Explaining the recent market moves across the Treasury yield curve

Treasury Borrowing Advisory Committee

October 31, 2023

Please discuss the Committee's views on the factors (and their relative importance) driving market moves across the Treasury yield curve over the last quarter. Can the moves be explained mostly by fundamental factors or are there technical or positioning factors that Treasury should be aware of? To what extent have Treasury supply and demand dynamics been a factor? What are expectations for yields going forward? In the Committee's discussion, please include relevant data and analysis that supports or discounts the relative importance of factors being discussed.

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Executive Summary

- Treasury yields have risen sharply since the start of Q3, particularly in longer maturities. As of October 20th, the 30y yield has increased 124 bps, compared to 20 bps for the 2y.
- The Fed hiked the policy rate by 25 bps over this period (largely as expected), and market pricing for the fed funds rate at the end of 2025 rose roughly 75 bps, from approximately 3.35% to 4.10%, reflecting expectations that the Fed will keep policy restrictive for longer.
- Yield increases have been largest in longer maturities and far-forward rates (e.g., 5y5y has risen ~150 bps), indicating that revised views on long-run neutral and term premia have played a bigger role.
- While there was likely some reassessment of long-run neutral amid ongoing economic resilience, models and surveys suggest real term premia accounts for most of the move.
- Term premia has risen from historically low levels; increasing treasury supply likely contributed to the repricing.
- While technical factors may have amplified the moves, they likely did not play a major role.
- Looking ahead, continued normalization in term premia and increases in neutral rate expectations could drive higher yields; in contrast, a material growth slowdown would lead to lower yields.

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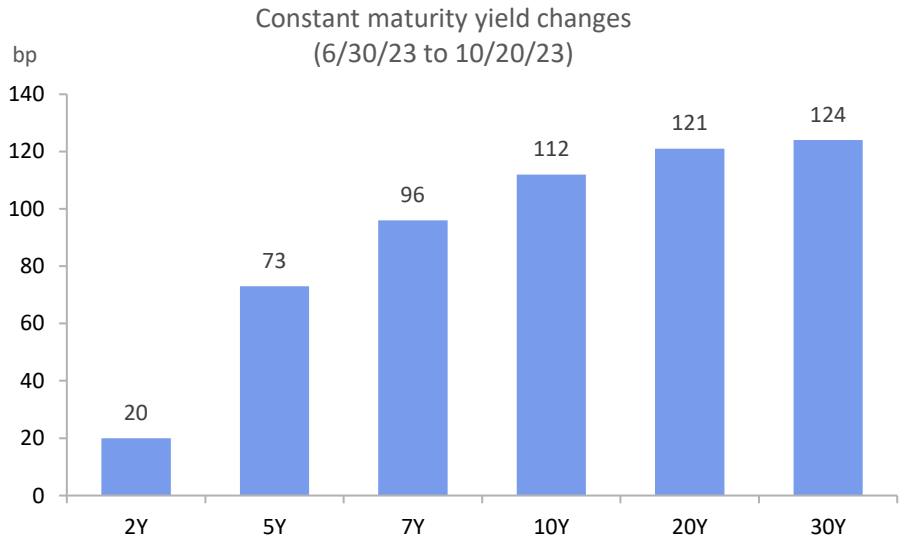
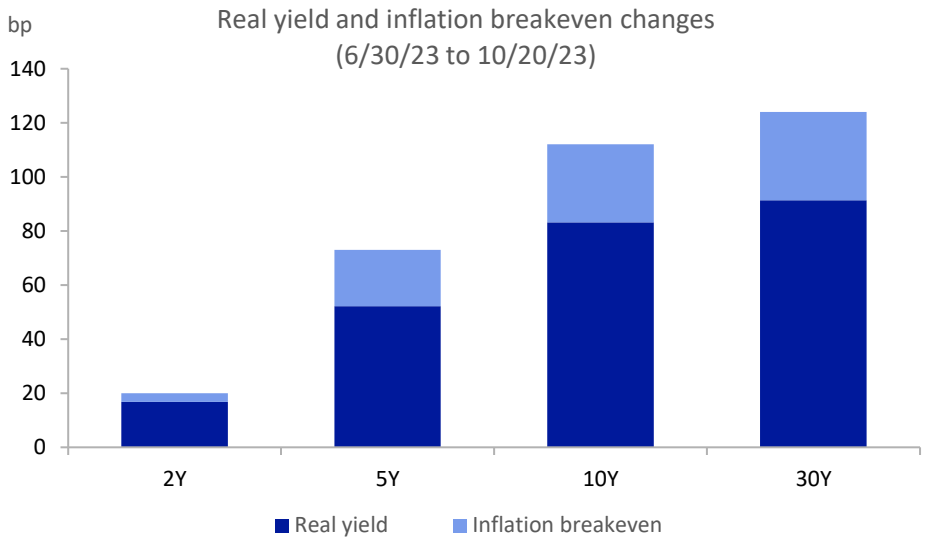
Overview of yield curve changes since start of Q3

- From the start of the third quarter to October 20th, Treasury yields rose between 20 bps and 124 bps across maturities with the yield curve substantially steeper.
- Higher real yields accounted for most of the rise in nominal yields. Breakeven inflation rates have increased moderately for 5y and longer maturities, while only increasing slightly in the front end.

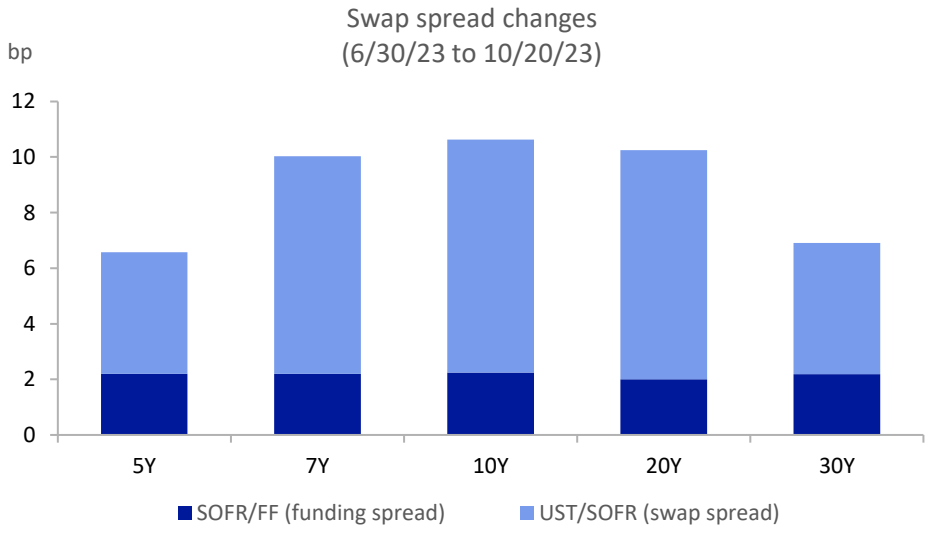


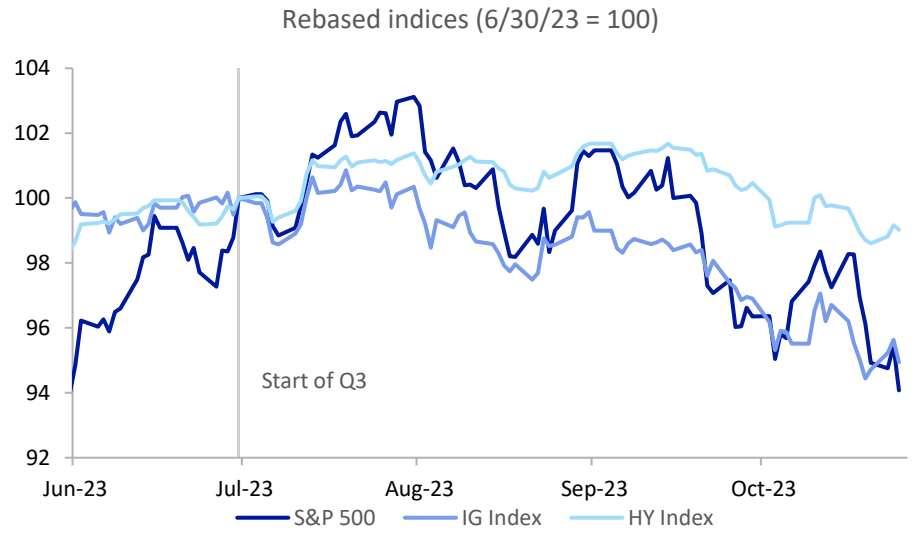


Source: Bloomberg Finance LP

Overview of yield curve changes since start of Q3

- Treasuries cheapened relative to swaps across most maturities, which accounted for 6-10 bps of the yield increases. However, the moves in swap yields and Treasury yields were not significantly different for the purposes of the charge.
- In markets more broadly, risk assets were initially resilient to higher yields but began to show impact in late Q3. Over recent weeks, as yields continued to rise, risk asset levels slipped further.





Source: Bloomberg Finance LP

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Framework for long-term yields

- The standard decomposition breaks term yields into short-rate expectations and term premia.

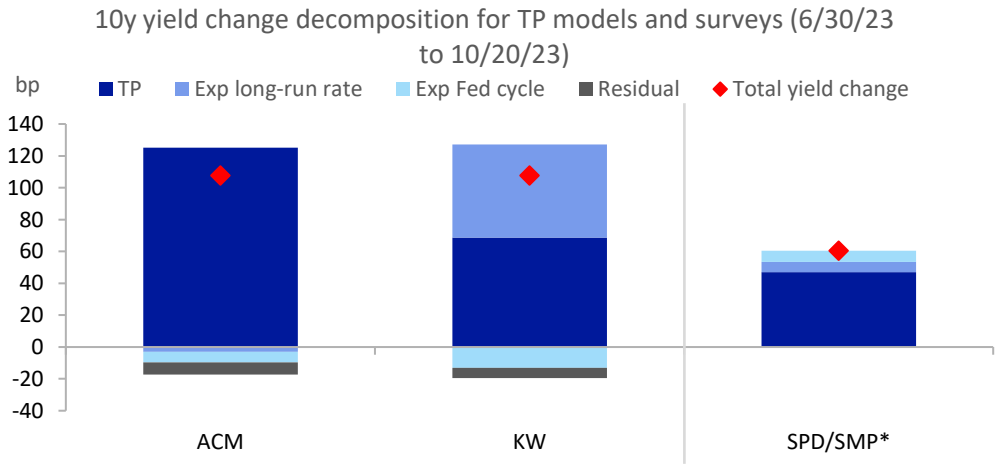
- Short-rate expectations can be decomposed further into expectations for the neutral rate and expectations for policy restraint relative to neutral (i.e., the cycle), leaving yields as a function of:
    - Expectations for the Fed policy cycle
    - Expectations for the long-run neutral nominal rate (i.e., r* + inflation expectations)
    - Term premia

- Technical factors like liquidity, positioning, and convexity flows can lead to short-run deviations from fundamentals.

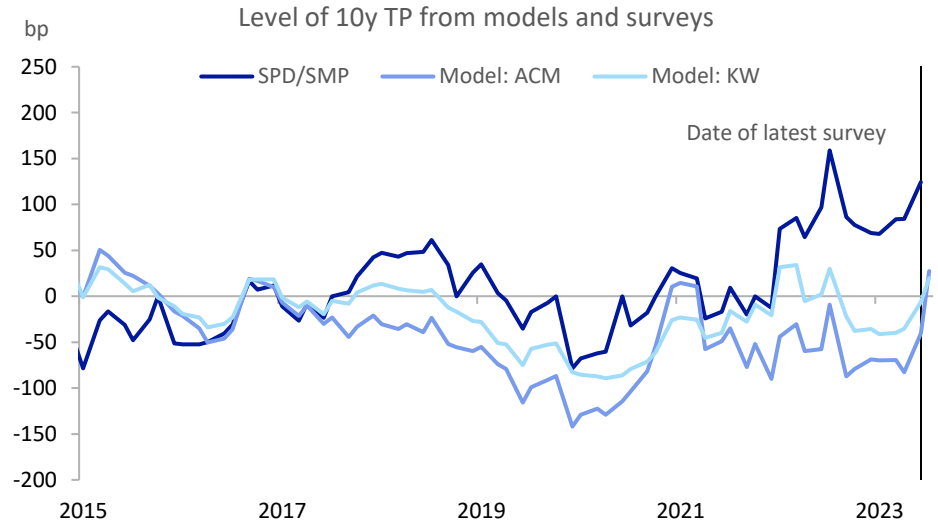
- In terms of underlying drivers for each of the components:
    - Fed policy cycle – driven by expectations for inflation, the labor market, and the Fed's reaction function.
    - Neutral rate – related to expectations for structural factors (e.g., productivity, demographic shifts), but views on neutral should be informed by how the economy responds to delivered Fed tightening.
    - Term premia – in theory related to factors such as inflation/nominal short-rate uncertainty, the correlation of bonds with risk assets, changes in net supply to private price-sensitive investors, and cyclical factors. However, anything unrelated to short-rate expectations that shifts bond demand should flow through to term premia.

Decomposing yields in practice

- Each of these fundamental components in the Framework for long-term yields is unobservable and so decomposing yields requires a term structure model or survey data on expectations.
- Both models and surveys suggest that since the start of Q3 the bulk of the yield move has been in term premia (relevant surveys are only available through mid-September), but they differ in degree and in the current levels of term premia (TP).
- Because breakeven inflation rates were little changed, the TP move seems likely to have been in real TP.



*The June and Sep SPD/SMP (New York Fed surveys) were used to generate the decomp, so the chart employs the 10y yield change between Jun 5 and Sep 11 for SPD/SMP. The model decomps use 5y5y short-rate expectations as the expected long-run rate.



Source: NY Fed, Federal Reserve, Bloomberg Finance LP

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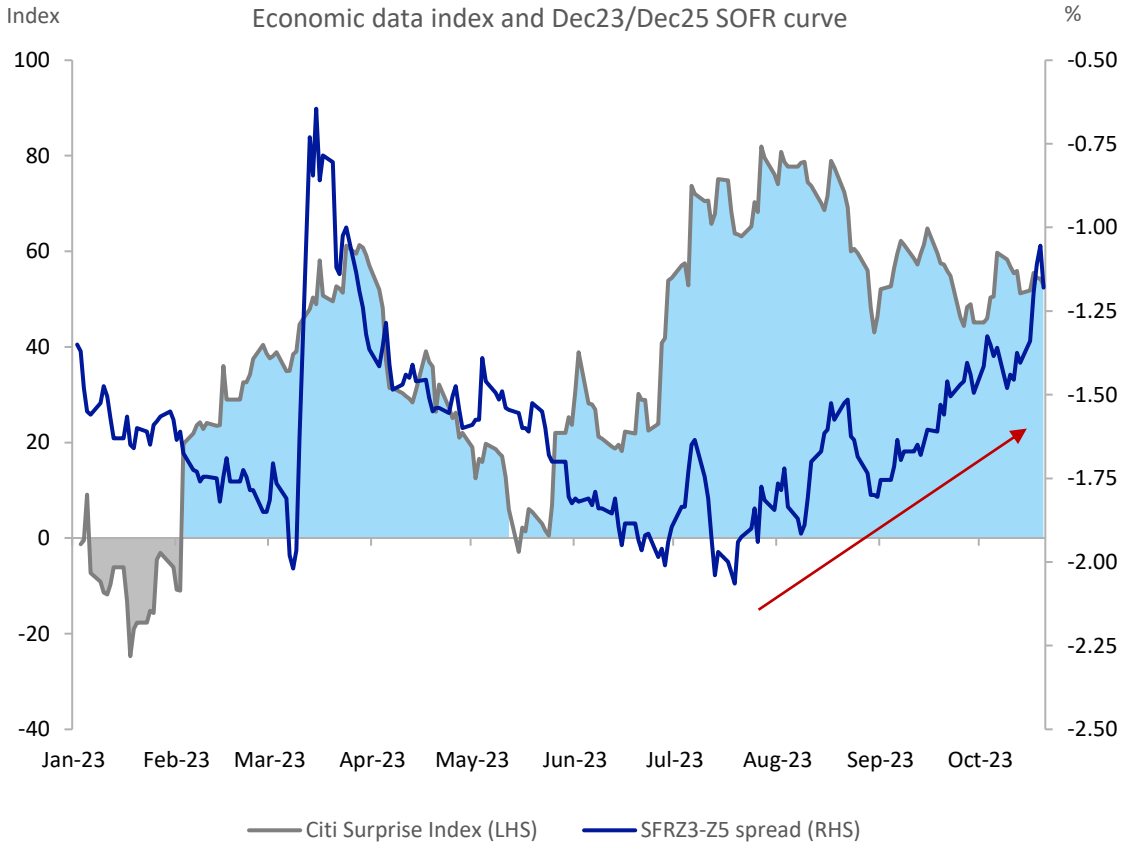
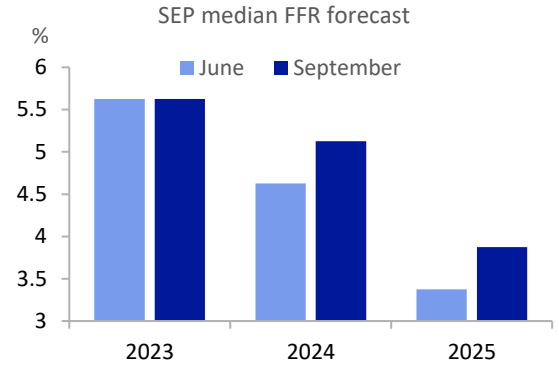
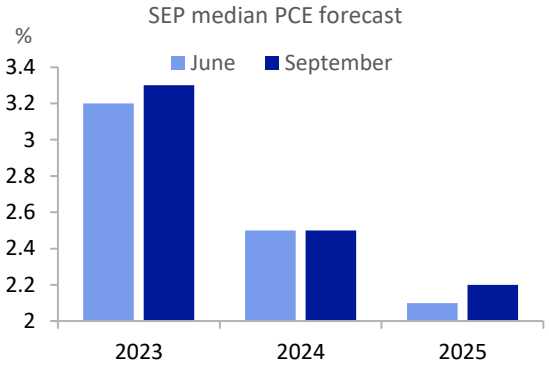
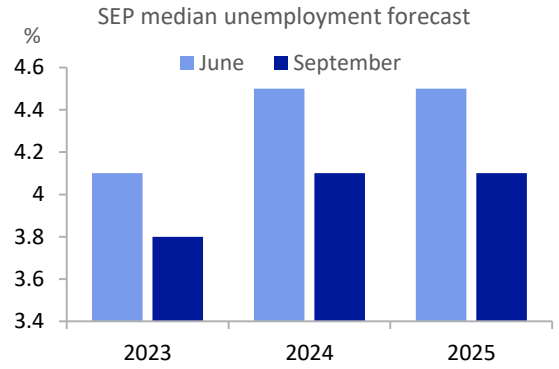
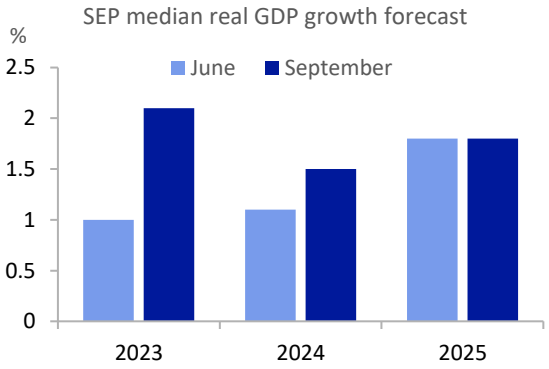
Fed policy cycle: Resilient data led investors to price out 2024-2025 rate cuts; the Fed also upgraded its forecasts







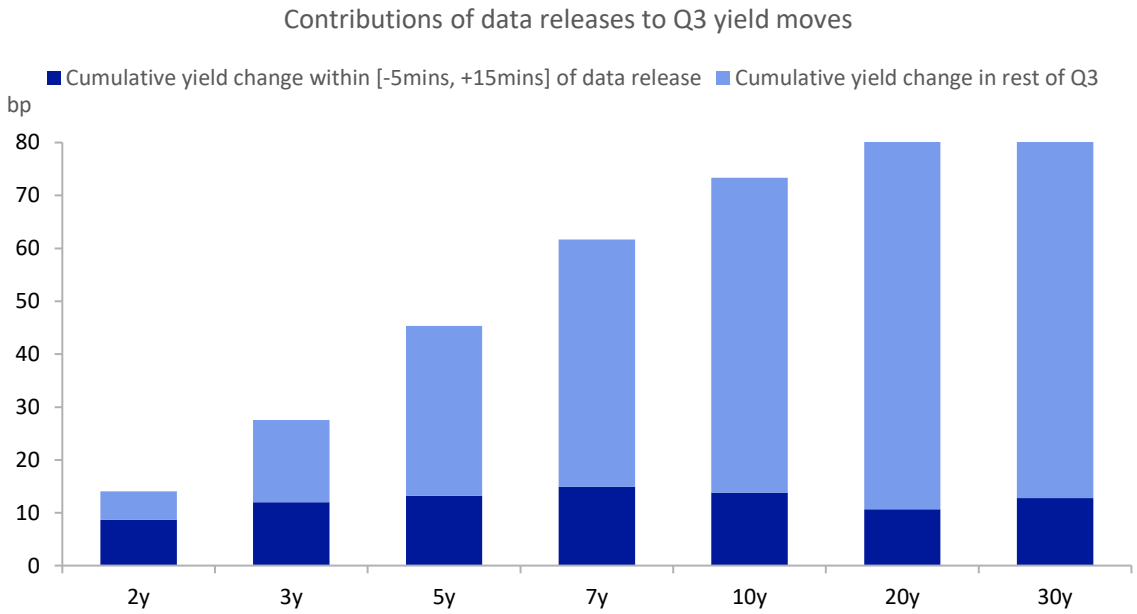




Source: Citi, Bloomberg Finance LP, Federal Reserve

Fed policy cycle: Shifts in Fed expectations have had only limited pass-through into longer-term yields

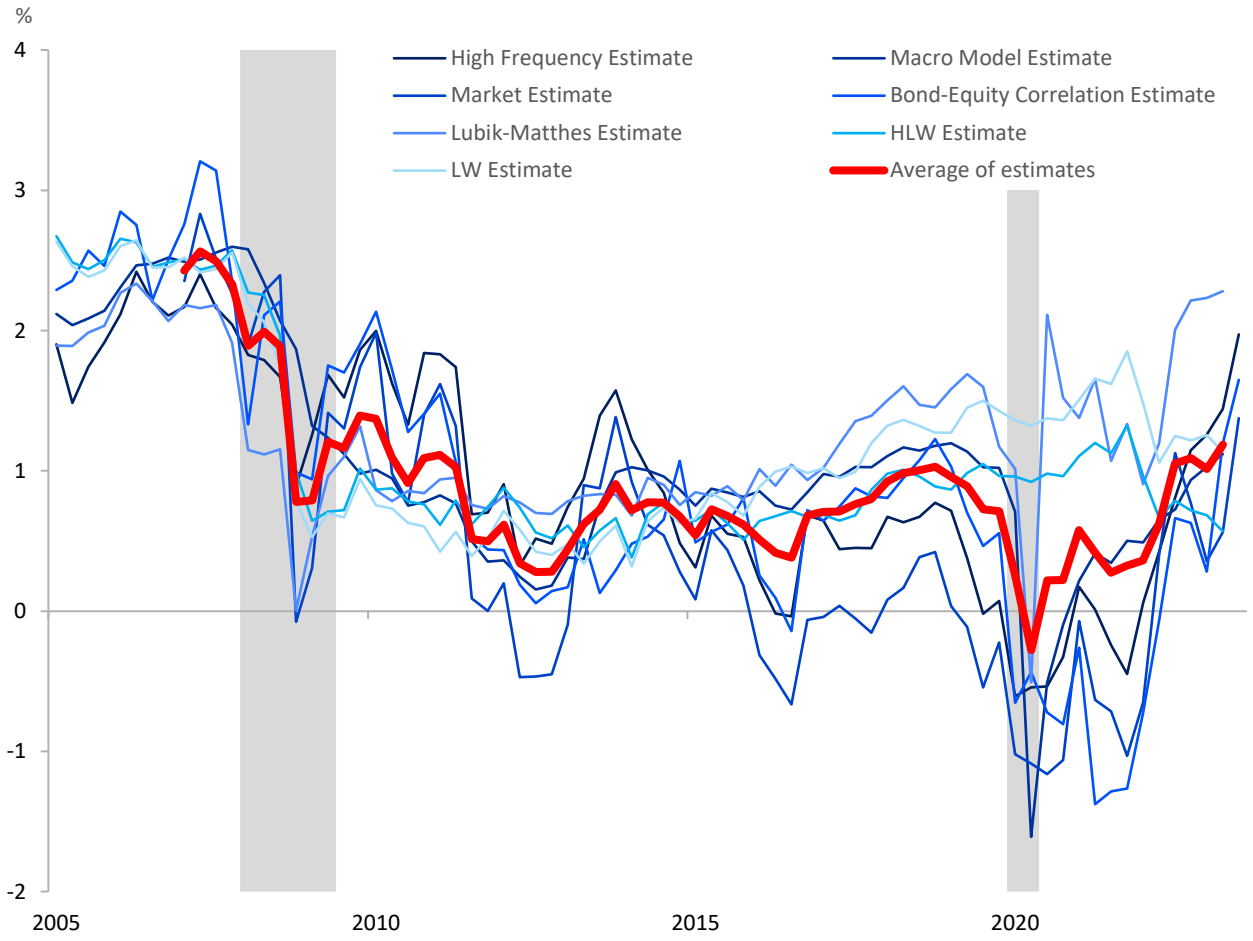
- Most of the increase in 2y yields in Q3 occurred around economic data releases, while less than 20% of the increases in 10y to 30y yield occurred in those windows.
- This is consistent with front-end yields being driven by the economic outlook and near-term Fed policy expectations and limited pass-through into longer-term yields.



Economic releases include: Employment situation reports, CPI, PPI, PCE, GDP, ISM manufacturing index, retail sales, durable goods, ADP employment report, unemployment, industrial production.

Source: Bloomberg Finance LP, TBAC member calculations

r* expectations: Higher than pre-Covid with further potential increases in Q3

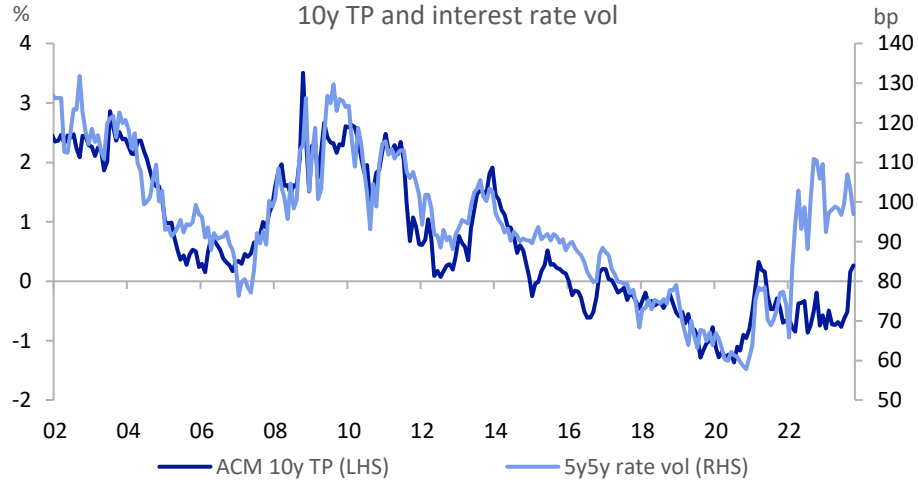


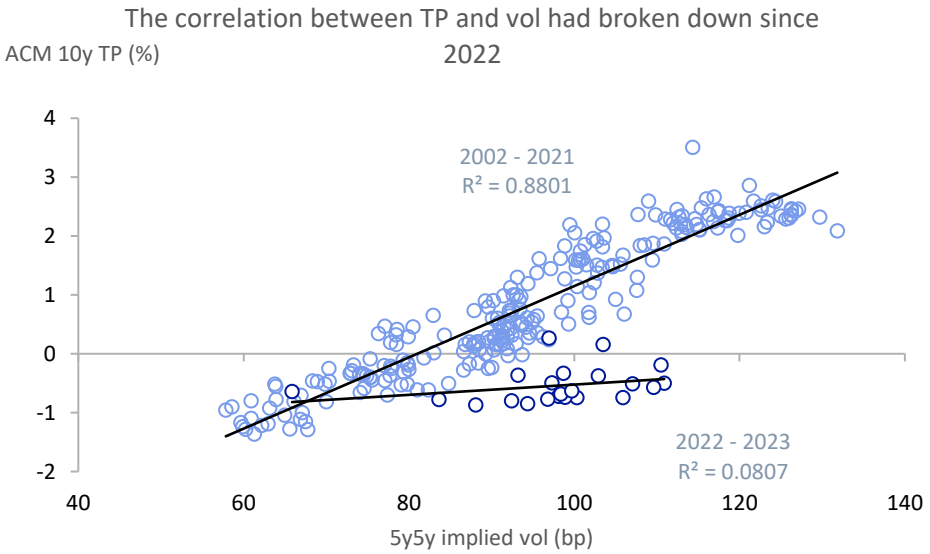
- Various ways of estimating r* suggest it has risen since pre-Covid.
- Available measures suggest r* also increased over recent months, though as noted earlier the shift in expectations for r* measured by models and surveys was modest.
- Uncertainty around r* may have also increased, which would be reflected in higher term premia.

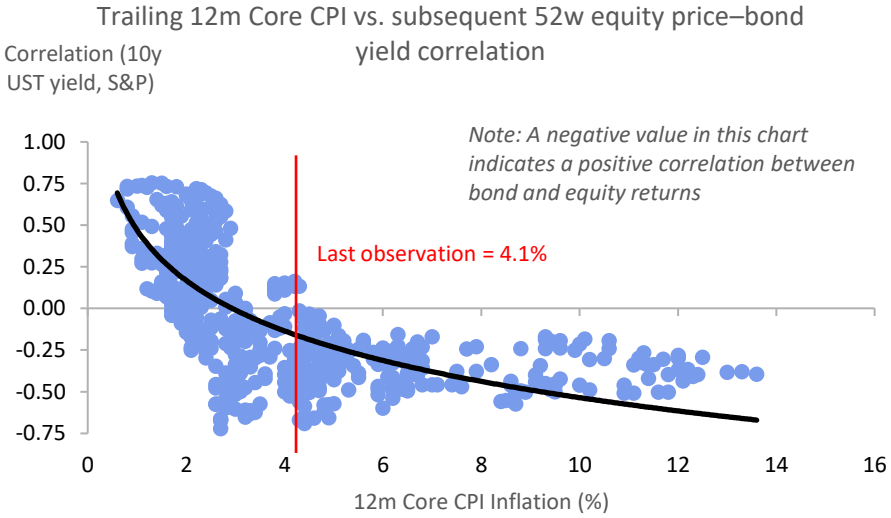
Source: Federal Reserve, Haver Analytics, Deutsche Bank

Term premia started Q3 at levels that looked depressed versus both history and fundamentals

- Term premia had fallen to very depressed levels as measured relative to several traditional model-based factors including inflation uncertainty, interest rate volatility, and bond-equity correlations.
- It is likely that some powerful and entrenched factors helped drive term premia to very low levels pre-Covid. More recently, however, newly-formed factors may have helped catalyze term premia's recovery.

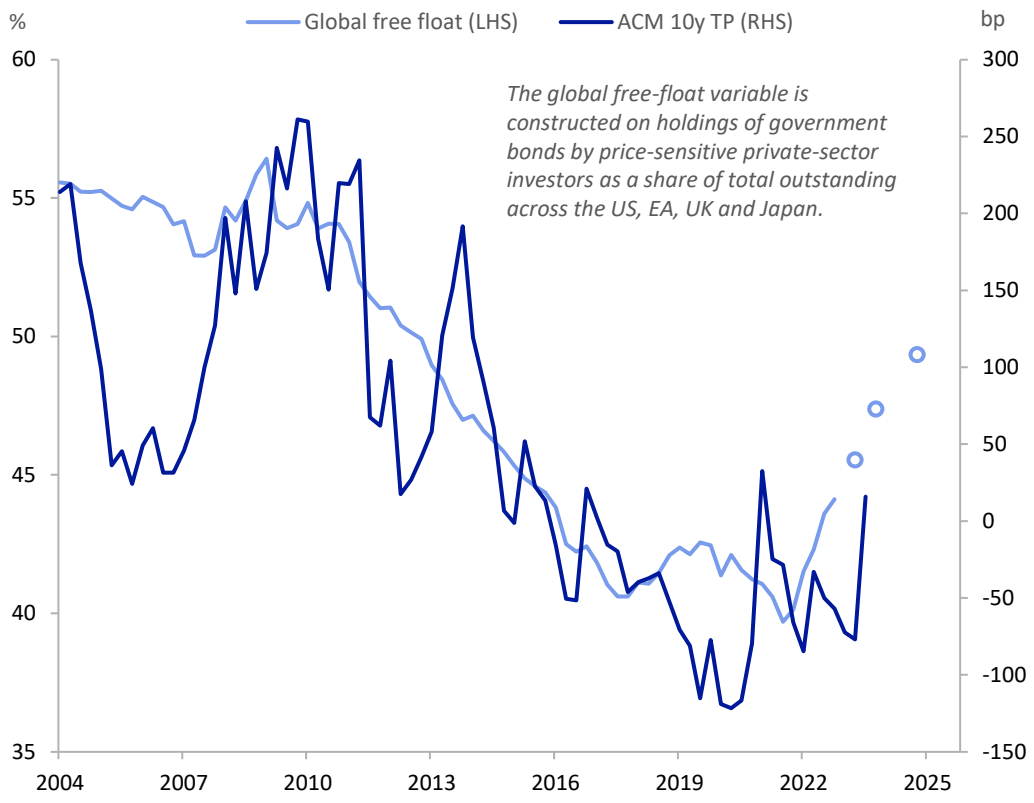






Source: Federal Reserve, BLS, Bloomberg, Haver Analytics

Factor that may have been pressuring term premia lower: QE was (obviously) bond buying

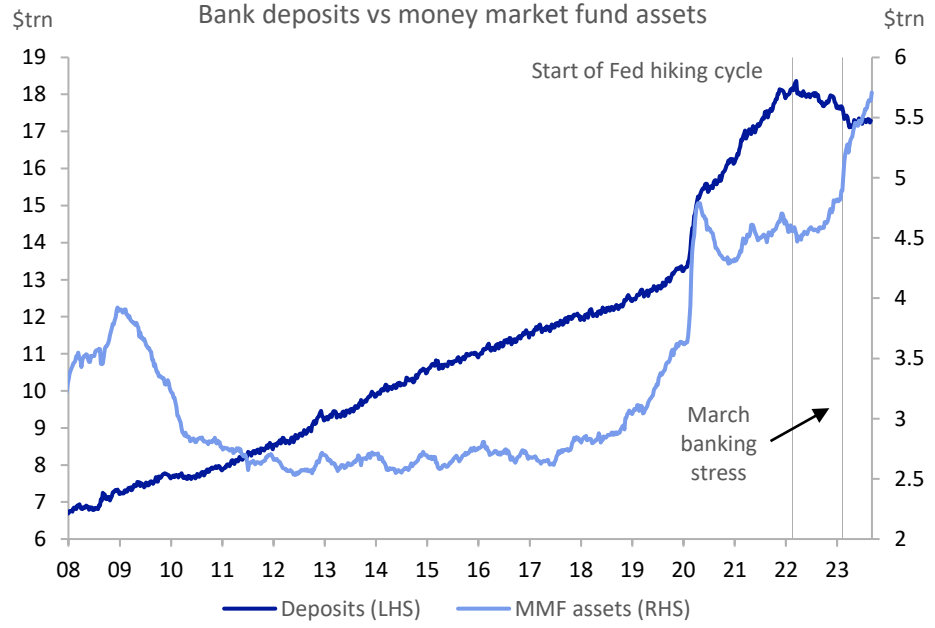


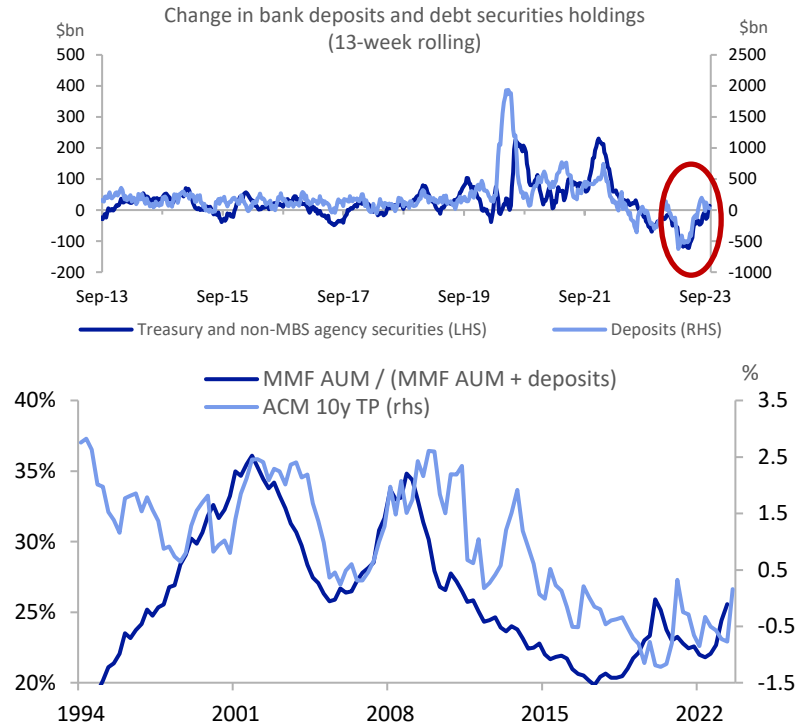
The definition of price-sensitive investors for this charge includes all parties except for domestic central banks, insurance companies and pension funds, and the foreign official sector.

- The share of G4 sovereign bonds held by private, price-sensitive investors fell between 2010 and 2022 from 55% to 40%, primarily due to QE. This is true in the US and other advanced economies.
- This dynamic reversed in 2022 with a sharp pivot from QE to QT in the U.S.
- Since then, price-sensitive investors have increasingly set the clearing level for Treasuries.
- The smooth transmission of ON RRP balances into banks over the past year, along with improved prospects of a soft-landing, suggest that Fed balance sheet runoff could go on for longer, a sentiment echoed by Chair Powell in the July post-meeting press conference. A longer period of runoff increases the amount of privately-held borrowing by the Treasury.

Source: Federal Reserve, Treasury, Haver Analytics, Deutsche Bank

Factor that may have been pressuring term premia lower: Money market reform and near-zero yields resulted in longer-duration bond buying

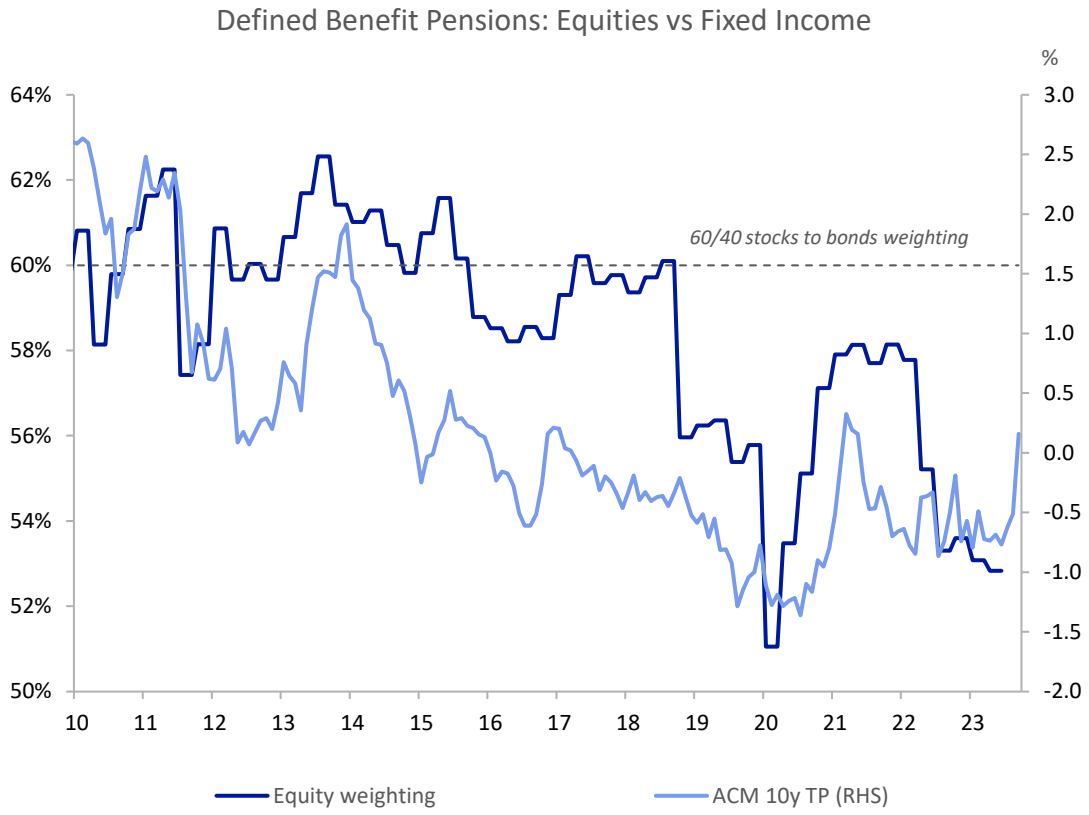




- Over 2010-2020, savers chose bank deposits over money market funds, likely due to two factors: (a) yields near zero disincentivized the time and effort to switch, and (b) increased regulation of money market funds reduced their attractiveness.
- Banks hold longer-duration assets against bank deposits than money market funds hold against their cash. Savers choosing banks over money market funds likely caused more bond buying than if savers had allocated to money market funds.
- That dynamic changed starting post-Covid as (a) non-zero yields caused a significant difference in expected returns on money market funds and bank deposits, and (b) the cost of regulatory changes had largely been internalized by money market fund users. Money market demand for UST has increased recently also perhaps due to recent Tbill cheapening.
- Relative to the pre-2010 trend, this could have resulted in banks buying additional Treasuries against $1-2trn of excess deposits instead of $1-2trn in money market fund buying of repo or short-dated assets.

Source: Federal Reserve, Investment Company Institute

Factor that may have been pressuring term premia lower: Competitive pressures and regulation on pension funds caused bond buying

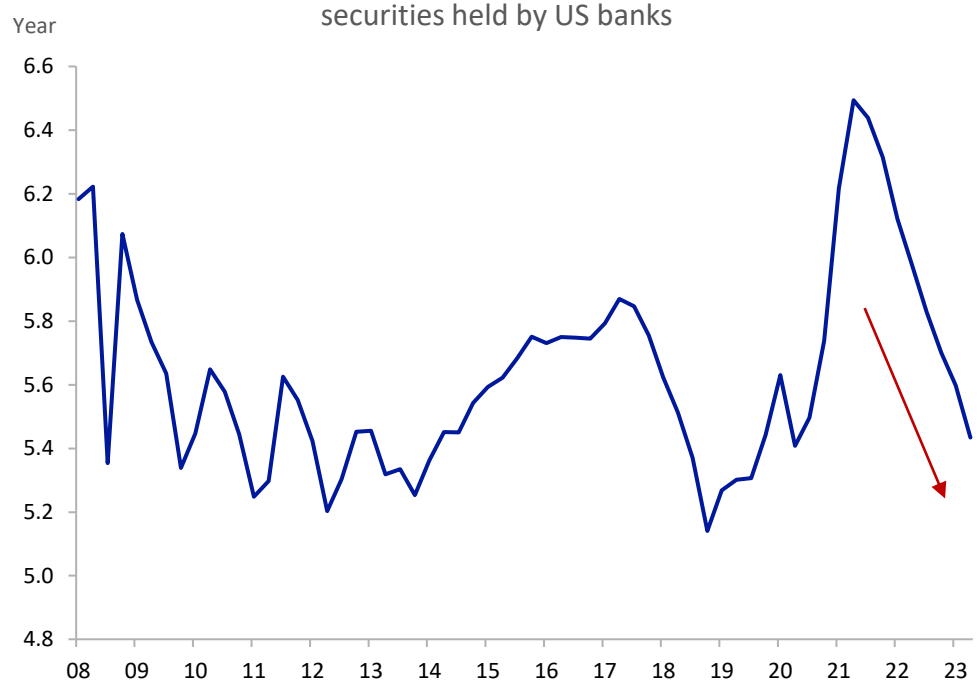


- Some combination of plan constituent changes, competitive pressures and regulation caused defined benefit (DB) pensions to hold more bonds and less stocks.
- Defined benefit plans had moved from 60/40 (in favor of stocks) to 50/50.
- This shift is estimated to have caused pensions to own $540bn more bonds than implied by the 60/40 static weighting.
- Looking at the time series, we see that dynamic may have slowed already.

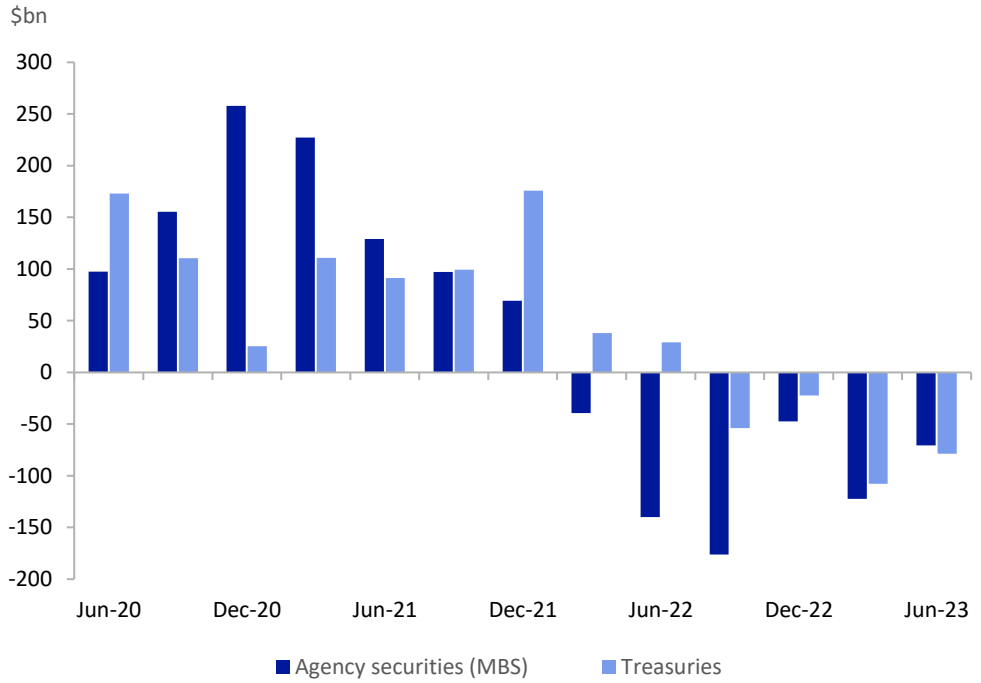
Source: Federal Reserve; Note: Pension assets calculated for bonds and equities only, all other assets excluded

New factor pressuring term premia higher: Banks reducing bonds and shortening the average life of holdings

Estimated average maturity of government non-MBS debt securities held by US banks



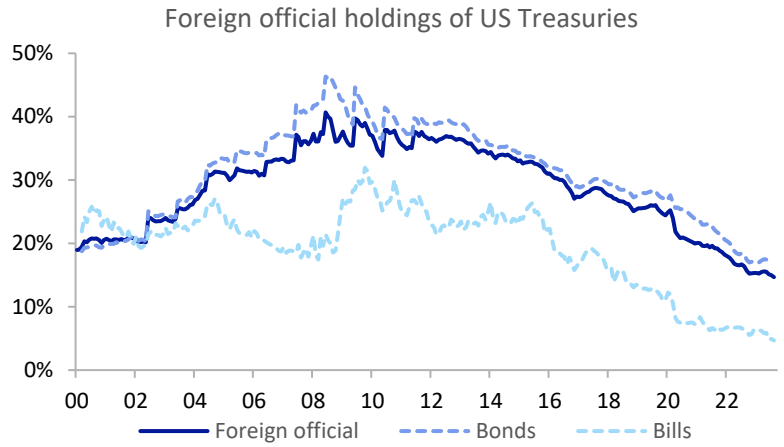
Change in bank debt securities holdings (QoQ)

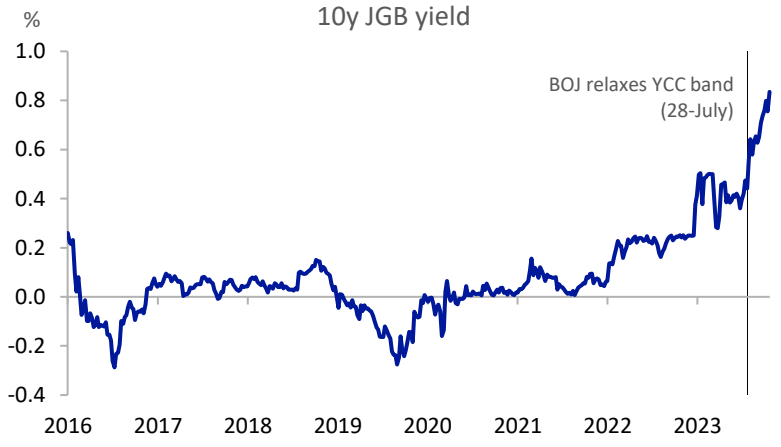


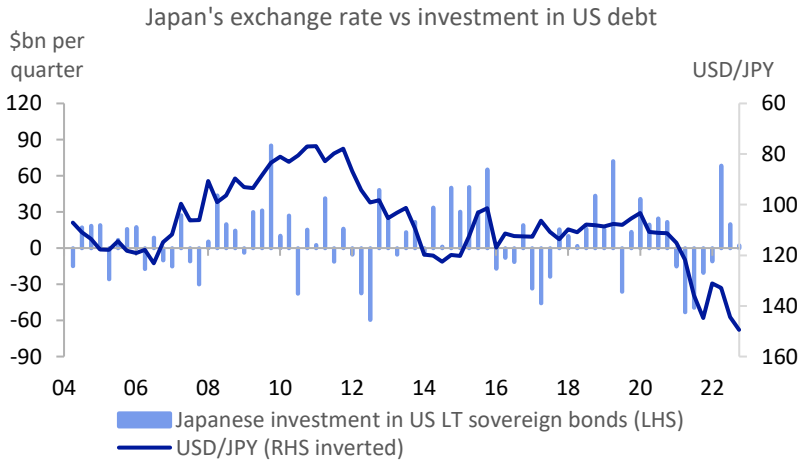
- After a period of increased investment, banks have been shrinking their portfolio of Treasuries and MBS since the start of Fed rate hikes.
- Banks have reduced their MBS holdings, which have longer average life, at a faster pace than their Treasury holdings, suggesting shedding of duration.
- Anecdotally, banks are shortening the average maturity of their securities after scrutiny on unrealized losses especially exacerbated by bank failures in March 2023.

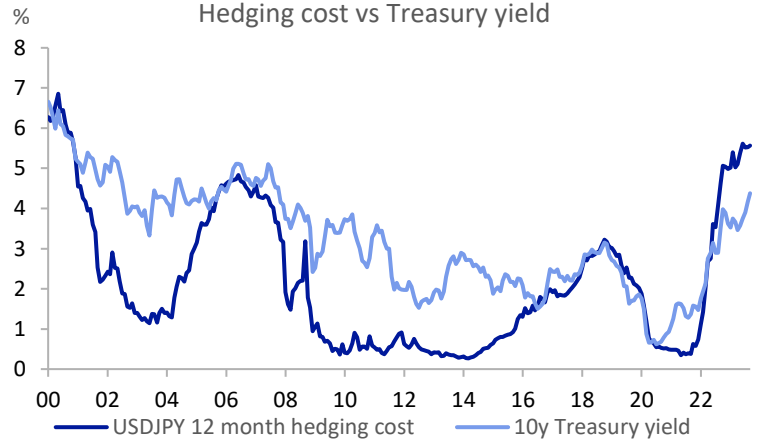
Source: FDIC, TBAC member calculations

New factor pressuring term premia higher: International investor holdings declining as a share of USTs outstanding





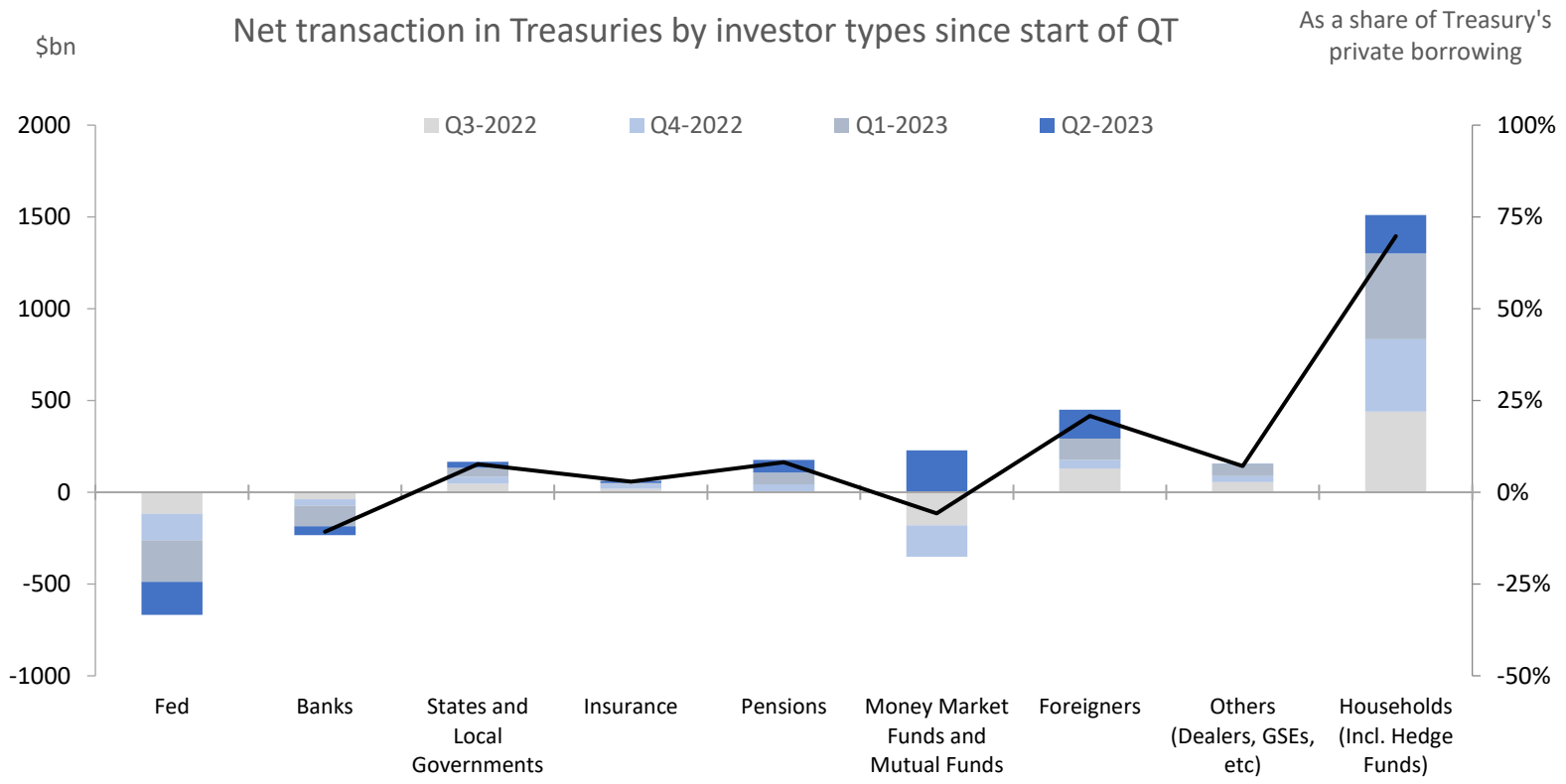




- Sponsorship by the foreign official sector has not kept pace with the growth of the Treasury market over the last decade.
- This may be driven by diversification concerns as well as relative value considerations.
- For Japanese private-sector investors, several headwinds may create persistent weak demand for Treasuries:
  - JGB yields are becoming more attractive with the BOJ's likely exit from YCC, reducing the need for Japanese investors to invest abroad.
  - A strong dollar deters Japanese investors from buying USD assets.
  - For investors who own assets on a hedged basis (such as lifers), hedging costs have risen above absolute yields, thus making hedged-Treasuries a negative returning asset.

Source: Federal Reserve, Treasury, Japan Ministry of Finance, Bloomberg Finance LP

New factor pressuring term premia higher: Households (including hedge funds) increasingly set the marginal price for Treasuries since QT



- Based on data through Q2, real money investors have either been net sellers or buyers of a relatively small portion of Treasury supply over the four quarters through Q2, leaving the bulk of new supply to non-traditional investors.
- The household sector, a category that includes domestic hedge funds, accounted for 70% of the private net supply in H2 2022 and H1 2023.
- While some of the household sector's positions reflect bond-futures basis positions, the residual non-basis positions indicate that a combination of both actual households and hedge funds are the marginal buyer of Treasuries.

Source: Federal Reserve

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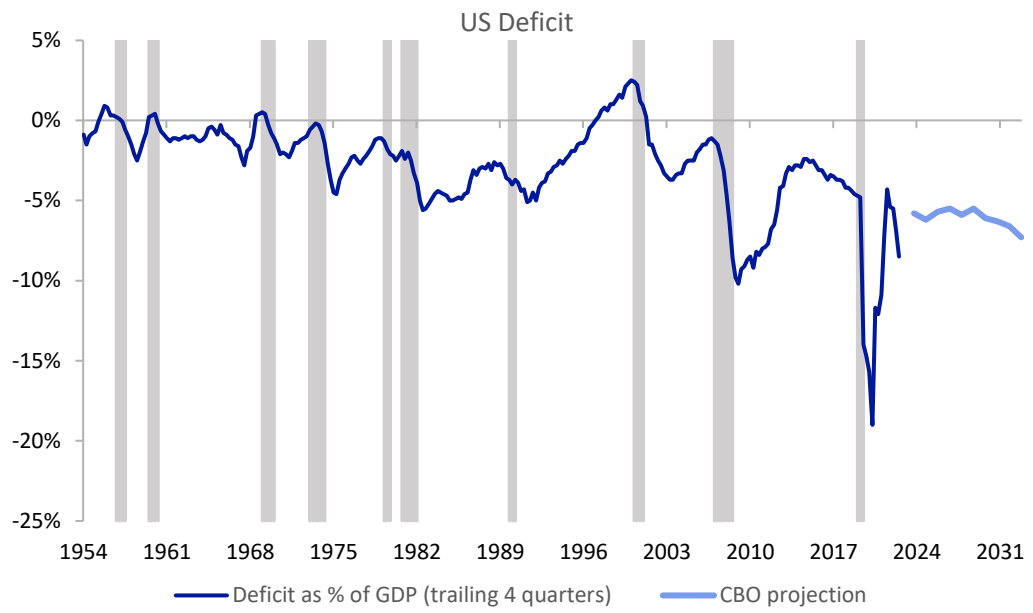
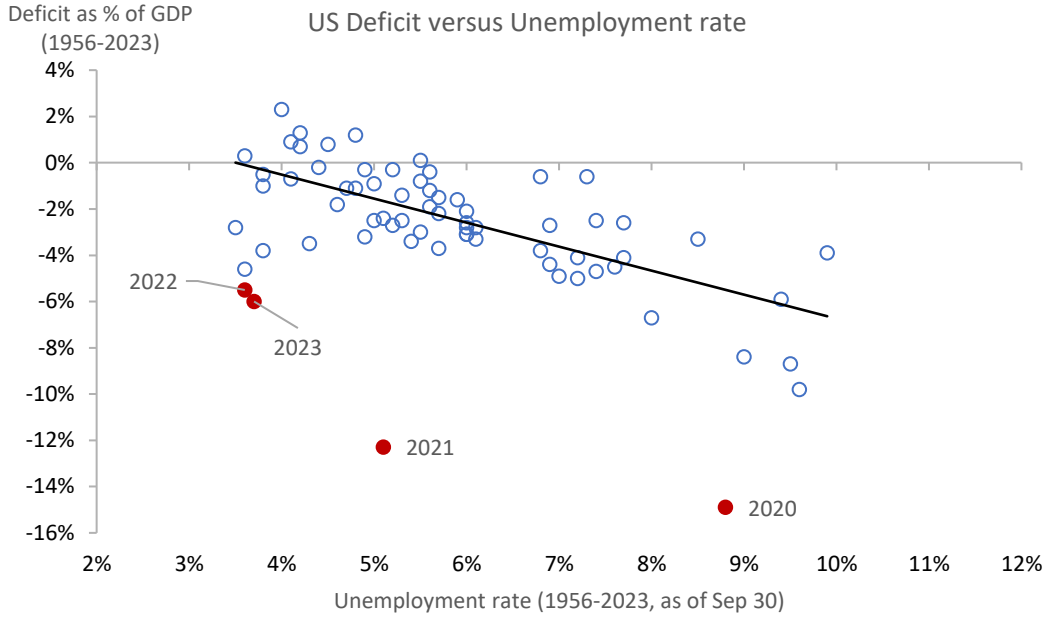
Large and ongoing deficits have fed expectations of significant supply increases

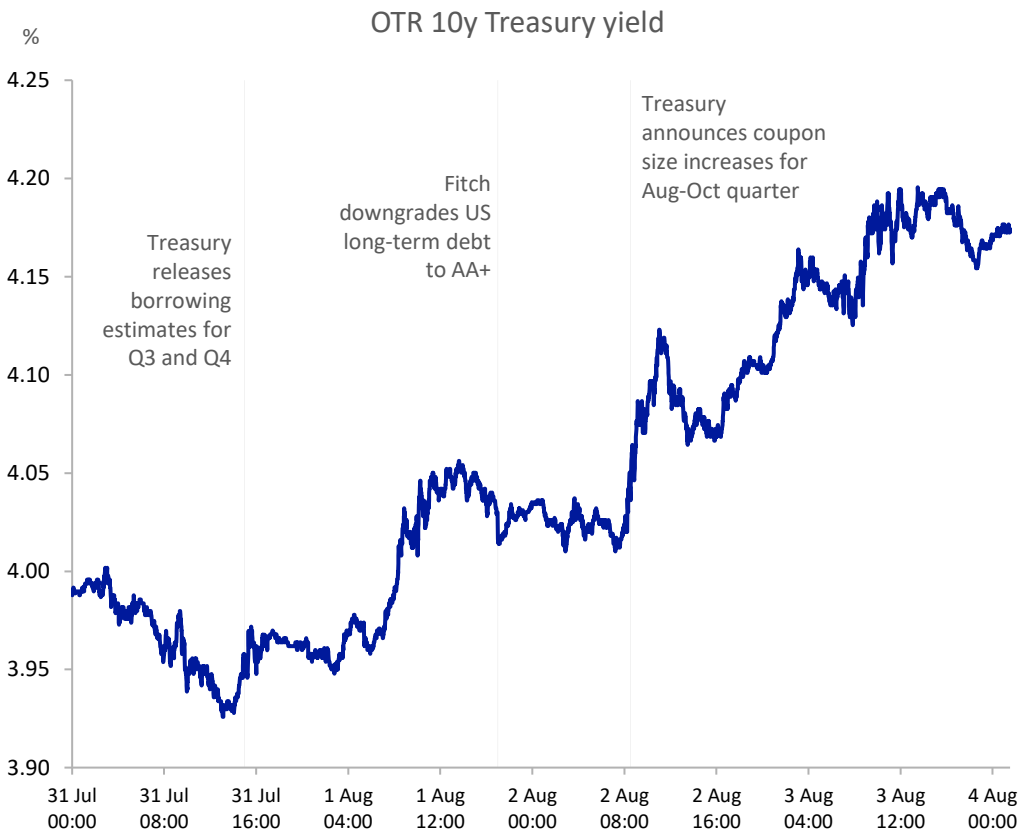




- The US fiscal deficit is at the top end of its range outside of recession / periods of high unemployment.
- A very high deficit despite a strong economy puts focus on government borrowing.

Source: Treasury, CBO, Bureau of Labor Statistics

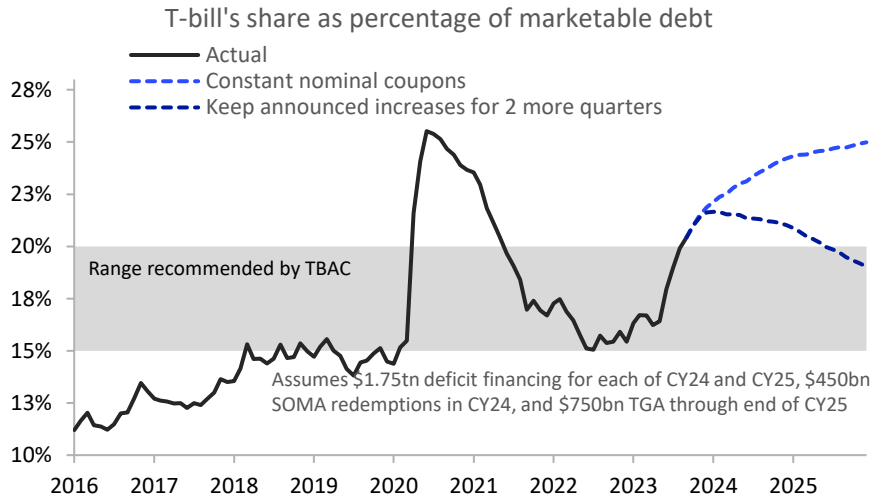
Yields rose following Treasury borrowing estimate and supply announcements during Q3

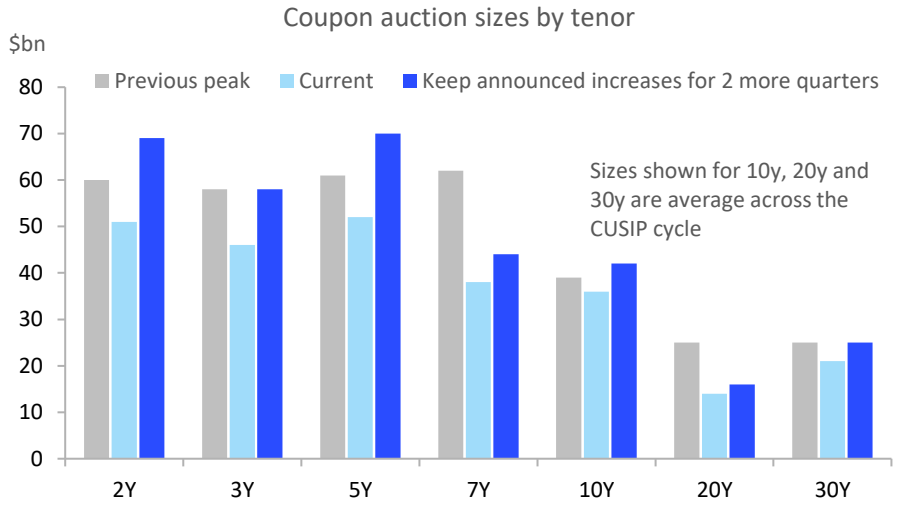


- In August, the Treasury announced larger-than-expected borrowing estimates and sizable coupon issuance increases across maturities.
- 10y yields rose sharply after each announcement. The immediate increase following the auction size announcement was bigger, despite changes that were largely in line with primary dealer expectations and TBAC recommendations.
- The Fitch rating downgrade on August 1st may have added to overall negative sentiment, but yields did not move notably on the announcement.

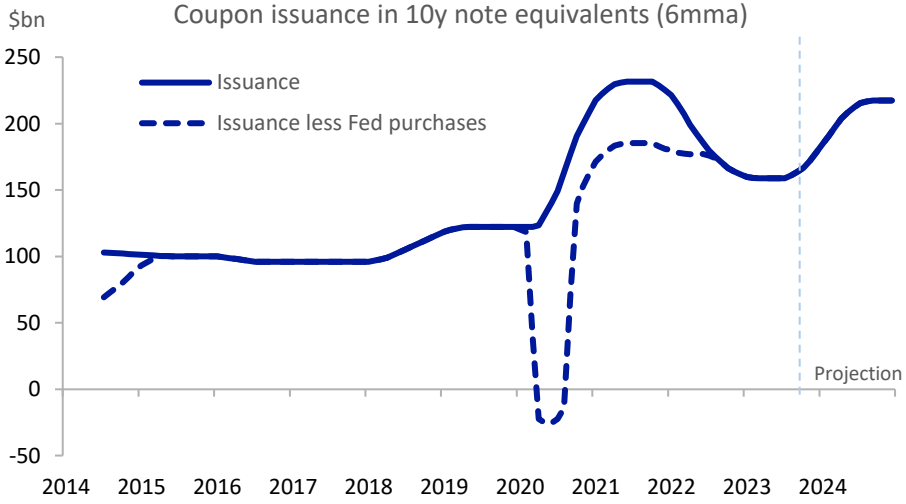
Source: Deutsche Bank

Coupon auction sizes are increasing, creating more supply pressure for next year



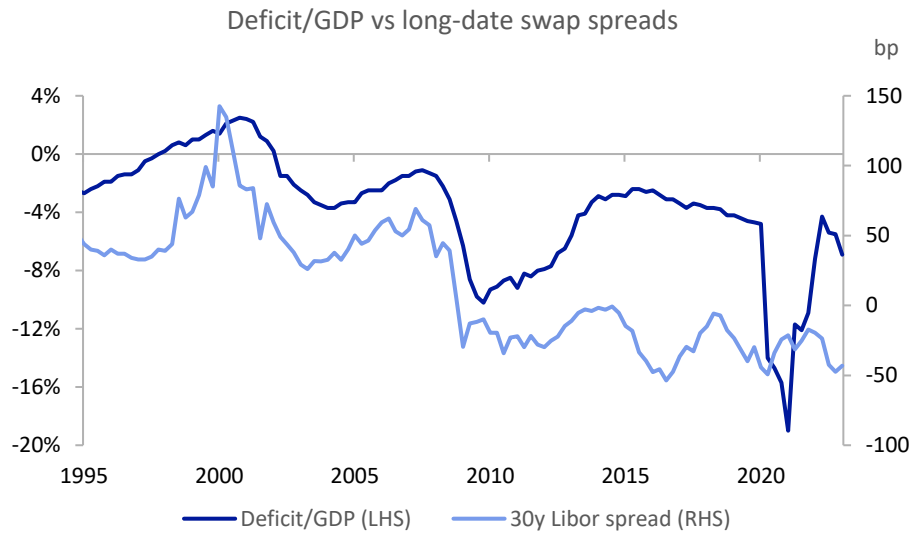


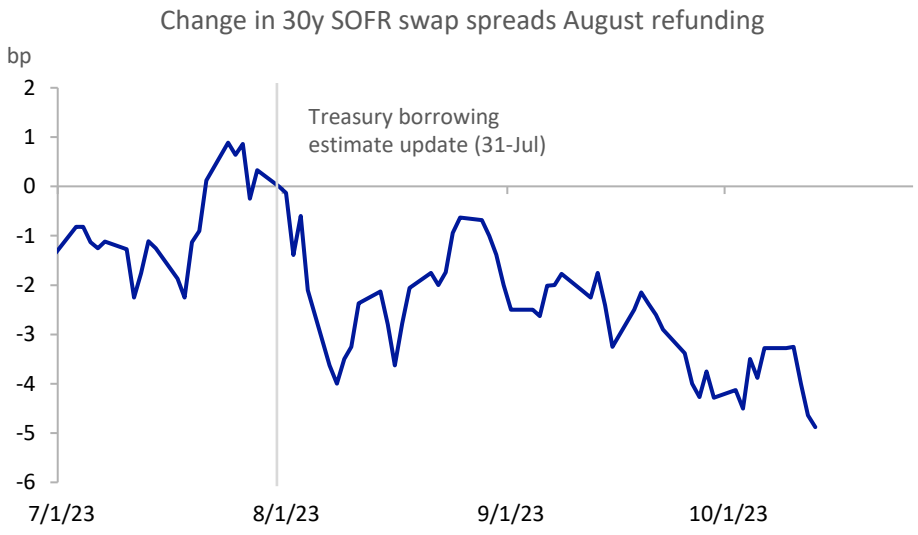
- Since June 1, the Treasury has issued $1.5 trillion in T-bills to meet its borrowing needs, including to rebuild the TGA from a very low level.
- As of the end of September, bill's share of marketable debt was 20.4%, above the TBAC's recommended range of 15-20%.
  - Bills are projected to remain above 20% until Q2 2025 under reasonable assumptions.
  - However, TBAC has indicated that it is comfortable with bills exceeding that range for some time.
- In August, the Treasury stated that *"further gradual increases [to coupon auction sizes] will likely be necessary in future quarters".*
- If Treasury were to keep the same pattern of increases announced in August for the next two quarters, auction sizes in most benchmark tenors would rise to a new record high. This would lift the duration of Treasury supply substantially higher next year as well.



Source: Treasury, Haver Analytics, TBAC member calculations

Narrowing swap spreads may again indicate supply/demand imbalance from increased Treasury issuance





- Long-dated swap spreads correlated highly with deficits pre-2008: long-dated spreads narrowed (Treasuries cheapened to swaps) as deficits went up.
- That correlation broke down from 2008-2021, perhaps due to factors discussed over the previous slides.
- While it is early to judge, the correlation may be returning; swap spread-narrowing in Q3, while relatively small, indicates deficits could be having a market impact. This narrowing overwhelmed any widening pressures that may have come from mortgage duration extension. It bears watching to see if the correlation continues to hold as it did pre-2008.

Source: CBO, Bloomberg Finance LP

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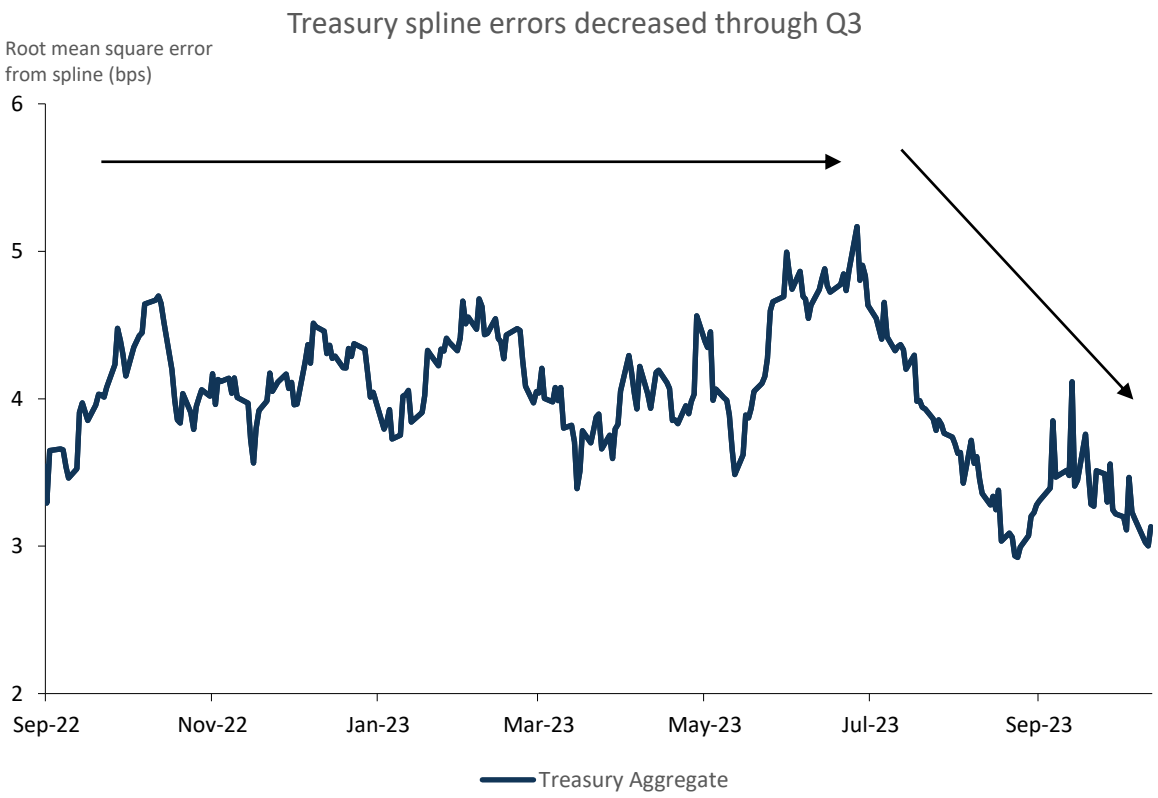
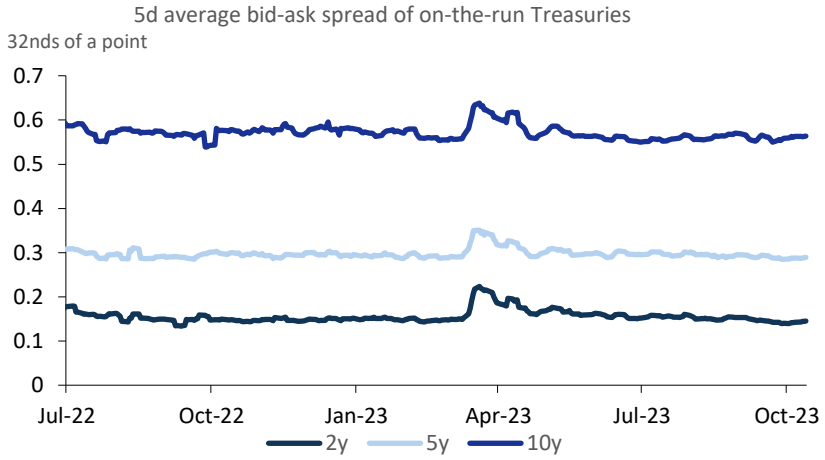
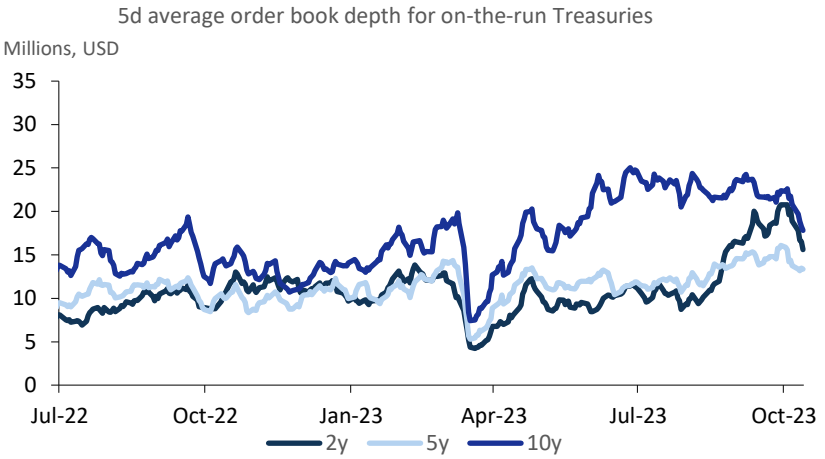
Market liquidity has generally been good, supporting the view that the yield rise was more driven by fundamental repricing



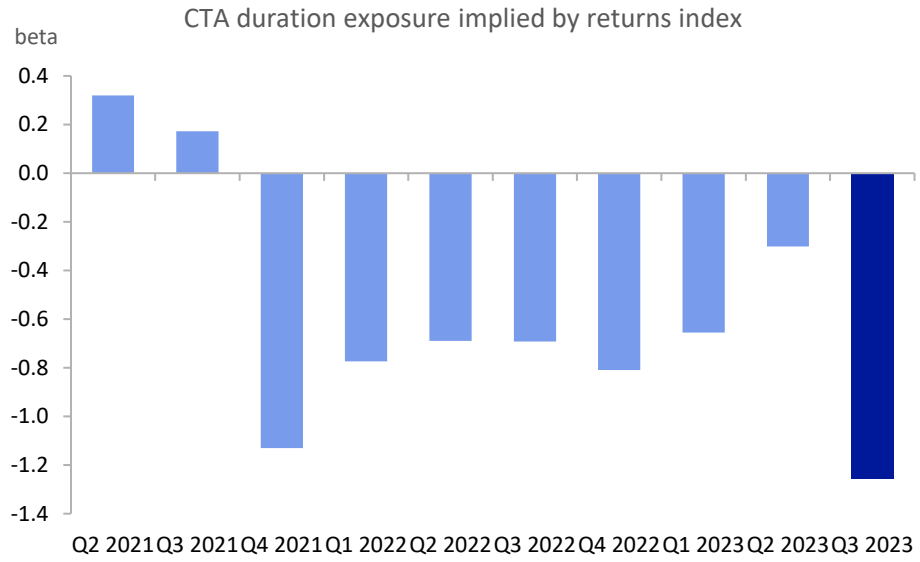


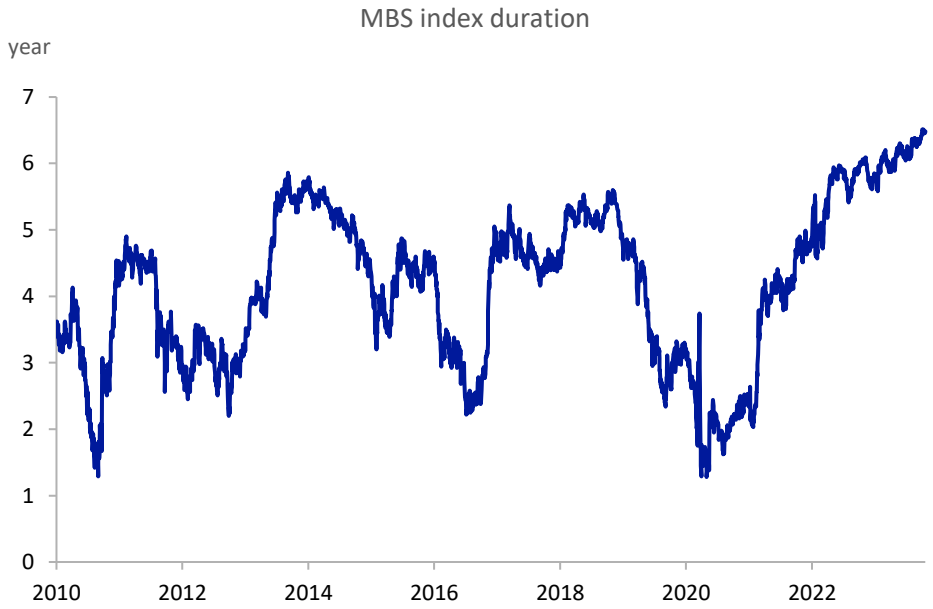


- Since the start of Q3, Treasury spline errors have declined, order book depth has improved, and bid-ask spreads for on-the-run Treasuries have remained stable.

Source: Deutsche Bank

CTA position changes may have amplified the market sell off, mortgage related convexity hedging was not a primary driver

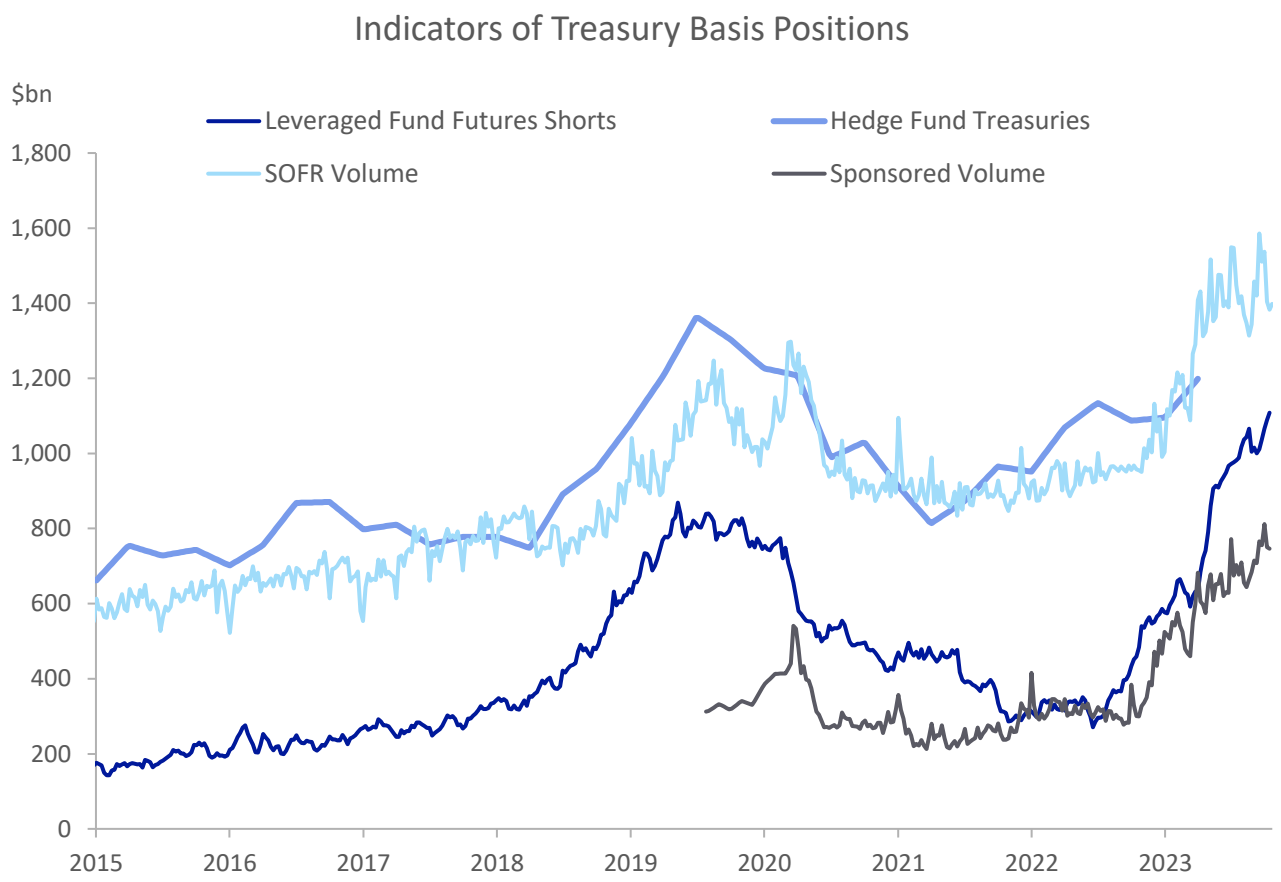




- Momentum strategies (CTAs) shortened their duration beta to the lowest level in Q3 as rates began to rise. Their position changes may have added to the market sell-off.
- Mortgage duration (Bloomberg MBS Index) extended from 6.07 years at the end of June to 6.48 years on October 20, raising the specter of convexity hedging. However, relative to prior history, this extension is modest.

Source: Soc Gen CTA Index, TBAC member calculations

Treasury basis trade possibly counteracted some of the cheapening pressure on Treasuries



- The Treasury cash-futures basis trade creates demand for cash Treasuries as relative value market participants sell futures and buy bonds. In doing so, they facilitate asset managers adding duration exposure via futures.
- The ongoing attractiveness of the basis trade and market data such as leveraged fund futures short positions suggest there are growing volumes of Treasury duration being held off balance sheet in futures.
- With hedge funds willingly providing liquidity to the buyers of futures, the functioning of the basis market may have helped counteract some of the cheapening pressure on Treasuries.

Source: CFTC, Federal Reserve Board, FICC

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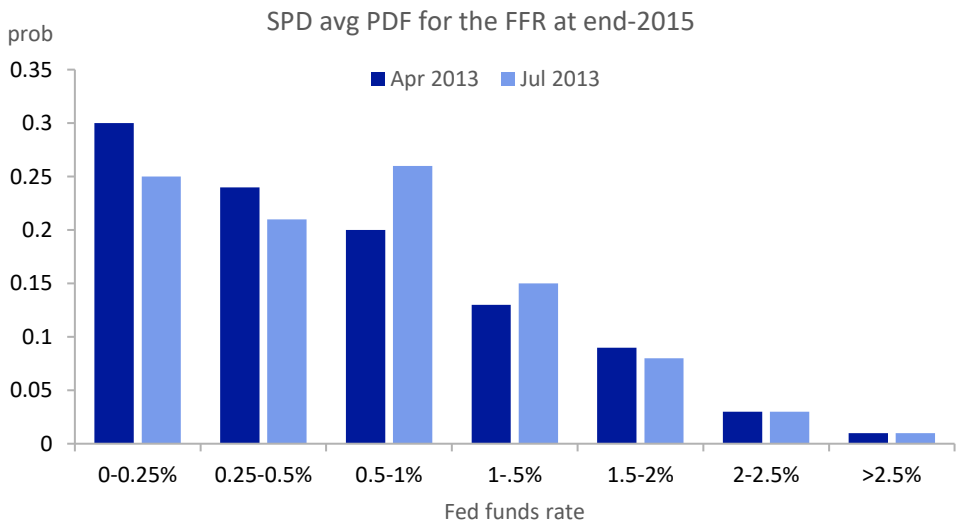
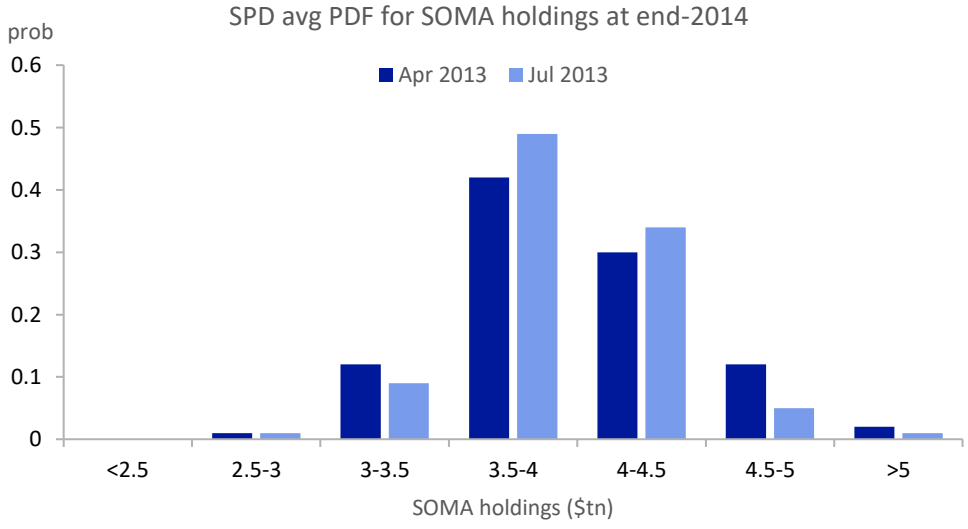
How do we square the substantial rise in yields with an apparently moderate-size shift in supply expectations?

- We have seen similar dynamics previously where the market moved significantly on information that was seemingly well-known and led to only modest adjustments in underlying fundamental expectations.
- The 2013 taper tantrum may be the most apt comparison. Chair Bernanke's remarks in May 2013 that the pace of Fed purchases could at some point slow catalyzed a sharp rise in longer-term rates (the 5y5y rate was up more than 100 bps between April and July), while the NY Fed's surveys showed little contemporaneous shift in expectations for the fed funds rate or SOMA holdings.





Source: Bloomberg Finance LP, NY Fed

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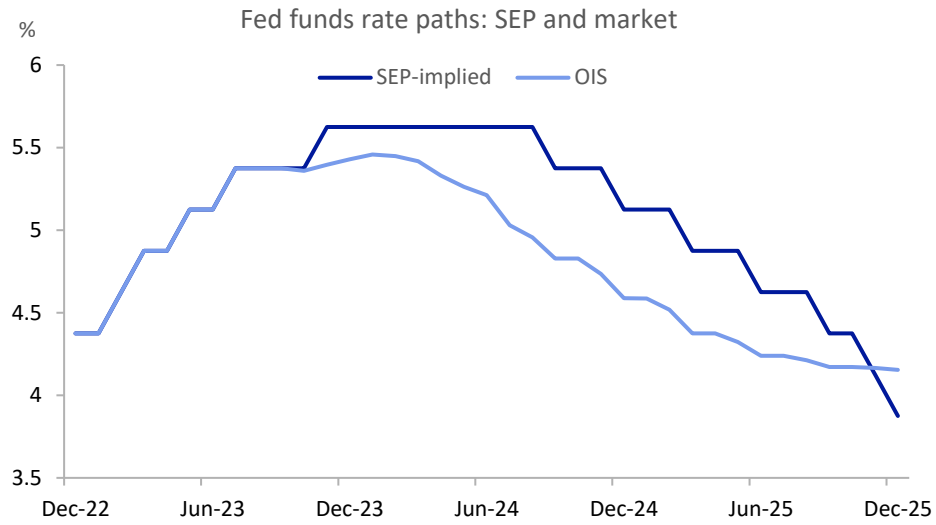
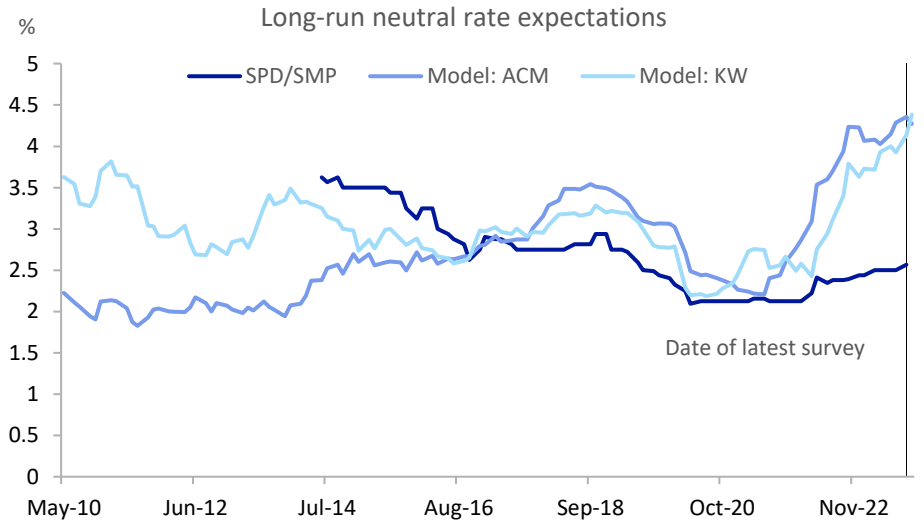
Yield outlook: Expectations components

- The framework helps to dimension potential moves in yields from here; while directional statements on the outlook are straightforward, magnitudes are highly uncertain.
- *Fed policy cycle expectations*
    - A shift to fully price the median SEP dots through 2025 could, all else equal, boost the 10y yield roughly 10 bps. A further shift up in near-term policy rate expectations should also in itself have a limited direct effect on long-term yields.
    - On the other hand, a mild recession would boost expectations for earlier Fed rate cuts, lowering yields.
- *Long-run neutral expectations*
    - It's difficult to gauge current neutral rate expectations. The SEP and surveys place it at 2.5% (nominal); term structure models put it much higher at around 4.4%.
    - An increase in neutral expectations from here should in theory pass-through close to 1:1 to the 10y.
    - Uncertainty around r* may be an important factor for TP.



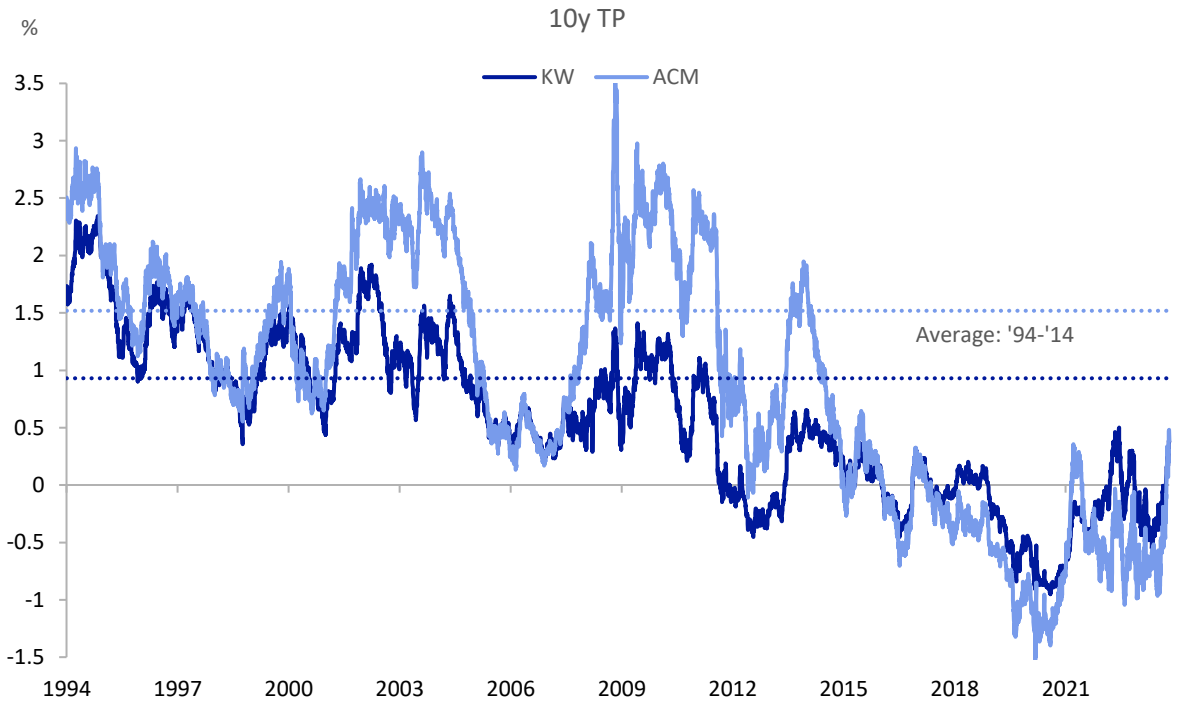


Note: For SPD/SMP uses expectations for the longer-run fed funds rate. For models uses the expectations component of the 5y5y rate.

Source: Bloomberg Finance LP, Federal Reserve, NY Fed

Yield outlook: Term premia

- Models similar to those used in early empirical work on LSAPs* find significant supply effects when estimated on data through the mid-2010s. Some specifications imply 10y TP should be as much as 150 bps above current levels.
- However, estimates on samples extending to 2020 find smaller supply effects; many still forecast that TP should be higher but by more moderate amounts.
- It is possible the models omit significant factors correlated with supply post-2014, producing downwardly-biased estimates of supply effects; some of those factors were reviewed above.
- The outlook for TP depends both on the magnitude of supply effects and the importance of other factors and whether their effects depressing TP are fading.
- One potentially conservative benchmark might be that term premia return to pre-2014 averages. That would imply an increase in KW and ACM 10y TP of roughly 55-110 bps from current levels.



Source: Federal Reserve; *E.g., Gagnon, Raskin, Remache and Sack (2011)

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Conclusion

- Treasury yields have risen sharply since the start of Q3, particularly in longer maturities. The Fed hiked policy rates as expected over the period and the market took out some cuts priced by 2025.
- However, models and surveys suggest that most of the yield increase was due to an increase in term premia.
- Term premia entered the quarter at historically low levels, although those historically low levels had persisted for many years. We argue that several of the fundamental factors which may have led to depressed term premia have abated (QE, pension fund asset reallocation, caps on money market fund assets) and new factors have emerged (decreasing fraction of UST supply going to overseas holders, banks shortening duration, households taking largest portion of UST issuance).
- We believe the term premia repricing may have been prompted by the market acceptance of increasing UST coupon supply.
- While technical factors may have amplified the moves, they likely did not play a major role.
- Some metrics suggest term premia have space to increase further.