18 January 2024

Investment Institute Macroeconomics

# The key drivers of 10-year US Treasury yields

## Deconstructing 10-year UST drivers and the direction they could take in 2024

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## Key points

- We analysed the sharp rise and subsequent fall in 10-year US Treasury yields, looking at the key components – the neutral rate, inflation expectations and term premia. We present a simple model of yields based on macro variables
- We suggest each of the core components has contributed to a rise in yields compared to levels seen in the mid-2010s
- Our yield model suggests, based on our forecasts – and market consensus – that we are unlikely to see 10-year yields fall significantly below current levels of around 4%
- We believe there are some indicators that show concerns over fiscal sustainability have pushed yields up over the past year. We will monitor this in the context of the coming election, with neither Presidential candidate currently suggesting that Federal debt reduction is a priority

## The backdrop to significant bond volatility

2023 was a wild year for US Treasury (UST) bonds. 10-year yields witnessed their biggest rise since 1980-1981: an overall increase of around 450 basis points (bps) from the lows of 2020. Last year alone saw yields rise 165bps from 3.35% in mid-January to 5.00% in mid-October. They closed 2023 113bp lower at 3.87%. Accordingly, 2023 was also a year of high bond volatility with 10-year yields at their most volatile since 2006.

Much of the yield increase and associated volatility reflected the shifting outlook for policy; both monetary and fiscal. Monetary policy was tightened aggressively – the Federal Reserve (Fed) delivered its sharpest adjustment in over four decades. But fiscal policy also contributed, with elevated public deficits and significant issuance also contributing to the yield rise. With monetary policy (if not fiscal) expected to turn during 2024, the case for yields retreating from 5% appeared clear.

In this paper we discuss how structural developments appear to be changing – which combined with our economic outlook – makes a less certain case for yields moving materially below 4%. We believe the apparently benign unwind of Fed security holdings is having a larger impact on Treasury yields than central bankers expected. We also suggest there is some evidence the underlying (and unobservable) neutral rate – the short-term interest rate if the economy was at full employment and steady inflation – may be higher than Fed forecasts. We conclude by presenting a simple macro model, which explains historical yield movements with underlying macroeconomic variables.

We illustrate what it suggests for future yields based on our own assumptions and investigate some alternative scenarios.

## Yields: The Fundamental corner stones

What we consider: The broad conceptual components of yields.

- The **neutral rate** (or r*): This is a theoretic construct and hence not directly observable, but should act as an anchor to 10-year yields over the medium term
- **Term premium:** The excess return investors require for them to lock in returns in over the longer term. This has been more volatile recently, impacted by the central banks' quantitative easing (QE) programmes of the past 15 years. We consider developments here in the context of central banks reversing QE with quantitative tightening (QT)
- We then look at **inflation expectations**. We highlight how the recent surge has seen longer-term expectations rise back to levels consistent with the Fed achieving its long-term inflation goals – having for much of the last decade been at levels below that yardstick

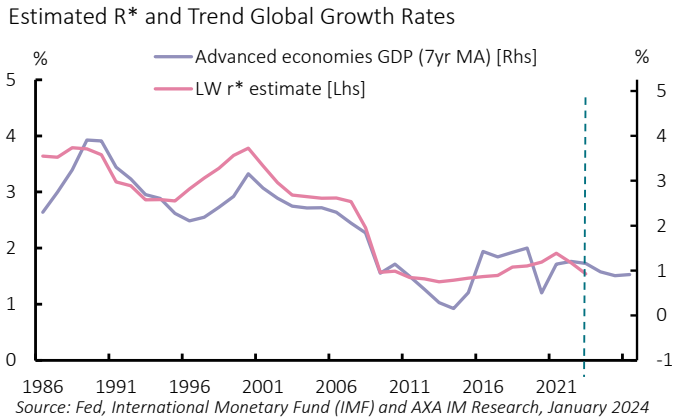
## R*: A shifting medium-term anchor

The overall rise in yields led to speculation over whether it reflected an increase in the underlying neutral rate. Drivers of the neutral rate are diverse and broadly not well understood. They can range from potential growth drivers, including demographic effects on labour supply, and productivity growth, to attitudes to risk, or changes in institutional backgrounds[1]. The neutral rate can also vary depending on whether one considers global or local conditions – and over different time horizons.

Given the vagueness of the concept, we have focused on how the neutral rate may be impacting the outlook for US interest rates. A well-observed assessment of the neutral rate has previously been made by Fed economists Thomas Laubach and John Williams. The so-called Laubach-Williams (LW) neutral rate has trended lower over several decades and fell sharply after the 2008/2009 financial crisis.

Looking at the drivers of the neutral rate, we believe that much of the movement is explained by growth's trend pace in advanced economies (Exhibit 1). This is consistent with views that the neutral rate should follow changes in potential growth and, on average, economies, expand around their potential growth rate. It is also consistent with our understanding that international interest rates are interlinked, therefore reflecting developments across advanced economies.

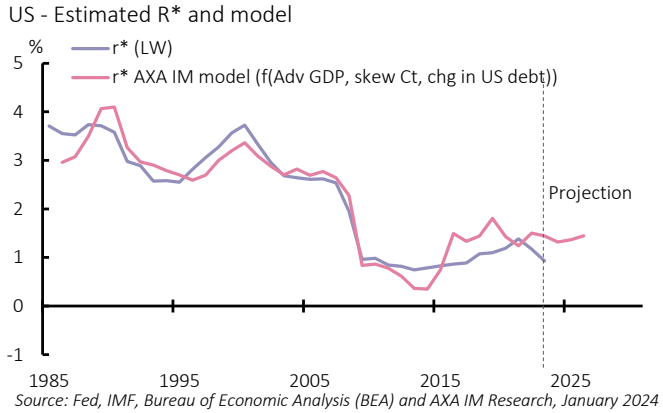
Exhibit 1: R* and trend advanced economy growth rate




*Source: Fed, International Monetary Fund (IMF) and AXA IM Research, January 2024*

However, we also allow our neutral rate estimate to reflect broader parameters of risk perception and behaviour, including the shift in overall borrowing trends. Exhibit 2 illustrates our simple model of LW neutral rates, which is precisely estimated using the 7-year moving average in advanced economy GDP growth, the change in total US indebtedness as a proportion of GDP and the skew[2] of annual US private consumption growth. This shows a broad fall in neutral rates to lows after the financial crisis, but also shows a rebound in those rates in more recent years. Our forecasts suggest neutral rates should be broadly steady. This results in two conclusions with regards to yields. First, a rise in neutral rates does seem to have occurred since the mid-2010 lows, accounting for some of the rise in yields since; such a move is unlikely to have contributed to the recent rise.

Exhibit 2: Simple r* model suggests little change over coming years




*Source: Fed, IMF, Bureau of Economic Analysis (BEA) and AXA IM Research, January 2024*

And second, our estimates seem incongruous with the Fed's assessment of the longer-term Fed Funds Rate (FFR). This is estimated to be at 2.5% in its latest Summary of Economic Projections (December 2023). However, with an inflation target of 2%, this suggests a long-term real rate at 0.5%. While we accept scope for uncertainty over time horizons, this still seems

[1] We last considered this in Page, D., "The best guide for US Treasury yields points upwards", AXA IM Research, March 2018.

[2] Skew is a description of the shape of data distribution – technically a (third) moment. Skew describes how asymmetric a data set is.

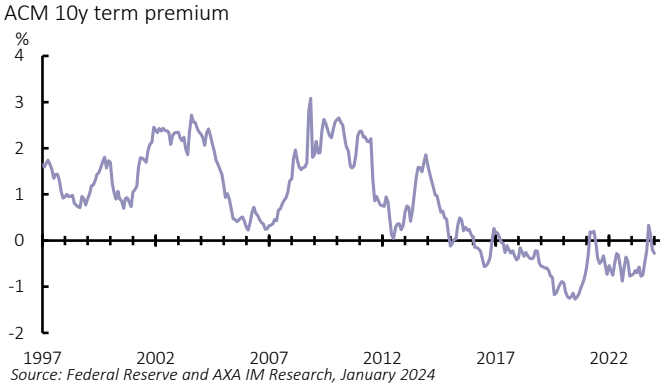
inconsistent with the LW current estimates of the neutral rate at 0.9% – and our own projections of this being steady around 1.3%. On our assessment, a longer-term Fed Funds target should be considered around 3.00-3.25%.

## A bigger term premia effect than expected

Term premia refer to the extra yield investors demand as compensation for holding long-term fixed rate assets over short-term. This premium is based on the expectation that inflation, interest rates, or overall economic conditions are more likely to change over longer periods of time.

However, term premia are unobservable and difficult to differentiate from underlying interest rate expectations, other risks, and liquidity premia. The Fed uses an Affine Term Structure Model (ACM) to estimate term premium and we focus on these assessments. Other estimation models exist which can produce different results. Exhibit 3 shows the ACM term premium on US Treasury 10-year yields has risen sharply from the lows of 2020; monthly averages are up 150bps to November 2023, with 100bps of that in the last 11 months. In turn, this suggests that for any given interest rate outlook, 10-year yields are 100bp higher over the last year alone.

Exhibit 3: Rise in term premium contributes to yield increase



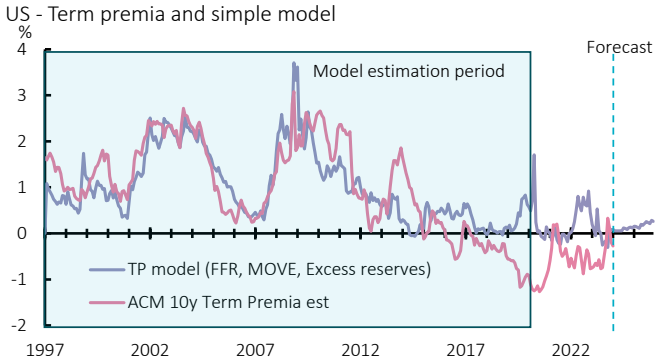

*Source: Federal Reserve and AXA IM Research, January 2024*

Term premia can naturally vary over time given the potential for evolving and differing economic conditions and expectations of future risks. Broadly we can explain term premia historically as being driven by two basic factors. First, the point in the interest rate cycle: term premia compensate bond holders for fixing their income against the risk that returns could rise. This is therefore a function of the interest rate cycle with investors requiring less compensation as rates are higher and fears of even higher rates recede. Second is volatility; the more yields move in general, the greater the risk of fixing over the longer term.

However, the advent of QE in 2008 saw central banks expand balance sheets, creating excess reserves by buying government bonds, amongst other assets. Part of the stated intention was to provide a portfolio rebalancing effect, which was designed to reduce these term premia. So, since then, a third factor – the level of excess reserves – has also been an important explanatory variable of term premia.

Exhibit 4 illustrates a simple model of the 10-year term premium based solely on these three factors which goes a long way to explaining most of the movements. Based on our forecasts for the FFR and the Fed's reversal of QE, QT and an assumption of some normalisation in volatility, we see the term premium gently rising from current levels.

Exhibit 4: Simple model points to further gains in term premia




*Source: Federal Reserve, Bloomberg and AXA IM Research, January 2024*

The suggestion that the Fed's QT has had much of an impact on bond yields is somewhat contentious. Fed Chair Jerome Powell has stated that he sees QT as having a marginal effect. Looking at the UK market, Bank of England Deputy Governor Dave Ramsden stated "the overall impact of QT on gilt yields appears to have been small"[3], with "any portfolio balance channel of QT… expected to show up in term premia". Indeed, while QE's impact on term premia and bond yields in general was thought to be rather marked, the expected impact of QT was not anticipated to be so. Ramsden explains this expected asymmetry is because of the "state contingency of the associated transmission channels". That is that, unlike QE, QT is not used to signal a given outlook for the policy rate, nor does it operate when market conditions are stressed, minimising "liquidity and market function channels".

Recent Fed research[4] supports our view that QT might have a somewhat larger impact on yields. This examines an instance when the Danish government unexpectedly halted debt issuance in 2015, arguing that this effect was synonymous to the portfolio balance channel of QE, but excluded the signalling and liquidity channels. The paper estimates the effect to have been "quantitatively similar to those reported in studies of QE

[3] Ramsden, D., "Quantitative tightening: the story so far", Bank of England. 19 July 2023.

[4] Christensen, J.H.E. and Thinggaard Hetland, S., "Passive quantitative easing: Bond supply effect through a halt to debt issuance", Federal Reserve, August 2023.

programs in the US and the UK". This of course is exactly the channel that QT operates through, and the authors believe that by also impacting additional "safety premia" that "passive QT ... has the potential to be even stronger and more contractionary for financial conditions than passive QE".

The outlook for Fed QT has recently come under closer inspection as markets consider how the Fed will balance this form of monetary tightening as it moves into a phase of overall policy loosening. These considerations have been exacerbated by recent Federal Open Market Committee minutes stating that "Several participants … suggested that it would be appropriate for the Committee to begin to discuss the technical factors that would guide a decision to slow the pace of runoff **well before such a decision was reached** …" (our emphasis). These were supplemented by Dallas Fed President Lorie Logan's comments earlier in the month suggesting the Fed "should slow the pace of runoff as ON RRP balances approach a low level" to "help get to a more efficient balance sheet in the long run".[5]

On balance, our expectation is that the Fed – once the economy does not weaken sharply and require material policy loosening – will want to continue reducing excess reserves despite being expected to move to easing monetary policy overall this year. Moreover, we believe the reduction in overnight reverse repo (ON RRP) holdings has added liquidity back into the system at more than double the pace that Fed QT is withdrawing it over the past four months, raising excess reserves over the period.

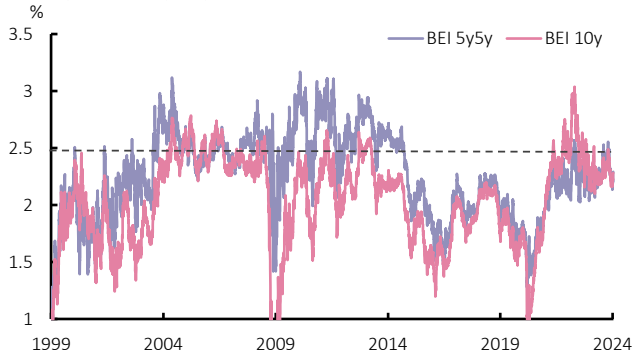
This suggests the Fed has scope to reduce reserves further – throughout this year – without fear of reducing reserves below the "ample" target level. That said, there is significant uncertainty around the underlying level of commercial bank demand for these reserves – particularly in the wake of the recent bank failures and deposit flight and increased used of ON RRP facilities. It seems sensible that the Fed conducts early discussions on this subject without necessarily inferring imminent action. However, we monitor short-term money market rates closely for signs of emergent price moves (revealing reserve scarcity) sooner than we expect. The exact path of QT will impact the outlook for term premia and yields.

## Inflation expectations

In terms of inflation expectations, Exhibit 5 shows both 10-year and 5y-5y (the average rate over a five-year period starting in five years) breakeven inflation expectations. The latter should exclude short-term cyclical variations in inflation and more closely reflect the markets understanding of the medium-term outlook for inflation, reflecting how successful the Fed is expected to be in achieving its 2% inflation target.[6]

Exhibit 5: Breakeven expectations rise back to target-consistent rate

US 10-year and 5yr/5yr Breakeven inflation




*Source: Bloomberg and AXA IM Research, January 2024*

Exhibit 5 shows inflation expectations have risen over the past few years after a period of having fallen after the financial crisis, specifically from around 2014. To us, this suggests that after 2014, markets thought the Fed would miss its inflation target to the downside. Since the recent surge in inflation, these concerns appear to have receded.

The 10-year breakeven inflation expectation also includes an impact on shorter-term inflation expectations more directly reflecting recent events. These have therefore risen by more than the 5y-5y components. However, it is these that influence current pricing and as Exhibit 6 below illustrates, the rise in 10-year inflation expectations has contributed to 10-year yields being around 70bp higher since 2021 compared to 2014-21.

Exhibit 6: Breakeven inflation average rates

| US Breakeven inflation averages | | |
|---|---|---|
| | 5y-5y | 10-year |
| 2004-2014 | 2.57 | 2.21 |
| 2014-2021 | 1.93 | 1.77 |
| 2021- | 2.26 | 2.41 |

*Source: Bloomberg and AXA IM Research, January 2024*

## A macro yield model

The above approach models the evolution of the concepts of yields, but we model 10-year yields directly using macro variables: GDP, the Fed Funds Rate, excess reserves, Treasury issuance and bond market volatility. That is to say that we do not estimate the yield directly based on our assessments of the neutral rate, term premia or interest rate expectations, although these assessments inform our view about underlying

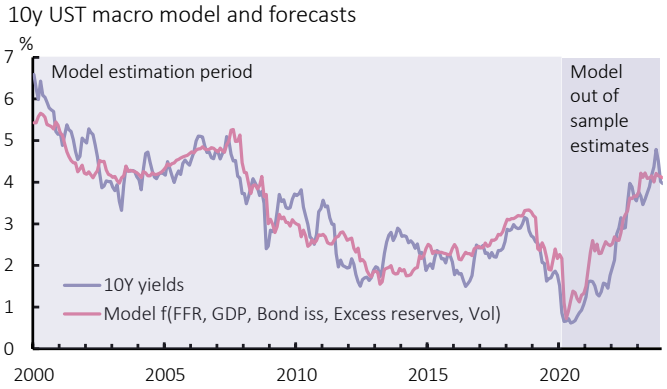
[5] Overnight reverse repurchase agreements

[6] Note, the Fed's 2% inflation target is for Personal Consumption Expenditures (PCE) inflation. Breakeven inflation is a measure of Consumer Price Index (CPI) inflation. Historically there is about a 0.5% difference between the two measures, CPI inflation being systematically higher. As such, a breakeven inflation expectation of around 2.5% is consistent with a 2% PCE inflation expectation.

forecasts for GDP and FFR particularly. A precise specification of the model is provided in Appendix A.

The model (Exhibit 7) is estimated over the period 2000-2019 but performs as well in the subsequent and challenging out-of-sample period of the pandemic and since. Some 95% of the model's residuals are within 1% over this period.

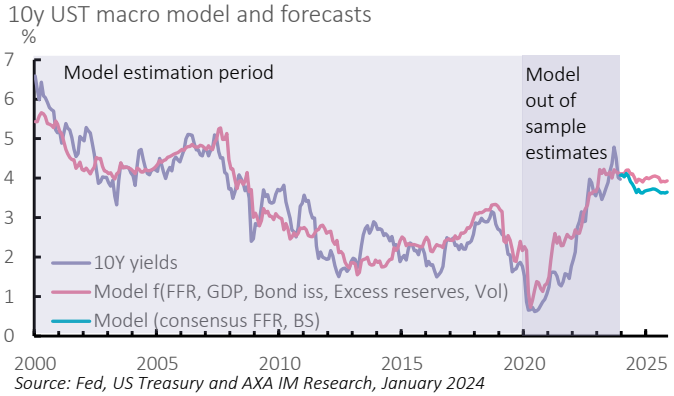
Exhibit 7: A simple macro model explaining 10-year UST yields




*Source: Fed, US Treasury and AXA IM Research, January 2024*

Using this model, we can assess likely yield paths given our own economic assumptions, or other scenarios (albeit that we make assumptions only about volatility). Exhibit 8 illustrates these yield estimates based on our current economic forecasts and based on market rate expectations and consensus expectations for the Fed's balance sheet. The model shows a difference of around 20bps from mid-2025 rising to over 25bps by the end of next year, between the two sets of forecasts.

Exhibit 8: Forecasts of future 10-year yields

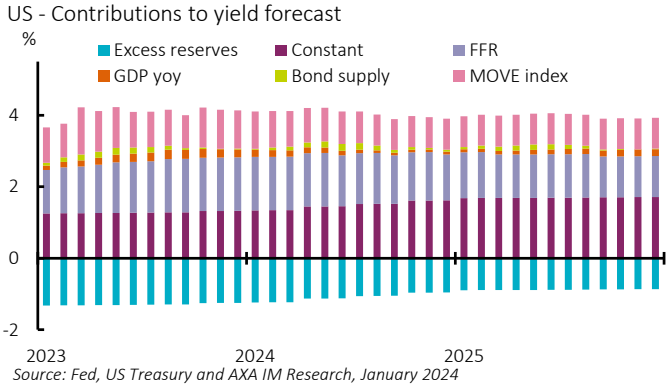



*Source: Fed, US Treasury and AXA IM Research, January 2024*

We make two further observations from our model. First forecasts based either on our economic outlook or consensus are reasonably stable at below 4.00% to around 3.75% and are similar to our independent assessment of the broad components of yields: r* of around 1.00-1.25%; breakeven inflation around 2%; and term premia rising to around 0.60%.

Second, our model suggests a stability in yields not seen in recent years. In our estimation, this is because in a large part, the downward impact on yields of the expected fall in the FFR is offset by the expected reduced downward pressure on yields from excess reserves as Fed QT continues (Exhibit 9). This estimation suggests QT has played a bigger role in adding to bond yields than commonly accepted. We estimate QT has added around 25bps to 10-year yields since it started in mid-2022 and is likely to add a further 25bps in 2024 and 15bsp in 2025. By contrast, the 0.75% reduction that we expect in the FFR in 2024 we estimate will lower 10-year yields by 21bps. This is consistent with the Fed's FRB/US macro model estimates that suggest a 0.75% rate reduction would have a 24bp impact on 10-year yields.[7] This would equate QT over the course of the coming year to three Fed rate hikes, where historically Fed Chair Powell has alluded to this being closer to one.

Exhibit 9: Estimated contributions to our 10-year yield forecast




*Source: Fed, US Treasury and AXA IM Research, January 2024*

## Fiscal fear?

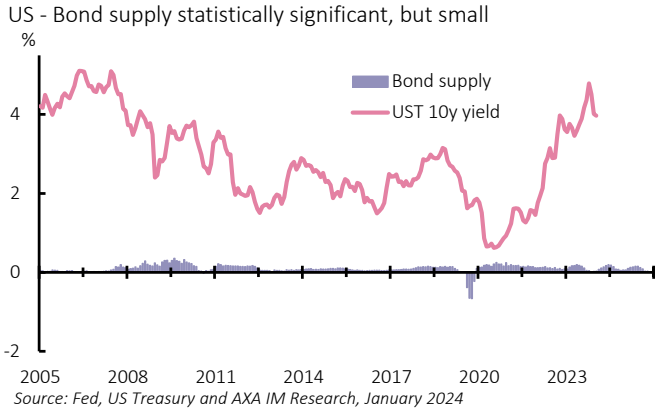
As yields reached 5% last year there was much discussion about the impact of the fiscal outlook on Treasury yields. With fiscal deficits of 6% of GDP, twice the level of the Eurozone's Stability and Growth Pact limit and Congressional Budget Office projections of US debt as a proportion of GDP reaching 108% by 2030 and 134% by 2040 suggesting the US is on an unsustainable fiscal path over the long run. However, we have a more difficult task ascribing how much that may be adding to yields today. We consider two aspects to this: first, the issuance that accompanies high deficits; second, the risk that a 'credit' premium begins to emerge in US Treasury pricing as for instance evident between Italian and German sovereign bonds.

In terms of issuance, we explicitly capture outright Treasury issuance in our yield model. Specifically, we look at how much

[7] FRB/US macro model: A large-scale estimated general equilibrium model of the US economy

the Treasury issues, less the amount that is maturing (net issuance). We then allow for whether the Fed is purchasing Treasuries or allowing them to mature (QE or QT). This measure provides a statistically significant contributor to overall yields. However, as
Exhibit 10 shows, the overall contribution to yields has historically been significant, but small, so even as net, net issuance rises sharply over the coming years its explicit impact on yields should be small.

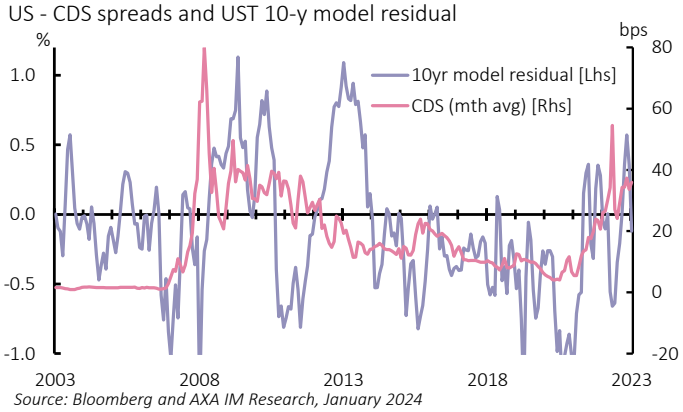
Exhibit 10: Estimated issuance impact on 10-year yields




*Source: Fed, US Treasury and AXA IM Research, January 2024*

In terms of the risk of a Treasury 'credit' premium, our previous research[8] suggests with US net debt at 98% it should still be some years before it faces genuine concerns about fiscal sustainability. However, at this stage regardless of the outlook for the next administration, neither Presidential candidate has made a reduction of the Federal deficit a priority, suggesting that in several years there may be a warranted concern. Besides our qualitative assessment, we also consider this by looking at the credit default swap market – instruments that provide insurance against default in underlying sovereign bonds and hence should more specifically measure the levels of concerns about fiscal sustainability.

Exhibit 11: Fiscal concerns add to UST yields




*Source: Bloomberg and AXA IM Research, January 2024*

Exhibit 11 shows the five-year US credit default swap premium. This has risen in recent years – indicating increased sustainability concerns – and is presently around levels similar to the start of the 2010s, around the time of the Eurozone sovereign debt crisis. We plot this with our sovereign yield model residual to show some correlation between the two series. This suggests that a rise in fiscal sustainability concerns has contributed to the rise in yields recently, over and above changes in the other determinants. Developments in perceptions of fiscal sustainability will be monitored going forwards.

A final consideration echoes our discussion of estimates of r*. Our estimates of r* are in part driven by changes in overall US indebtedness. Hence while we think it is natural that government borrowing costs reflect changes in government indebtedness, overall interest rates and r* – which we argue impact on Treasury yields - reflect broader levels of borrowing. It is thus noteworthy that although government indebtedness is rising, broader levels of US indebtedness have fallen back sharply since the COVID spike in Q2 2020 and overall debt, at 350% of GDP, is now at levels last seen in 2011, lower than the 380% 2009 peak. Public indebtedness is for now occurring against a backdrop of broader private sector deleveraging, particularly in the household and financial sectors.

## Yields close to anchor point

The rise in yields over the past few years has been sharp and currently exceed those seen over the previous decade. We believe much of this increase has been driven by structural factors: a rise in the neutral rate from its lows; an increase (back to target) in inflation expectations; and a rise in term premia, largely reflecting the removal of QE assets. These factors look likely to persist in the medium term.

More cyclically, the swing in Fed rate expectations, outright QT and elevated volatility have looked to be the key drivers of higher yields, while increased issuance and fears of fiscal sustainability also appear to have contributed. Accordingly, as yields have settled around 4% so far in 2024, we do not see a considerable downside from here over the coming years based on our economic scenario – nor based on current consensus expectations. Indeed, we argue that for yields to return to levels prevailing over much of the 2010s, we would likely have to see a much sharper adjustment in Fed policy rates – one more typically associated with recession.

[8] Page, D., "US debt ceiling impasse: unnecessary and unavoidable", AXA IM Research, May 2023

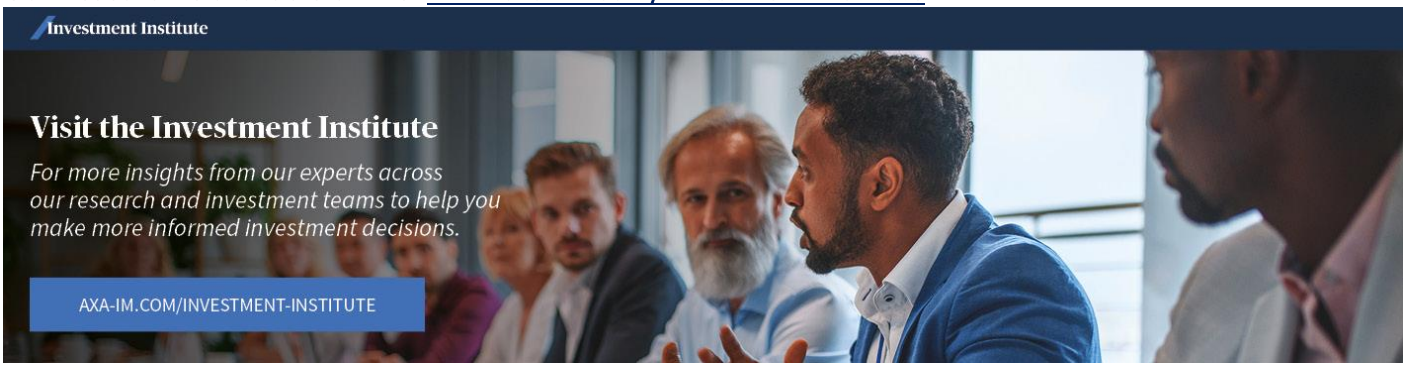
## Appendix A – Specification of 10-year UST model

The model provides the precise estimation of our 10-year UST yield model for information.

| Preferred model specification for 10-year UST yield | | |
|---|---|---|
| Dependent variables | Est. coeff | Level of signification |
| Constant | 2.58 | *** |
| Level of FFR | 0.28 | *** |
| GDP (yoy) | 0.09 | *** |
| Bond supply % GDP (8m lead) | 0.31 | *** |
| Excess reserves % GDP (12m lead) | -0.12 | *** |
| MOVE index | 0.01 | *** |
| *** significant at 1% level | | |
| $R^2$ | 85% | |

*Source: AXA IM Research, January 2024*

## Our Research is available online: www.axa-im.com/investment-institute



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