularly given the concerns about the COVID-19 outbreak. Regardless, it stays on hold for many years thus allowing real rates to become negative, labor markets to get tighter and inflation to eventually rise above 2% (bottom right chart of Figure 4).

Second, when inflation does rise above target and the Fed begins to remove policy

Box 1: Modelling expectations embedded in yields using a small-scale model of the economy

We use a small-scale model of the economy to illustrate how a change in the Fed reaction function can alter the trajectory of the path of short rates and therefore the yield curve. This model comprises three equations: for the unemployment gap, the inflation gap and a policy rule. A particular policy stance affects the evolution of the unemployment gap, which in turn affects the inflation gap which in turn affects the policy stance in the next period and so on.

Unemployment gap:

$$U_t = a * U_{t-1} + b * U_{t-2} + c * (R_{t-1} - R^*_{t-1}); R_t = N_t - I_t$$

U is unemployment gap, N = nominal federal funds rate, I = y/y core PCE inflation rate, R is the real policy rate and R* is the real neutral rate (for a discussion of R*, see Box 3)

Inflation Gap:

$$I_t = a * I_{t-1} + b * I^*_{t-1} + c * U_{t-1}$$

I and I^* are y/y core PCE inflation rate and inflation expectations respectively (for a discussion of I^*, see Box 2)

Policy rule: Instead of choosing a Taylor rule, we generate a path of policy rates (N_t) which minimizes the following loss function.

$$\text{Loss function} = \sum U_t \hat{} 2 + (I_t - 2) \hat{} 2 + (N_t - N_{t-1}) \hat{} 2$$

The first two terms represent the deviation from the dual mandate and the third term is to ensure that there are no sudden changes in policy rates from one year to the next. The advantage of this approach over choosing a policy rule is that a) it negates the need to choose a policy rule (as there are several) and b) it allows us to explore policy paths beyond those that can be generated by linear rules. An unconstrained rule may be better suited to a makeup framework.

Needless to say, this is a very simplified version of the model of the economy. One can also use the Fed's FRB/US model, which has hundreds of equations but such a stylized model can provide the needed intuition without being complex, in our opinion. Further, we calibrate the above model to the impulse response results from FRB/US to capture similar dynamics.

accommodation, it does so at a measured pace. The Fed needs to allow inflation to remain above 2% for some time as otherwise realized and ex-ante inflation expectations would not be consistent. The Fed eventually makes policy tight thus bringing the labor market and inflation back to steady state. Worth noting is that policy in real terms becomes only modestly tight (much less so than implied by a Taylor rule) thus leading to a gradual normalization. As referred to by Fed Governor Brainard, one could think of this approach as adopting "opportunistic reflation."

Third, the steady state nominal rate is higher under the makeup framework. This should not be a surprise; the more credible the Fed in meeting its inflation goal, the greater is the likelihood that inflation expectations embedded in bond yields rise to 2% thus pushing nominal rates higher, even if the real neutral rate stays the same.

Overall, a credible change in the reaction function, all else equal, can significantly alter the trajectory of the policy rate, not just immediately but well into the future. Before we delve

Box 2: Inflation expectations are anchored below 2%

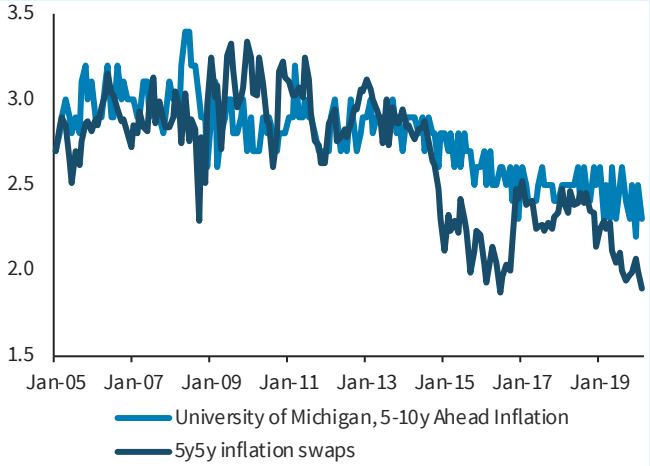
One feature of this long recovery has been inflation persisting below 2% even as the unemployment rate has fallen to decades' lows. Immediately after the great financial crisis, when the Fed launched asset purchases, it was widely criticized for creating hyper-inflation down the road. Meanwhile, a few trillions later, inflation refuses to even sustain at the 2% target.

A possible reason is that inflation expectations themselves are anchored below 2%, which given a flat Phillips curve, make it hard for the Fed to reach its target sustainably. Figure 5 shows survey measures of long-term inflation expectations (as measured by University of Michigan) have steadily drifted lower and are significantly below the levels prevailing before the crisis. Market measures of inflation expectations (or compensation) have fallen even more. 5y5y CPI swaps traded around 3% before the crisis and are now at just 2%. This is also evident in the actual behaviour of inflation. Figure 6 shows a top-down model of core PCE inflation using labor market slack, past changes in broad trade-weighted dollar and energy prices. As can be seen, the fit is reasonable but what is interesting is that when we project inflation forward assuming unchanged right hand side variables, it stabilizes at 1.7%. This also suggests that inflation expectations are anchored below 2% and whenever inflation has actually hit 2%, it has been due to "transitory" factors. Our economists have published a underlying inflation gauge, which points to the same conclusion (*Barclays Underlying Inflation Gauge: Turn up the heat to hit 2%*, September 9, 2019).

Overall, the evidence suggests inflation expectations are not anchored at 2% but somewhat below. In our view, the Fed's own policy decisions have at least been partly responsible; the Fed has been too eager to "normalize" policy even as inflation remained stuck below 2%. The framework review aims to rectify this perception.

FIGURE 5

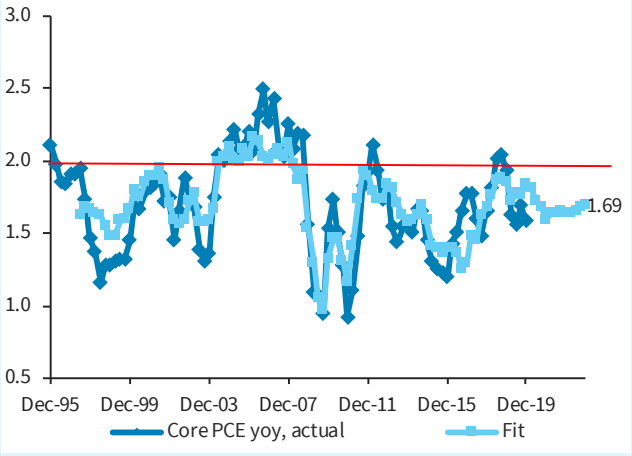
Measures of inflation expectations have been drifting down



Source: Haver Analytics, Barclays Research

FIGURE 6

A top down model suggests inflation anchored below 2%



Source: Haver Analytics, Barclays Research

into other scenarios, we first translate the above-discussed path of policy rates into yield levels across tenors. We also use real world examples to illustrate how a shift in the reaction function can alter the response of the yield curve to the evolution of economic data. Further, while one can consider upside scenarios as well, where the unemployment rate falls even faster, we believe the conclusions would not be different. The Fed would still be likely to run easier policy under a "makeup" framework versus the "bygones" framework.

Reshaping the yield curve through expectations…

As mentioned earlier, yield levels can be thought of as having an expectations component based on how policy rates are likely to evolve and an additional term premium component.

In the makeup framework, rate levels are lower up to the intermediate sector and the yield curves much steeper than in the bygones one

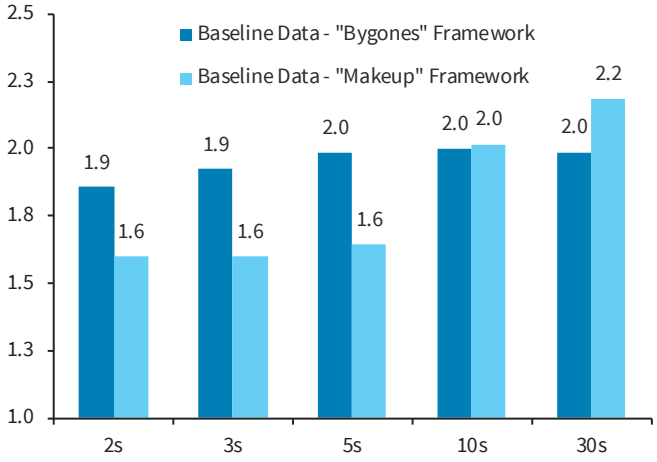
Figure 7 shows rate expectations levels under the two frameworks. As can be seen, versus the bygones framework, rate levels are lower up to the intermediate sector in the makeup one; for instance, at the 5y tenor the expected path of short rates would average 1.6% in the makeup one versus 2% in the bygones one. On the other hand, the picture is the opposite at the long end of the curve; at 30y policy rates would average 2.2% in the makeup framework versus 2% in the bygones one. While it is tempting to compare these results to market pricing, we would suggest caution, as that requires taking a view on the distribution of economic outcomes as well as term premium, which we do later.

The simulation results should not be surprising, as in the makeup framework, longer tenors need to price in the possibility of an overshoot even as shorter tenors price in the Fed on hold for longer. This is most evident in the shape of the curve. Figure 8 shows that that the 5s30s curve steepens to 54bp in the makeup framework versus less than 0bp in the bygones framework. This is especially true in forward space; 3yf 2s10s at 53bp versus -7bp.

While these results seem intuitive, it is useful to see whether this has been reflected in the real world. The closest analogies for the bygones framework are the price actions followed by the insurance eases in 1995 and 1998, when the Fed cut policy rates by 75bp and the economy recovered from the downturn. While it is difficult to find an analogy for the makeup framework , the closest one is the optimal control discussion in 2012 when the then Vice Chair Yellen argued in favour of delaying rate hikes (versus that implied by Taylor rules) to allow for further improvement in the labor market[1].

FIGURE 7

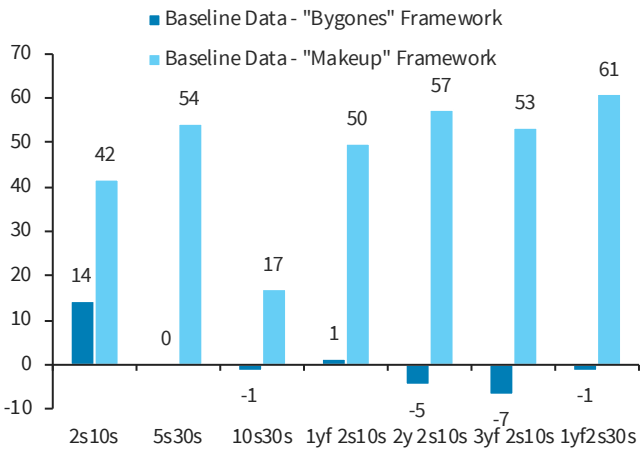
"Makeup" strategies would anchor front to intermediate yields but should push long-term yields higher…



Source: Barclays Research

FIGURE 8

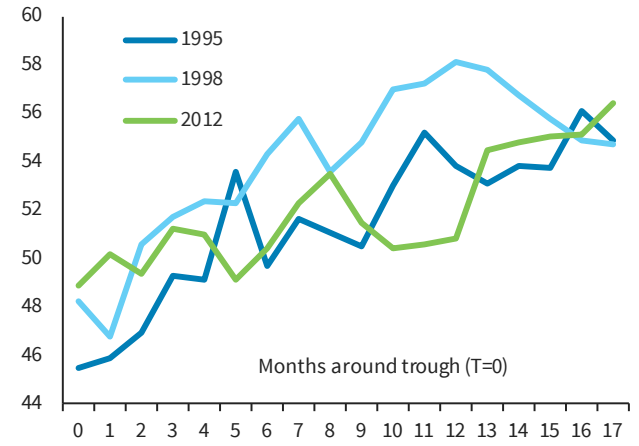
…resulting in much steeper curves in a favorable economy



Source: Barclays Research

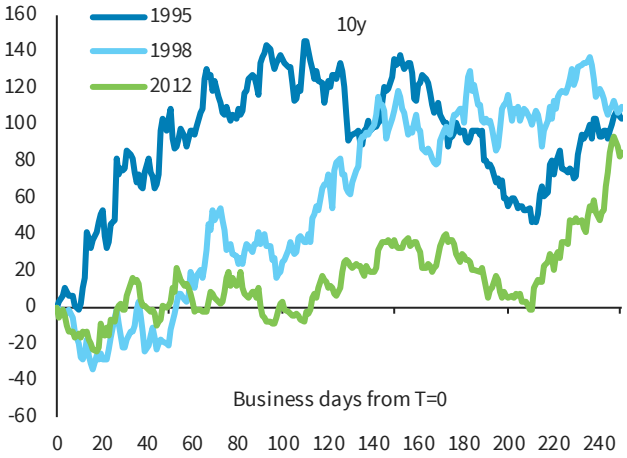
[1] *https://www.federalreserve.gov/newsevents/speech/yellen20120606a.htm*

FIGURE 9
ISM rebounded following insurance eases…



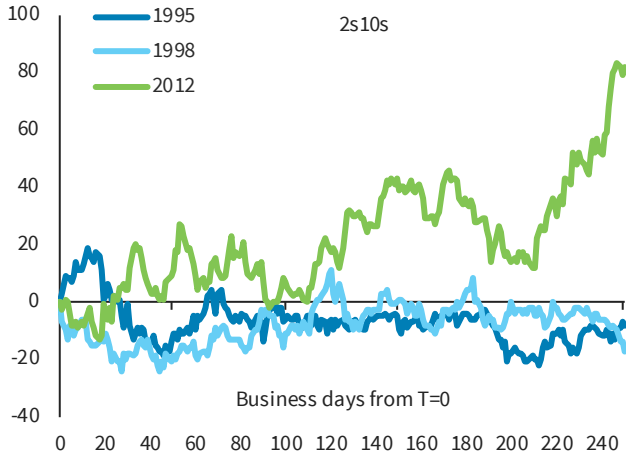
Source: Haver Analytics, Barclays Research

FIGURE 10
…leading to a significant selloff in 10s…



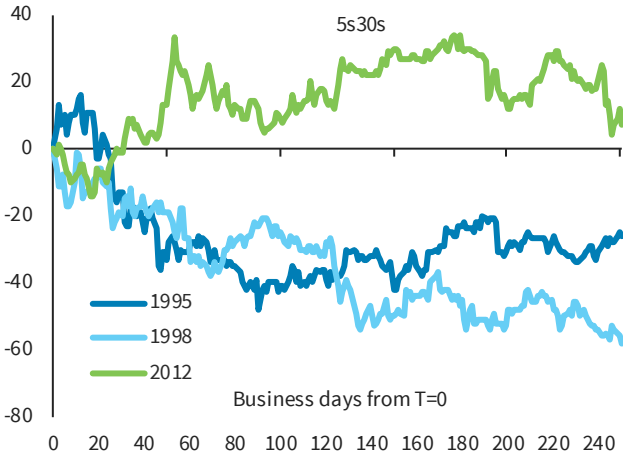
Source: Haver Analytics, Barclays Research

FIGURE 11
…and the flattening of the 2s10s curve (except in 2012)



Source: Haver Analytics, Barclays Research

FIGURE 12
A divergence in curve behavior



Source: Haver Analytics, Barclays Research

In Figures 9 to 12, we plot the ISM manufacturing index (as a proxy for the economy), 10y yields, 2s10s and 5s30s yield curves around these events (t=0 being the last rate cuts in 1995 and 1998 and June 2012). ISM troughed right around the "insurance cuts" and was also rising in late 2012 as the global economy recovered from the European crisis. Figure 10 shows that 10y yields rose over the subsequent months, especially in 1995 and 1998 when the data recovered more sharply; yields rose in 2012 but less so until the taper tantrum.

Evolution of yields in the real world confirms the intuitive results from the small-scale model

What is interesting is that evolution of the yield curve. The selloff was led by the front to intermediate sector in 1995 and 1998. The 2s10s and 5s30s yield curves flattened in the selloff; within a year of the last rate cut, 2s10s and 5s30s curves were 20bp and 50bp flatter. This was because as the data recovered, the market started pricing in rate hikes. This is very similar to our results for the bygones framework; the 2s10s (and 5s30s) curve is steepest in spot space but flattens in the forward space as rate hikes enter the horizon. On the other hand, in 2012, the selloff was led by the long end; 2s10s and 5s30s gradually steepened with the former steepening by as much as 80bp, though they were "helped" by the taper tantrum in mid-2013. Again, this is consistent with our simulation results under the makeup framework which show a steeper 2s10s in the forward space.

Overall, evolution of yields in the real world do confirm the intuitive results from the small-scale model. In addition, as we discuss below, yield curves can steepen further through the term premium channel.

…and through greater term premium at the long end

Post GFC, term premium for safe haven bonds has generally been very low and deeply negative at times. Investors have accepted this new reality reluctantly as it contradicts commonly held beliefs that investors need to be compensated for taking duration risks; after all, the investor is exposed to inflation by accepting fixed nominal cash flows.

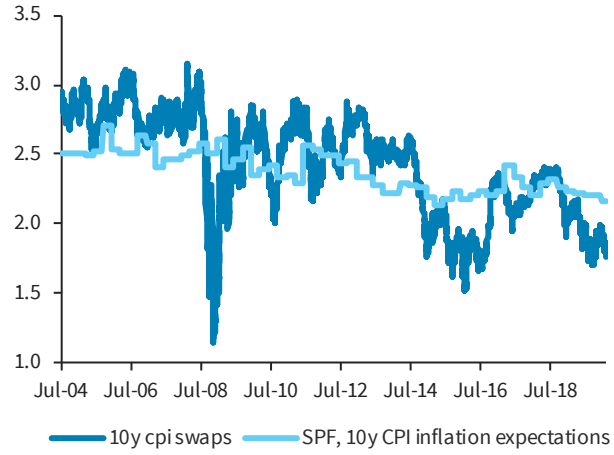
Term premium has been very low and sometimes negative, which reflects a shift in the regime: where instead of worrying about a rise in inflation, investors are rather worried about what adverse outcomes mean for their portfolio of risk assets

So why has term premium been so low and sometimes negative? It mainly reflects a shift in the regime: where instead of worrying about a rise in inflation, investors are rather worried about what adverse outcomes mean for their portfolio of risk assets. Figure 13 shows that inflation swaps rates have been below survey-based inflation expectations, thus pointing to a benign view about upside inflation risks. Figure 14 shows that at the same time, the stock-bond return correlation has persisted in negative territory. In other words, negative term premium is the price investors are willing to pay to get the diversification benefits that Treasuries provide, especially in the absence of high inflation. Interest rate volatility has declined to historical lows, which has also suppressed term premium.

While many have attributed low term premium to the Fed's securities portfolio, which is much larger today than pre-crisis, we see little evidence of a permanent effect. While it is certainly true that the markets reacted sharply to initial announcements of QE and the taper tantrum, that is not sufficient to argue that the channel through which QE affects the yield curve is the portfolio channel (investors selling bonds to buy riskier assets). For instance, when the Fed let its portfolio shrink, there was no discernible upward pressure on term premium. In our view, this was because that had little information about the path of policy. The taper tantrum actually brought into question the timing of the first hike (as evidenced by a rise in volatility at shorter tenors). In our view, asset purchases work mainly via the expectations channel, i.e., it is unlikely that a central bank would be hiking when it is buying assets. Hence, asset purchases are largely a stronger form of forward guidance.

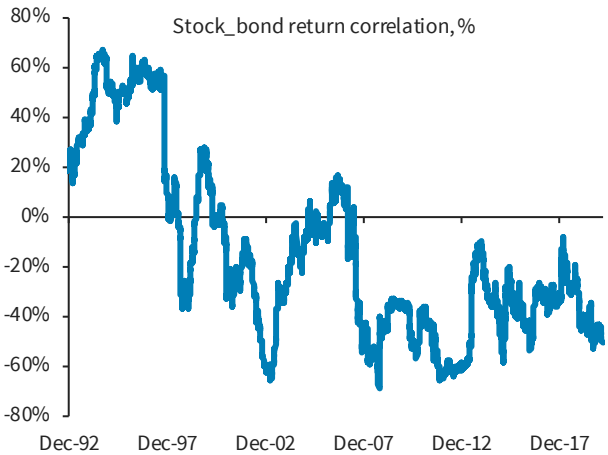
Following from the earlier discussion, it is therefore natural to expect higher term premium further out the curve under the makeup framework for a few reasons: First, to the extent the Fed shows willingness for inflation to overshoot 2%, investors should take a more balanced

FIGURE 13
Investors have a very benign view about upside inflation risks (%)



Source: Survey of Professional Forecasters, Barclays Research

FIGURE 14
Stock-bond return correlation has persisted in negative territory even as yields have fallen



Source: Barclays Research

view of inflation risks. Second, there is likely to be greater uncertainty about the path of policy rates over the medium term (related to the timing and extent of overshoot), which should push volatility in those parts of the curve higher (see the volatility section for more details). Finally, the point on the yield curve that benefits in risk-off environments should move further in. Presumably in periods of above-target inflation, the Fed may not be able to offset adverse shocks to the economy to the extent it can when inflation is below target. Hence, for all these reasons, one should expect higher term premium at the long end of the yield curve, at least on a relative basis if not outright, further steepening the yield curves.

Modelling expectations in a downturn

So far, we have seen the market implications of a shift in the framework assuming that the economy is "still in a good place." While the implications of such a shift in a strong economy are not to be understated, they could be far more profound should the economy take a turn for the worse. As we argue below, rates investors need to consider seriously the implications of the Fed adopting new policy tools, such as "yield caps".

We simulate a garden variety recession in which an exogenous shock to the economy pushes up the unemployment rate by 2pp over a two-year horizon

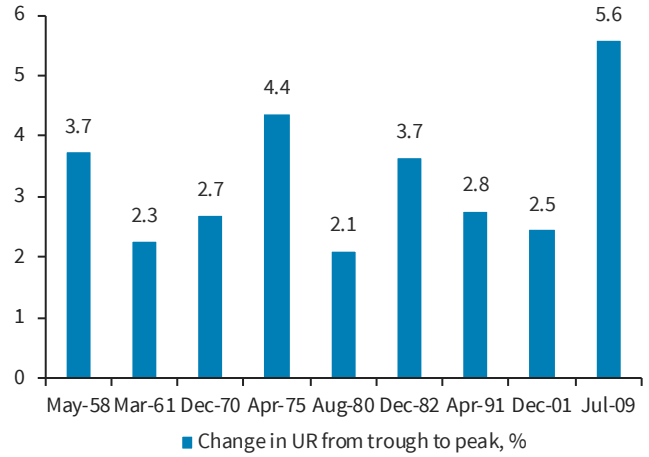
We again rely on our small-scale model. Here we simulate a garden variety recession in which an exogenous shock to the economy pushes up the unemployment rate by 2pp over a two-year horizon. As Figure 15 shows, this is somewhat less than the smallest increase in the unemployment rate that has materialized in a downturn. Given that there are no obvious excesses in the economy, it is reasonable to assume that should there be an exogenous shock, the impact would not be as adverse as in the past.

In Figure 17 we show the evolution of the same key variables; unemployment gap, inflation gap, nominal and real fed funds rate. The green and the purple lines show the results under the bygones and makeup framework, respectively. To put these in perspective, the thin blue lines show the results from the previous simulation.

To begin with, as the unemployment rate rises (bottom left chart) and inflation begins to fall (bottom right chart), the Fed eases policy (top two charts). Since the bottom end of the target range of the fed funds rate is only 1.5%, the Fed quickly finds itself at the ZLB. With a negative real rate, monetary policy turns accommodative (but not as much as it first appears as neutral rates fall as well, see Box 3 for details), thus supporting a decline in the unemployment rate and a modest subsequent rise in the inflation rate. When it looks like the unemployment rate is getting close to prevailing NAIRU estimates, the Fed begins to

FIGURE 15

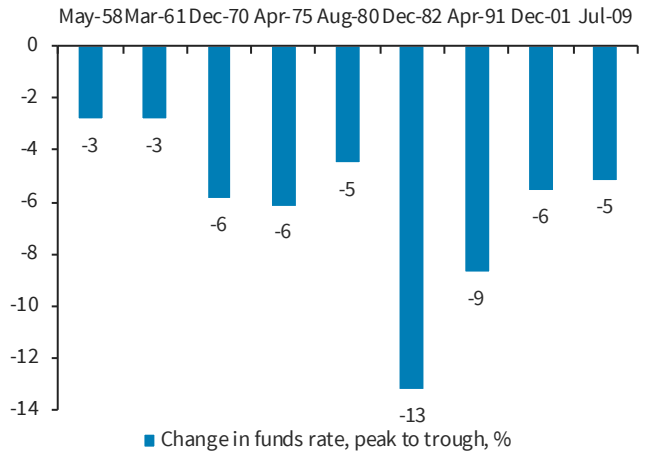
Unemployment rate has typically risen by more than 2pp in a recession (%)



Source: Haver Analytics, Barclays Research

FIGURE 16

The Fed has cut much more than 1.5pp in a recession (%)



Source: Haver Analytics, Barclays Research

remove accommodation. Again, inflation rises from the lows but does not get to 2%. In fact, since inflation expectations are likely to fall further from where they were before the downturn, it does not even reach those levels. In steady state, policy returns to the "new" neutral, the labor market is modestly tight but inflation is well below 2%.

One thing of note is that even in the bygones framework, the fed funds rate remains at the ZLB for a few years. While this may seem surprising given the exogenous shock's garden-variety magnitude, the reason is the proximity to the zero lower bound. Figure 16 shows that historically the Fed has eased policy rates by far more than the 1.5pp available currently. It is possible that the Fed's adopting "unconventional" tools could shorten this period, but their effectiveness may be less now than immediately after GFC.

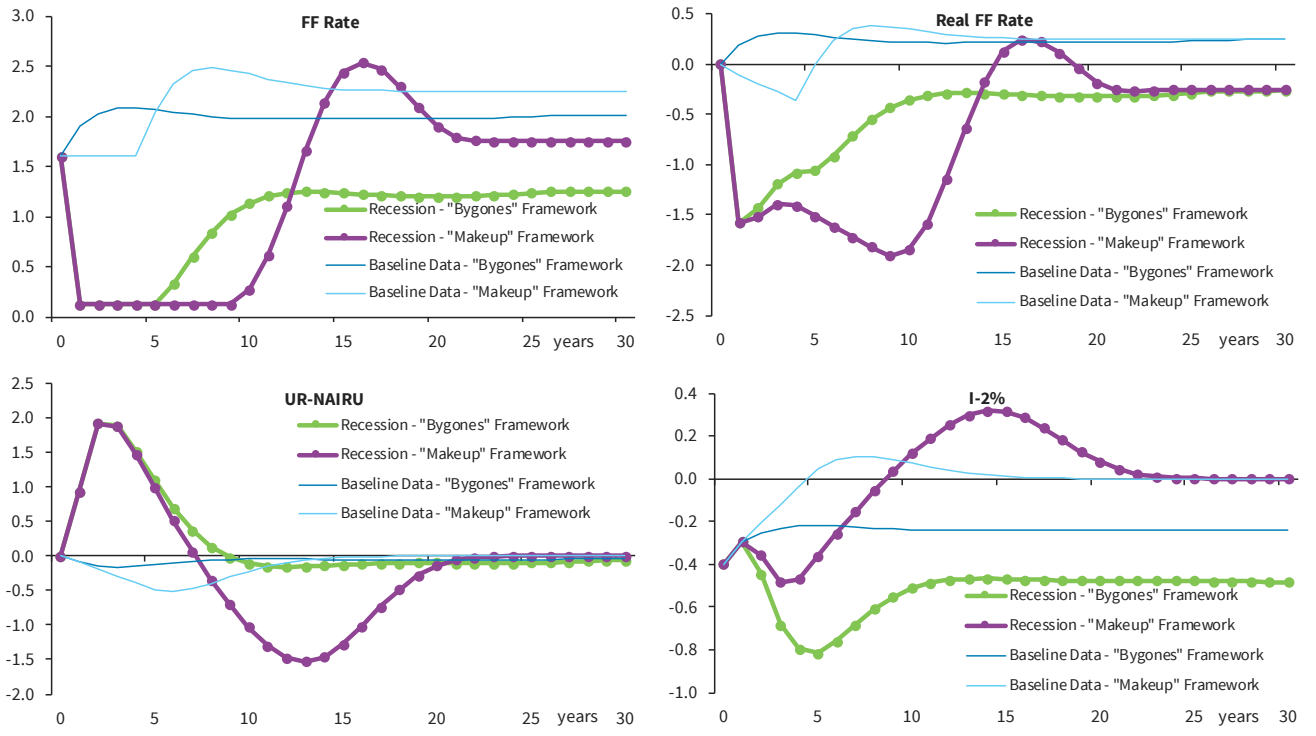
To make up for the inflation shortfall, the Fed would need to push the labor market significantly into tighter territory and stay at the ZLB for much longer in the makeup framework

Over the forecast horizon, inflation remains below 2%. What could the Fed do to push it higher? Again in this scenario, we minimize the loss function subject to an additional constraint of inflation averaging 2% over a long horizon. We also assume that the inflation commitment is credible enough to push expectations to 2% over time. Figure 17 (purple lines) shows the alternative path of evolution of these key variables.

What really stands out is that to make up for the inflation shortfall the Fed would need to push the labor market significantly into tighter territory. The reasons are two-fold: a) first, the inflation shortfall the Fed would need to make up for to keep expectations anchored at 2% is much larger and hence requires a bigger overshoot and b) a fairly flat Phillips curve requires labor markets to tighten much more for a given overshoot. In turn, that would require staying at the ZLB for much longer. As Fed Governor Brainard noted, the Fed would achieve this by announcing an intention to push inflation above 2% and also adopting tools that convey an expectation to stay at the ZLB for long; otherwise inflation expectations would not rise (a critical assumption in these simulations).

FIGURE 17

Modelling the expectations component in a downturn (%)



Note: See Box 1 for the methodology. Source: Barclays Research

What could the new policy tool be? In a recent speech, Fed Governor Brainard noted that "[i]n particular, there may be advantages to an approach that caps interest rates on Treasury securities at the short-to-medium range of the maturity spectrum—yield curve caps—in tandem with forward guidance that conditions lift-off from the ELB on employment and inflation outcomes." While there is definitely merit to this idea, in our view, but as the above simulation shows, short-to-medium maturity caps may not provide additional stimulus. Even in the bygones framework, the Fed is expected to stay on hold for many years. Hence, those yields would already reflect such an outcome.

To provide additional stimulus consistent with the makeup framework, we believe the Fed may have to go beyond the front end. For instance, when Bank of Japan adopted the yield curve control framework, it targeted 10y yields, noting in September 2016 that "The Bank will purchase Japanese government bonds (JGBs) so that 10-year JGB yields will remain more or less at the current level (around zero percent)."[2]

Box 3: Neutral rate estimates may fall further in the next downturn

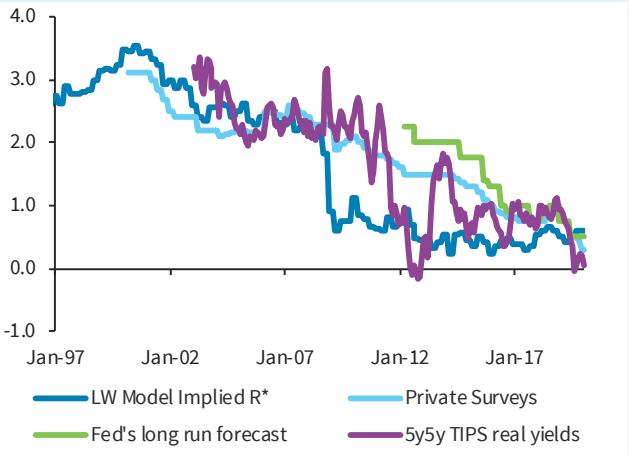
The neutral rate, which serves as an anchor for long-term yields, has significantly declined from pre-crisis levels. Figure 18 shows that regardless of which measure you chose – model based, survey based or market based – long-term real yields at 0-0.5% are much lower today than pre-crisis at 2-2.5%.

All the reasons for this is beyond the scope of this paper, but it is understood generally to be reflecting excess savings over investments. Demographics seem to have a played a major role in various inter-connected ways. Aging of the population, rising longevity and rising inequality are all estimated to have led to higher savings. At the same time, while productivity growth seems to have improved somewhat over the past few years, it remains to be seen whether that shift higher is permanent.

How is it likely to evolve? In Figure 19, we use the Holston Laubach Williams model to project r* under different economic scenarios. Under the consensus scenario, model implied r* gradually falls towards 0%. The model captures that if despite the o/n real rate being at 0%, the economy does not accelerate, then r* may not be as high as 0.5% as the Fed currently forecasts. Should the economy slow down materially, model implied r* would decline faster and perhaps into negative territory. While this is a mechanical application of the model and one needs to argue from a structural perspective as to why r* should fall but perhaps in a downturn as business investment falters or households grow more cautious, the equilibrium rate shifts lower.

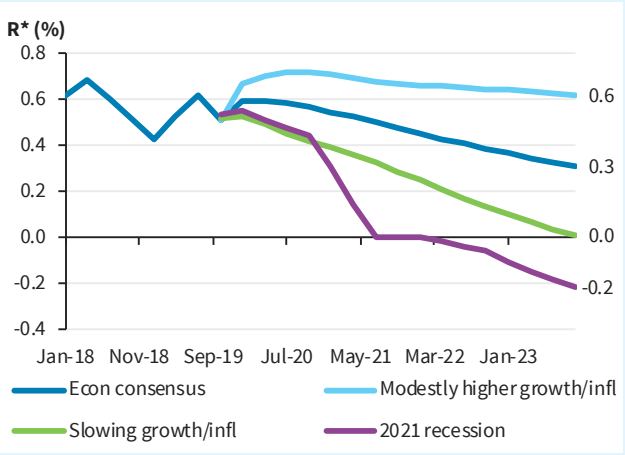
The key implication is that in the next downturn, long-term real yields may fall further, and for policy to be as effective, the Fed would need to remain on hold for longer, which will pull real rates lower across the tenors.

FIGURE 18
R* estimates are much lower today than pre GFC (%)



Source: Federal Reserve, Barclays Research

FIGURE 19
R* estimates should decline further from current levels



Source: Federal Reserve, Barclays Research

Having said that, the trade-offs following a downturn with a low starting level of inflation could potentially be greater than if the economy is growing above trend with inflation closer to 2%. For instance, would pushing the unemployment rate to such low levels or inflation above 2% for so long be desirable? Perhaps that will hold the Fed back from such a strong commitment, but, as we discuss below, the Japan experience with YCC argues against an incremental approach. If the commitment is not seen as credible enough, then inflation expectations are unlikely to rise, perpetuating "low forever."

Low for longer or forever?

Next we look at how such a shift in the framework would interact with a downturn and what that means for yield levels and curves. In Figure 20 and 21, we show yield levels across tenors as well as key yield curves. To put these in context, we show the results from the previous simulation as well.

A few things stand out:

In the next downturn, long-term yields may be pinned close to 0 with the entire steepness of the curve beyond the 10y point

First, regardless of the framework, in a downturn, front to intermediate rates fall close to zero lower bound. This underscores our point that yield curve caps in the short to medium tenors are likely not incrementally stimulative.

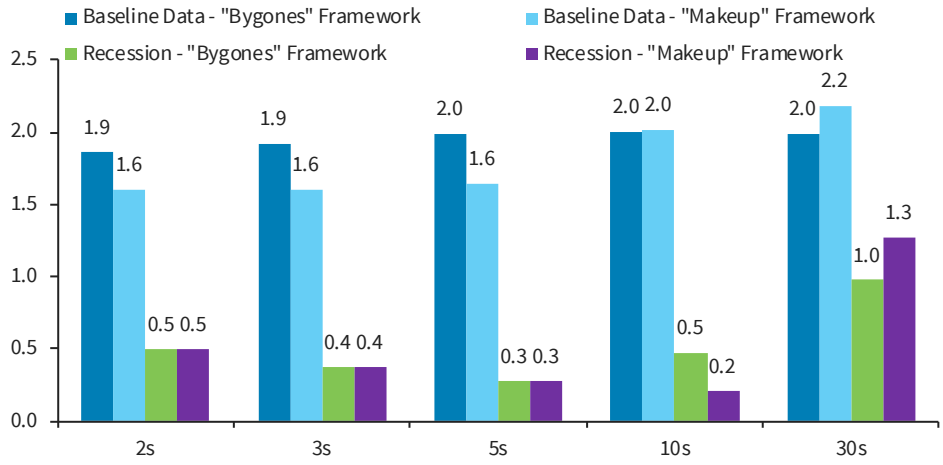
Second, following from the above, yield curves such as 2s10s do not steepen under the makeup framework and may even flatten. This is in sharp contrast to how 2s10s has typically behaved in a major easing cycle and also what our simulation shows (Figures 22 and 23). The reason is that 10y yields fall materially as well.

Third, the entire steepness of the curve is beyond the 10y point. 10s30s steepens to 100bp even as 2s10s is inverted in the spot space and close to 0 in the forward space. Figure 17 shows the reason: the 30y tenor prices in the overshoot, whereas yields up to the 10y point price in the Fed at ZLB.

Do these results look intuitive in the real world? Unlike in the previous example where we looked at the evolution of yields in a strong economy, there are no recent examples in the US. However, we can look at the yield curve control (YCC) experiment in Japan to see if our conclusions make sense and as we discuss below, they do.

FIGURE 20

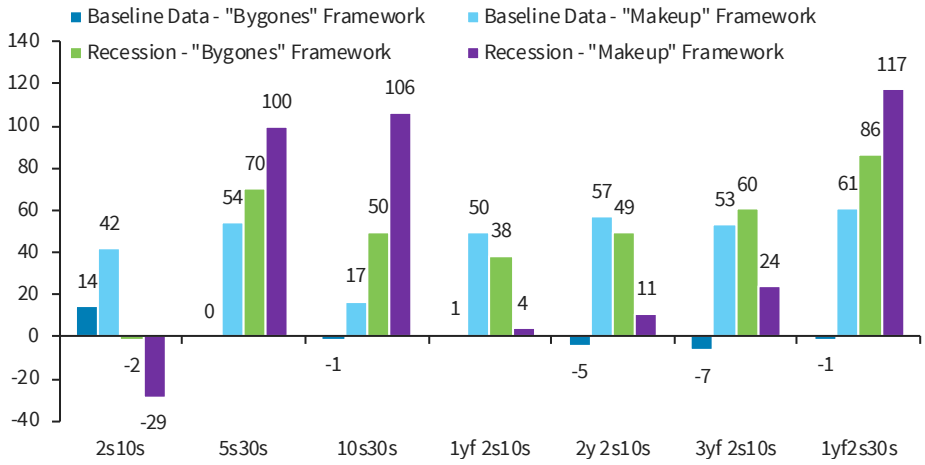
Yields all the way up to 10y could be pinned down to close to 0% in a downturn…



Source: Barclays Research

FIGURE 21

…with the entire steepness in the yield curve beyond the 10y tenor



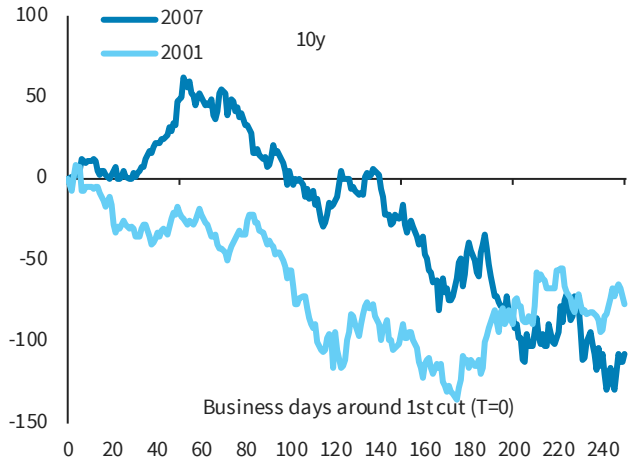
Source: Barclays Research

Japan: A shift in volatility and activity to the super-long end

The BoJ launched its yield curve controls (YCC) in September 2016 after the JGB curve bull-flattened rapidly with super-long yields falling to around 0% at one point amid the search for positive yield following the introduction of the negative interest rate policy (NIRP) in January of that year (Figure 24). With the extremely low level of yields raising concern that the BoJ's low interest rate policy could have costs exceeding its benefits, the BoJ conducted a "comprehensive assessment" in September 2016. It reached a conclusion on the optimal yield curve level and shape for maximizing monetary easing effects on the economy and prices. It concluded that yield declines in the short/medium-term sectors could affect the economy positively, while excessive declines in long/super long yields could negatively affect economic activity by lowering the investment returns of life insurers and pension funds and increasing the retirement liabilities of corporates.

FIGURE 22

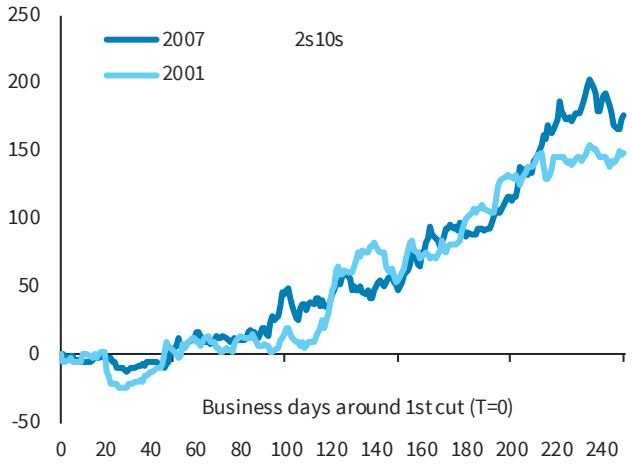
10y yields fell in the 2001/2007 easing cycle (bp)



Source: Haver Analytics, Barclays Research

FIGURE 23

2s10s curve steepened in 2001/2007 easing cycle (bp)



Source: Haver Analytics, Barclays Research

In 2016, BOJ introduced YCC to keep short-term policy rates at -0.1% and long-term rates around 0% through the purchase of JGBs

Hence, it decided to introduce YCC to keep short-term policy rates at -0.1% and long-term rates around 0% through the purchase of JGBs. In order to facilitate this, it added a fixed-rate buying operation (unlimited JGB buying at a fixed yield) to its ordinary buying operations. BoJ's readiness to suppress any divergence from its target (initially 0±10bp, widened to 0±20bp at the July 2018 MPM) strengthened expectations for long-term JGB yields to stay in line with targeted levels. At the same time, it introduced an "inflation-overshooting commitment" (to continue expanding the monetary base until realized core CPI inflation exceeds the 2% "price stability target" on a stable basis) which further strengthened expectations for the BoJ to stick with YCC until the core CPI held stably above 2% y/y.

As a result, yields out to the 10y sector remained low with little volatility. Meanwhile, in the super-long sector, where the comprehensive assessment concluded that excessive yield declines would negatively affect the economy, the BoJ continued to reduce its JGB buying in order to encourage a bear-steepening of the curve, showing a weaker commitment to yield curve control than in other sectors (Figures 25 and 26). This brought a tendency for the curve to fluctuate between bear-steepening and bull-flattening. Although the super-long share of overall JGB trading volume in the secondary market was already trending upward since the launch of quantitative and qualitative monetary easing (QQE) in April 2013, it rose from around 20% at that time to over 25% after the introduction of YCC to around 30-35% today. Hence, both the volatility and activity shifted to the 10y+ tenors (Figure 27).

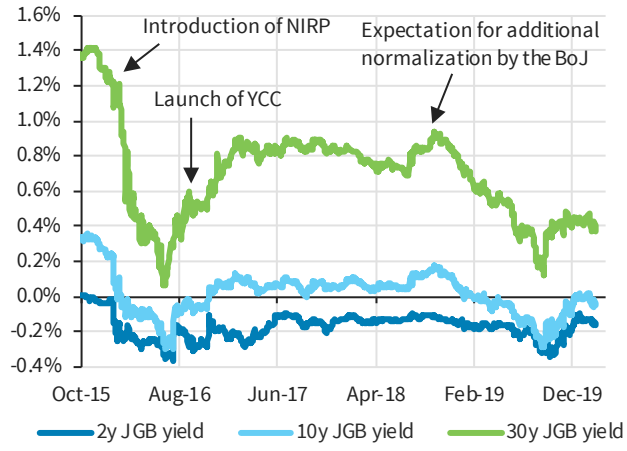
While YCC did have the intended effect, over time even super-long yields started drifting lower, which is a tale of caution for the US

When the BoJ weakened its control of the curve, by widening the YCC trading band from 0±10bp to 0±20bp in July 2018, the yield curve did not flatten. Instead, the JGB curve strengthened its bear-steepening bias until early October with implied volatility increasing in the process and the 20y sector underperforming after a period of outperformance until then. Given the BoJ's stance that short/medium-term yield declines are positive for the economy, while super-long yield declines are negative, any normalization of policy would likely involve a shortening of the sector targeted under YCC.

Hence, YCC did have the intended effect. However, over time even super-long yields started drifting lower, which is a tale of caution for the US (Figure 25). Despite these efforts, inflation and inflation expectations failed to rise to the 2% target. Expectation for those conditions to persist led many investors to show a strengthened preference for super-long sectors with positive yields and relatively attractive carry, particularly the 20y sector. The BoJ gradually reduced its buying in the over-10y sector, but domestic investors, especially banks

FIGURE 24

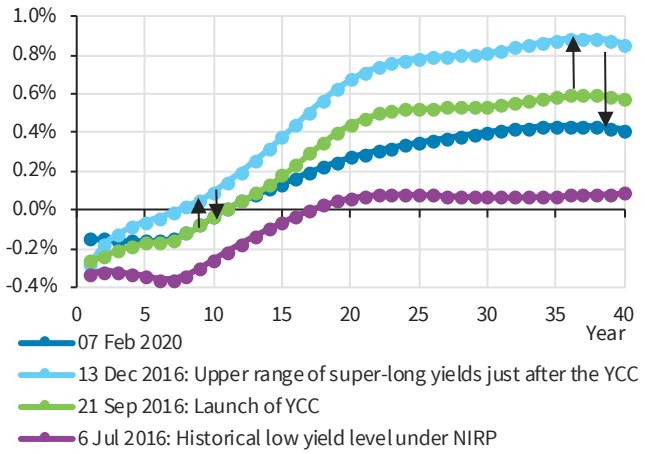
YCC brings orderly capping of JGB yields from short-term sector



Source: Barclays Research

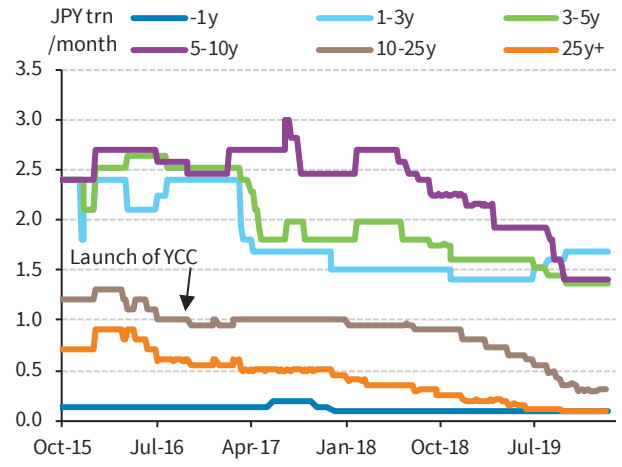
FIGURE 25

JGB curve shows strengthened tendency to change with the long end



Source: Barclays Research

FIGURE 26
BoJ gradually reduces over-10y purchases



Source: Bloomberg, Barclays Research

FIGURE 27
Trade volume in over-10y sector increasing further under YCC

Source: JSDA, Barclays Research

and pension funds, strengthened their investment in the pursuit of carry. Ultimately, steady demand from real money investors led the super long to rally as well. While the relentless rally in safe haven yields globally did not help, the fact that inflation expectations failed to rise show the limit of monetary policy.

In our view, the lesson is that inflation and inflation expectations were allowed to remain subdued for too long, which argues for the Fed to be as aggressive as possible up front rather than to take an incremental approach.

Rate volatility looks very different in a "makeup" regime

We have already laid out how a change in the framework leads to a change in the shape of the curve. There is a key difference in the resulting policy paths, in that policy in the "makeup" regime is much more likely to produce "overshoots" in inflation or unemployment compared to the status quo, and consequently lead to overshoots in policy rates. More generally, however, in the presence of uncertainty on the state of the economy, a "makeup" policy framework also implies a different interest rate volatility surface.

The new regime should feature higher volatility in longer tenors than the old regime

In order to understand the impact of the changing policy regime, we run a set of simulations using the small-scale model described earlier. In the example given above, we had simulated a garden-variety recession in which an exogenous shock to the economy pushes up the unemployment rate by 2pp over a two-year horizon. In our simulation, we vary the size of the unemployment shock and the timing of the arrival of the recession, by drawing from the historical distribution of unemployment changes over one year, and then solving the small-scale model in each scenario. This allows us to generate a series of potential paths for the fed funds rate. Assuming that agents have a perfect understanding of the economy after each shock, we construct forward-looking par rate paths from the path of the funds rate. We conduct the exercise for current policy and the new regime.

We use the simulated paths to come up with standard deviations for each tenor for 1y and 2y forward dates. The standard deviations for various forward-looking tenors at the 1y expiry are shown in Figure 28, under both the "makeup" and the "bygones" regimes. The real-world analogue of these standard deviations would be the swaption-implied volatilities for each tenor at those expiries, although the numbers are not exactly comparable since we are ignoring that component of volatility that arises from shocks to term-premia. We then draw conclusions from the difference between simulated standard deviations.

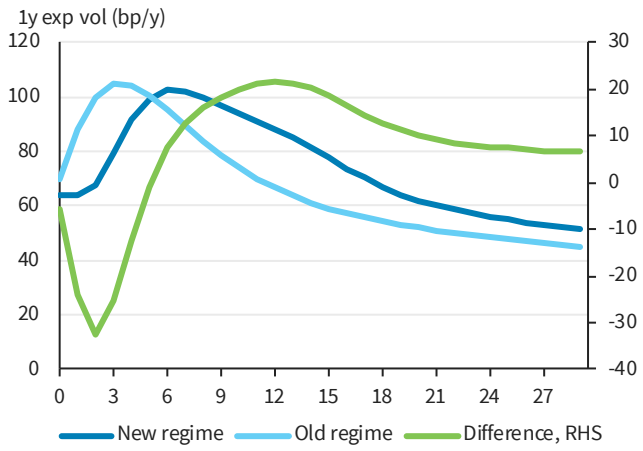
- Despite ignoring term premia shocks in our simulations, the shape of these simulated vol surfaces is qualitatively similar to the actual vol surface (the peak of volatility is between 5y and 10y tenors).
- It suggests that the new regime should feature higher volatility in longer tenors than the old regime.
- The new regime should feature lower volatility in shorter tenors than the old regime, because the probability of being on hold for a long period is higher.
- We also find that the new regime leads to lower correlations between shorter and longer tenors, which is an additional boost for curve volatility. With shorter tenor vols essentially the same, and longer tenor vols somewhat higher, this implies that the curve should also be more volatile in the new regime.

We also find that the new regime leads to lower correlations between shorter and longer tenors, which is an additional boost for curve volatility

What is the reason behind these results? We offer an explanation through a stylized example. Figure 30 shows policy rate paths for a "makeup" framework under various scenarios of a shock in the economy that causes the Fed to cut aggressively to zero, compared with stylized paths under a "bygones" regime in Figure 29. The main difference between the two is that under the "makeup" regime, the fed stays on hold for longer and then hikes at a faster pace. In this stylized example, there is only one source of uncertainty: the timing of the arrival of the downturn, which results in the range of paths shown in both figures.

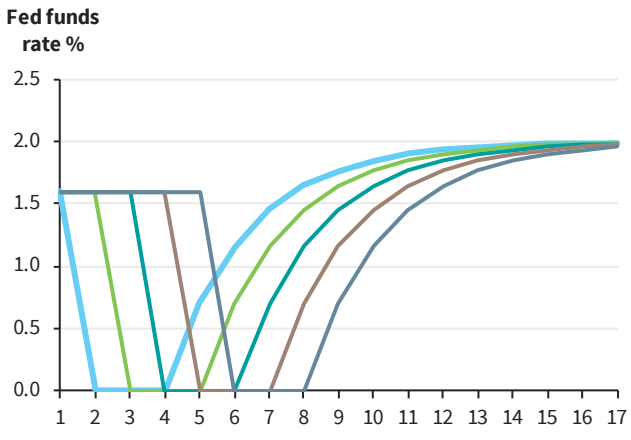
Next, we assume perfect foresight and construct forward-looking 10y rates under each scenario. Figures 31 shows the 10y rates resulting from the stylized paths under a "bygones" framework, while Figure 32 shows them under a "makeup" framework. The latter clearly features a much wider range for the 10y rate over the next few years. It is also easy to show that a similar result should hold for the curve, because the combination of staying low and overshooting leads to 2y rates and 10y rates moving very differently between the two frameworks. In the "bygones" framework, shorter tenor and longer tenor rates are rising at the same time, while in the "makeup" framework, shorter tenor rates can stay very low when longer tenor rates have already begun rising. Further, in the long run when the "overshoot" happens, shorter tenor rates can rise above longer tenor rates in the "makeup" framework, while they cannot in the "bygones" framework. The figures above are based on a stylized example, but they make the point that a "makeup" strategy results in higher volatility in longer tenors and a more volatile curve. Given the low level of forward

FIGURE 28
Simulated volatilities for 1y expiries under current regime and new regime



Source: Barclays Research

FIGURE 29
Stylized example of Fed funds rate evolution under a bygones framework

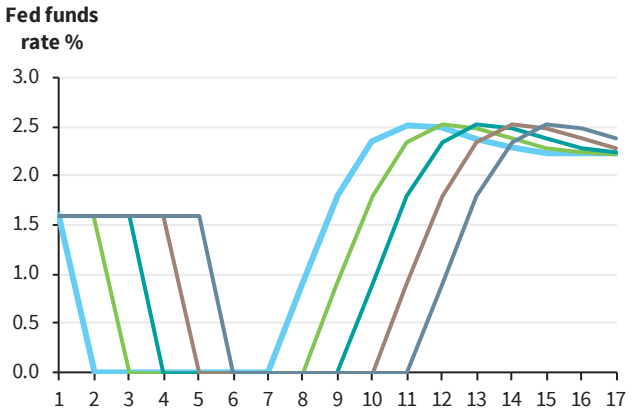


Source: Barclays Research

volatility on long tenors currently, long forward vol positions is an attractive way to benefit from a framework change.

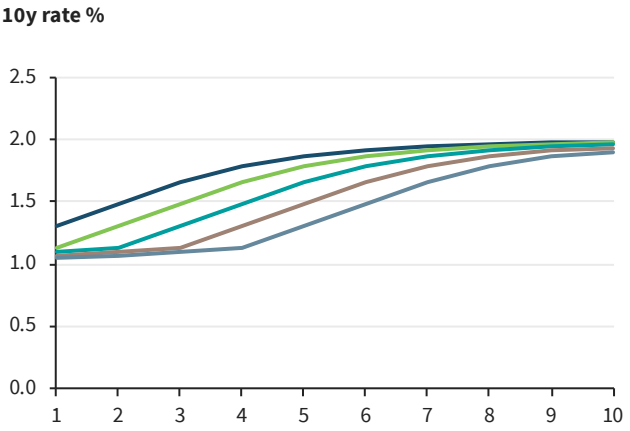
Curve risk is viewed as a second-order source of risk relative to duration risk because curve variance has been less than one-fourth the variance in the level of rates (Figure 33). Our simulation results, however, suggest that the ratio could be much closer to one, particularly when dealing with the belly-long end curve because the combination of macro uncertainty and a Fed that overshoots can lead to more volatility and less correlation between the belly and the long end. Long-term hedgers should keep this uncertainty in mind, given that many long-dated products have exposure to the shape of the future curve. In particular, implied 5s30s curve volatility in 1y to 2y forward dates currently is at the lower end of its historical range, which may be cheap in the context of changing policy reaction function.

FIGURE 30
Stylized example of Fed funds rate evolution under a makeup framework



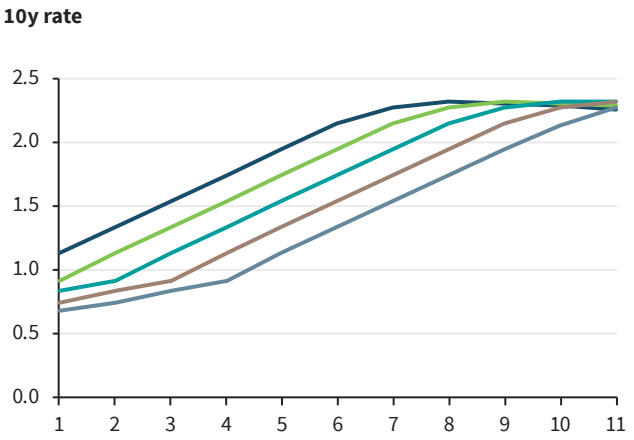
Source: Barclays Research

FIGURE 31
Stylized example of 10y rate under current regime



Source: Barclays Research

FIGURE 32
Stylized example of 10y rate under a makeup framework



Source: Barclays Research

FIGURE 33
Curve variance has been a fraction of the variance of 10y rates; this may change in the new regime

Source: Barclays Research

Trading Opportunities

Are the markets already priced for a shift in the policy framework? We don't think so.

In Figure 34, we plot the term premium across the curve, assuming that the makeup framework was in place and risks to the economy were skewed to the downside. Term premium up to the 5y tenor is about -30bp to -35bp; however, that at the long end could be as low as -70bp. The negative term premium at the front end still does not seem out of bounds, particularly if there is a rate cut in the near term. Were we to factor that in, the implied term premium would be less negative. However, if the market were priced for a credible shift in the policy framework, term premium at the long end should have been much less negative.

Hence, overall, yields in the front to intermediate sector, while having fallen well below prevailing level of o/n rates, are not unreasonable under a makeup framework. At current levels, we believe belly-long end curve steepeners, both in outright and conditional forms, look attractive. We also find value in buying forward volatility on long tails as well as curve volatility. See details below:

5s30s Spot or 1yf2s30s curve steepeners:

- The belly-long end curve should reflect not only a heightened probability of the Fed being on hold (or easier) but also the possibility of medium-term overshoot (Figure 35).
- The belly-long end curve could steepen in either scenario and the economy, surprising to the upside, could lead to a bear steepener, or, entering a downturn, could lead to a bull steepener.

1yf2s30s bear steepeners

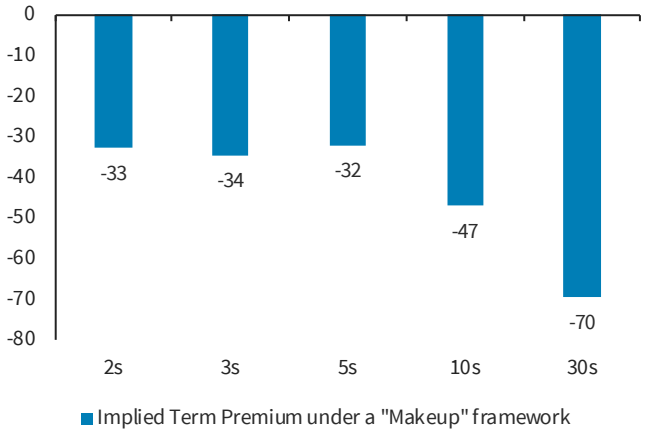
- We believe a selloff is likely to be led by the long end. Upside surprises are likely to lead to a reassessment of neutral rates and term premium, rather than the policy path.

*Long forward vol on long tenors through FVA (2yf 1y*30y vol)*

- Our results suggest that vol on longer tenors could rise under a "makeup" framework.
- Formosa supply has depressed longer dated vols on 30y tails relative to shorter dates, as

FIGURE 34

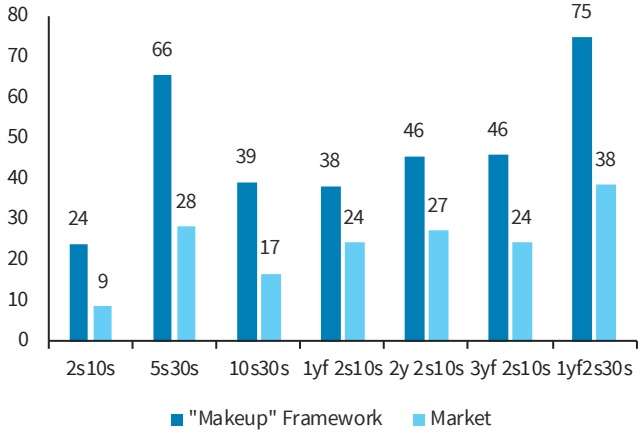
Under a makeup framework, implied term premium is modestly negative up to the intermediate sector but deeply negative at the long end (bp)



Note: We assign a 25% probability to a downturn and the remaining 75% probability to the economy continuing to grow above trend and then compare the results to the prevailing OIS rates. Source: Barclays Research

FIGURE 35

Under a makeup framework, belly-long end curves (such as 5s30s or 1yf 2s30s) should be much steeper (bp)



Note: We assign a 25% probability to a downturn and the remaining 75% probability to the economy continuing to grow above trend and then compare the results to the prevailing OIS rates. Source: Barclays Research

a result of which the vols are likely to roll up.

Long 1yf 5s-30s spread option vol

- Implied curve vols are somewhat higher than realized vols because the curve has been relatively stable. However, we believe that the market is under-pricing curve uncertainty.
- The implied variance of the 1y expiry 5s30s curve from spread options is currently less than one-fifth the variance of the 1y*30y rate. Our analysis suggests that this ratio should be much higher. This, together with the fact that vol on 30y itself can rise, suggests that buying 1yf 5s30s spread option vol is attractive, especially in the form of curve caps.

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