Outlook for demand for US Treasuries

October 2023

Please discuss:

1. The Committee's views on how structural demand for Treasury securities will evolve in the near- and medium-term across different products and tenors.
2. What factors (e.g., the economic and monetary policy outlook) should Treasury consider when evaluating domestic and foreign demand from different investor classes over the next one to two years?
3. How should these views inform Treasury's future issuance decisions?

Executive Summary

1 How will structural demand for Treasury securities evolve in the near- and medium-term across different products and tenors?

- In recent years, demand base for U.S. Treasuries has shifted toward more price sensitive investors
- While some of these shifts are cyclical in nature, there may also be structural factors at play
- Over the medium term, demand from mutual funds, pension funds, and money market funds is likely to increase, while that from banks and foreign investors may continue to face headwinds
- Despite shifts in demand, Treasury auctions continue to be well subscribed – average auction tails have not risen, even as volatility of tails has increased in line with market volatility

2 What factors (e.g., the economic and monetary policy outlook) should the Treasury consider when evaluating domestic and foreign demand from different investor classes over the next one to two years?

- **Global macroeconomic outlook:** A recession would likely result in increased demand from most investor bases. However, a soft-landing scenario may result in a continuation of current demand patterns
- **Assessment of structural nature of higher term premium:** Term premium has recently risen, driven by multiple factors including borrowing needs of ~5%+ of GDP. A structurally higher term premium might result in recent trends persisting and demand not reverting to pre-pandemic proportions
- **Synchronization of global monetary policy:** Global economies have had varied responses to synchronous tightening in monetary policy, with the US economy remaining resilient. Subsequent asynchronous global monetary policy changes are likely to have implications for the demand base through FX and global portfolio allocation channels

3 How should these views inform Treasury's future issuance decisions?

- Recommend increasing flexibility of issuance strategy in light of a shifting demand base and higher term premium. Specifically:
  - Increase 2y, 5y, and 10y auction sizes greater than pro rata to skew issuance toward tenors less impacted by the rise in term premium and those that benefit from greater liquidity premium
  - Increase TIPs issuance, especially in intermediate maturities, to reflect positive inflation risk premium
- Recommendations for further study:
  - Evaluate patterns of inflows into MMFs, and other T-bills investor bases, under various economic scenarios, and analyze their allocation decisions into T-bills to inform optimal decision making around medium-term divergence from long-term T-bills band
  - Reassess how nimbly, and within what range, should the committee recommend the Treasury change the medium term expected interest cost to roll-over risk trade-off
  - Reevaluate the products and processes, presented in the TBAC charge "Potential Innovations in Treasury Products and Tools" January 2019, to attract new and existing investors

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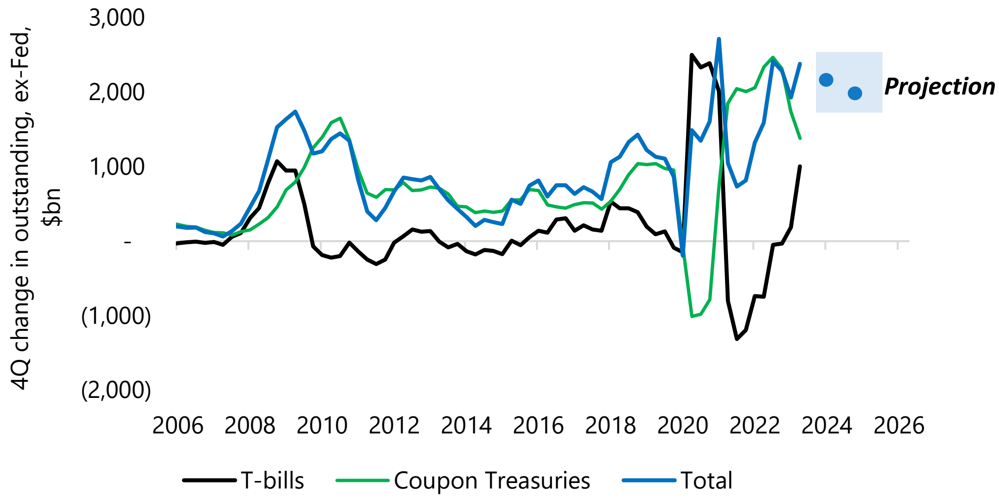
How will structural demand for Treasuries evolve in near and medium term?

Increase in supply in H1’23 was absorbed by a broad cross-section of private sector demand

Private investors have absorbed a significant increase in net supply in a rising rate environment



Source: Macrobond

Trends in demand for Treasuries show evolution toward more price sensitive investors

	Change in marketable Treasuries out, ex-Fed, $B	Households	Banks	Insurance	Private Pension	MMF	Mutual Funds, ETF	Foreign	Others[1]
H1 2023	1,281	53%	-6%	2%	11%	14%	5%	24%	-3%
2022	1,394	45%	2%	-1%	-3%	-33%	-8%	-18%	118%
Previous easing (Q1 2019-21)	4,166	-13%	20%	0%	3%	20%	13%	32%	25%
2015-2018 hike	3,136	18%	14%	2%	9%	16%	14%	5%	22%
Q1 2009-Q4 2018	7,947	13%	11%	2%	6%	4%	14%	38%	12%
Q2’23 holdings, out, ex-Fed	20,070	11%	9%	2%	5%	6%	9%	38%	19%

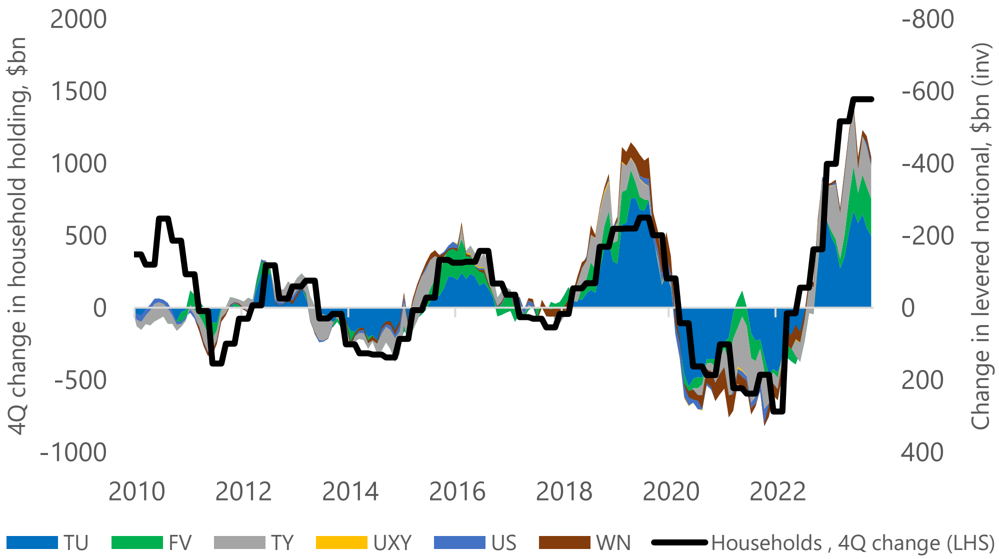
Source: Federal Reserve, Macrobond

- Over the previous four quarters, marketable debt outstanding, adjusted for Federal Reserve holdings, increased by more than $2trillion, ~3x the average in the prior decade
- Private investors have absorbed this supply in an environment of considerable macroeconomic uncertainty and sharply rising interest rates
  - Demand base has shifted toward more price sensitive buyers with “households”[2] absorbing more than half of the net increase in outstanding
  - Relative to 2022, demand for US Treasuries became more broad-based in H1’23. Pension funds, money market funds, mutual funds and foreign investors all absorbed a greater share
  - Banks displayed reduced demand – changing regulatory environment and risk management decisions likely played a role
- Importantly, CBO and consensus forecasts over the medium term are for net supply of US Treasuries to remain at these relatively high levels

1) Others category includes non-financial corporates, State and Local government ex-SLGS, GSE and statistical discrepancy
2) “Households” category includes domestic hedge funds and personal trusts

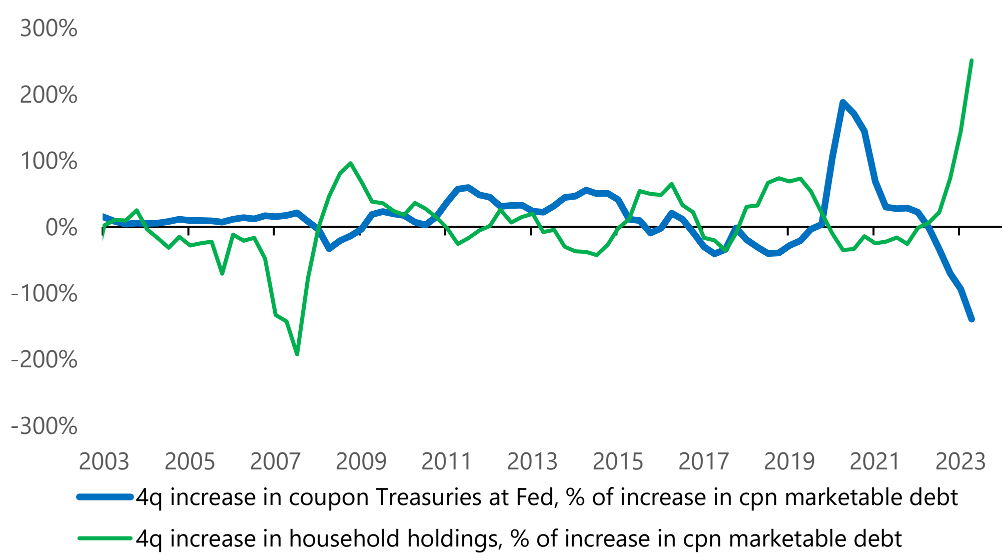
Demand base has shifted toward more price sensitive buyers

Household demand correlates with levered fund net notional position



Source: CFTC, BNP Paribas, presenter's calculation

The Fed displaces more price sensitive investors during QE. The latter increase their holdings in QT episodes



Source: Federal Reserve

- In recent years, Treasuries held by households have risen
- Since 2021, household holdings of Treasuries have increased by $1.7T – amounting to ~50% of the total increase in marketable debt outstanding, ex Fed
  - Households averaged 18% of total increase in marketable debt outstanding in the previous 2015-2018 hiking cycle and 13% from 2009-2018 overall
- The increase by household investors correlates with buildup of levered net short notional positions, concentrated in the TU contract. This suggests that the increase in household positions are partially attributable to basis trades by levered (and more price sensitive) investors
- Increased household demand, together with the Fed not rolling over maturing securities, and lower demand from official foreign investors, indicates that the demand base may have shifted toward more price sensitive investors, contributing to a rise in term premium

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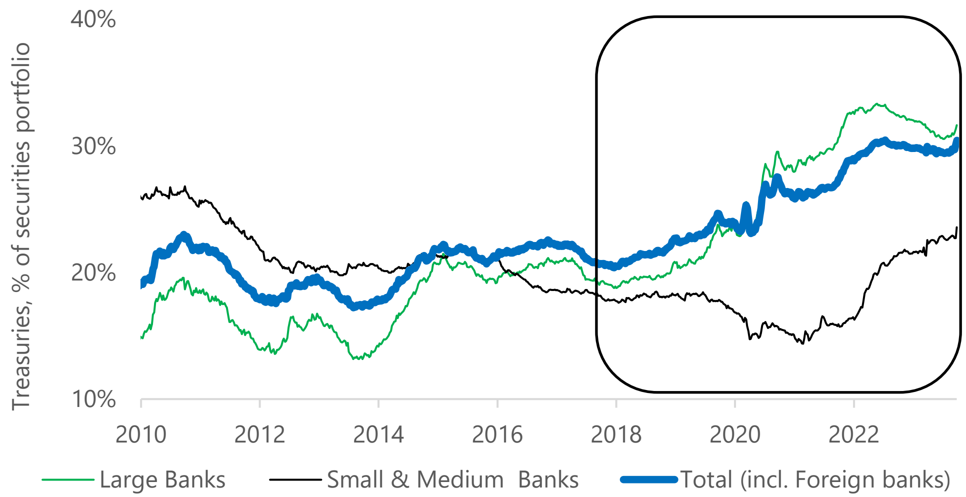
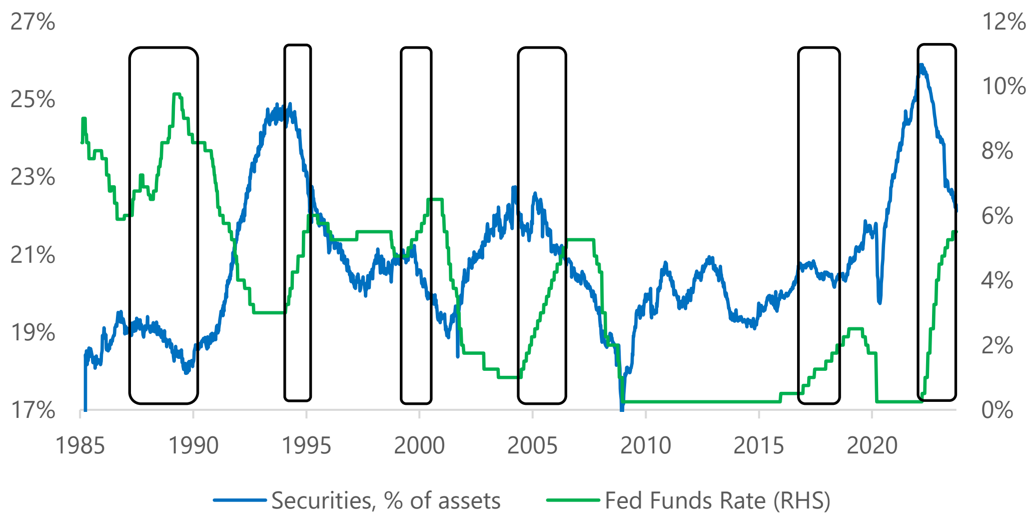
While banks' securities portfolios have shrunk, their allocation to Treasuries has increased

Treasuries are a greater allocation within banks' securities portfolio…



Source: Federal Reserve

…even as securities, as % of assets, have declined (as is typical in hiking cycles)



Source: Federal Reserve

<u>Recent trends</u>

- Treasuries outstanding grew by $1.3T ex Fed, In H1'23, however, those held by banks declined by ~$100B
- Weakened bank demand is likely driven by:
  - <u>Slowing asset growth</u>: Total assets of commercial banks were largely unchanged over the past year - compared with ~2.5% in the previous hiking cycle
  - <u>Shrinking securities portfolio</u>: With sharp rise in interest rates and underperformance of MBS assets, banks actively shrunk their securities portfolio as a percentage of their assets -- This pattern is typical in hiking cycles
- Even as securities share of assets has shrunk, allocation to Treasuries within the securities portfolio has increased, from 20% in 2017 to 30% currently

<u>Outlook for demand</u>

- Banks may continue to reduce allocation to securities. However, Basel 3 Endgame may encourage switches out of GSE MBS into UST/GNMA, due to differing capital treatment
- Table below outlines the potential sensitivity of these trends on Treasuries demand

Asset Growth, yoy	Securities, % of assets	Treasuries, % of securities	Additional demand, $B
0.0%	22%	30%	$0
1.5%	21%	33%	$100
3.0%	21%	35%	$220
1.5%	23%	35%	$350

Assumes changes in asset growth, declining share of securities as a portion on assets (in line with prior hiking cycles), and continued growth in allocation of Treasuries holdings within securities portfolios by banks

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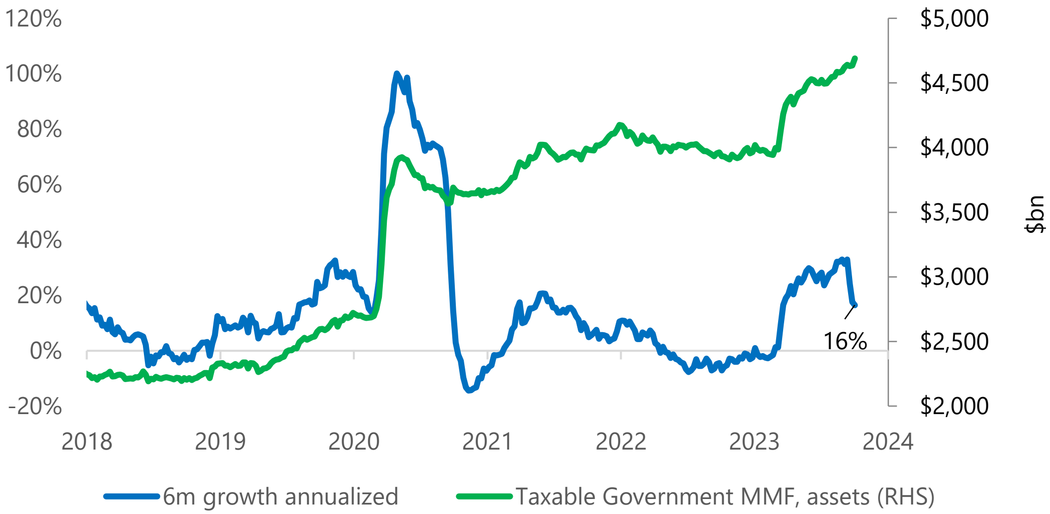
Recent T-bills cheapening vs OIS has made them attractive to money market funds

Amid the sharpest hiking cycle in decades, inflows into Government MMFs have surged



Source: ICI, Macrobond

Allocation to T-bills in government MMFs has increased recently, with further room to rise

Source: Bloomberg, Macrobond

Recent trends

- Demand for US Treasuries from money market funds has increased this year, driven by an increase in inflows and Treasuries valuations cheapening relative to OIS
- Government and prime MMF assets have increased ~$700B and ~$250B YTD
  - Government MMF holdings of Treasuries increased $160B in H1'23, and have increased an additional $300B as T-bill issuance ramped up post Q2 debt ceiling crisis
- For much of 2021-22, MMFs substituted T-bills with Treasury repo. The recent buying of T-bills has not come entirely at the expense of Treasury repo and reflects allocation of incoming capital into T-bills

Outlook for demand

- T-bills allocation in government MMFs averaged 30% - 40% from 2013 to 2019, increased to ~60% in the pandemic, subsequently declined to 20% amid rich valuations, and is now back to 30% with potential to rise
- With investors attracted by high T-bill yields relative to longer end of the Treasury curve, inflows into MMFs are likely to remain strong
  - A 5% annual increase in MMF assets and an increase in allocation to T-bills to 35% translates to ~$150B in new annual demand for T-bills
- Recent changes adopted by the SEC to increase the minimum liquidity requirements for MMFs may be a marginal[1] tailwind for T-bills demand

1) As of end of September, 0.17% of the ~$6trn in MMFs assets were under the 25% daily liquid assets requirements and 2.5% were under the 50% weekly liquid assets requirements

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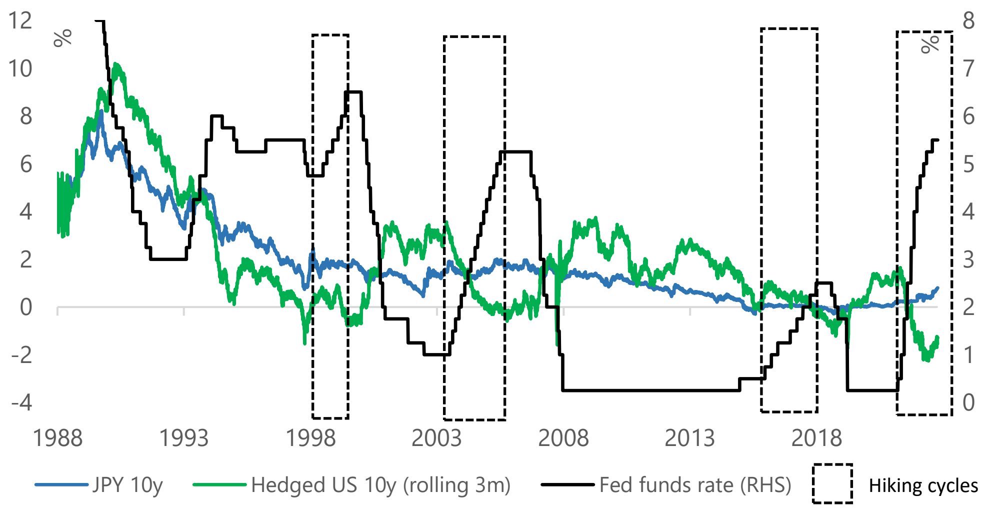
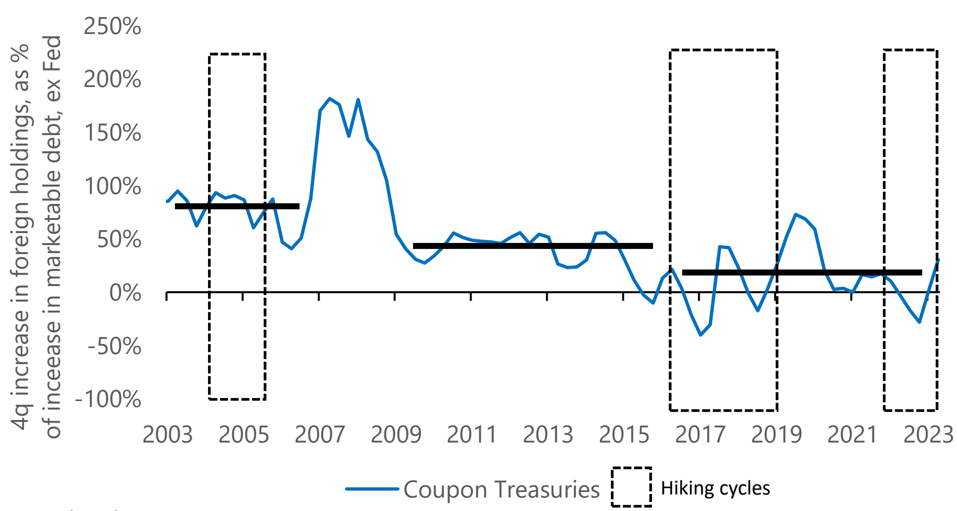
Foreign investors reversed the 2022 trend, but official demand likely faces structural headwinds

As is typical in hiking cycles, higher FX hedging costs lower the hedged Treasury yields to foreign currency funded buyers



Source: Bloomberg, calculations

Foreign demand is absorbing a smaller proportion of net issuance in recent years than was true previously



Source: Bloomberg

Recent trends

- Increase in foreign investor Treasury holdings accounted for ~25% of the increase in total outstanding in H1
- This was notable for two reasons:
  1. The increase represented a turnaround from 2022 when foreign investors were net sellers
  2. The increase represented was despite prohibitively expensive costs of hedging FX risk, suggesting some of the purchases might not be FX hedged and potentially includes purchases by offshore HFs in basis trades or otherwise
- Flows from Japanese investors in 2023 are on pace to be one of the strongest year since 2013, despite yields of US Treasuries looking significantly lower than those of JGBs on a partially hedged basis

Outlook for demand

- As the end of the current hiking cycle comes into view, the headwinds from high hedging costs will diminish and may drive greater demand for US Treasuries
  - In the previous hiking cycle, foreign investors accounted for ~5% of the increase in Treasuries outstanding before increasing to ~30% when the cycle ended
- Despite this potential cyclical boost, foreign demand for Treasuries may face structural challenges due to reduced pace of international FX reserve growth
  - Foreign demand, on a structural basis, appears to have settled at a level lower, as a percentage of outstanding, than in 2009-15
  - Foreign investors are unlikely to absorb ~50% of issuance as they did in that period

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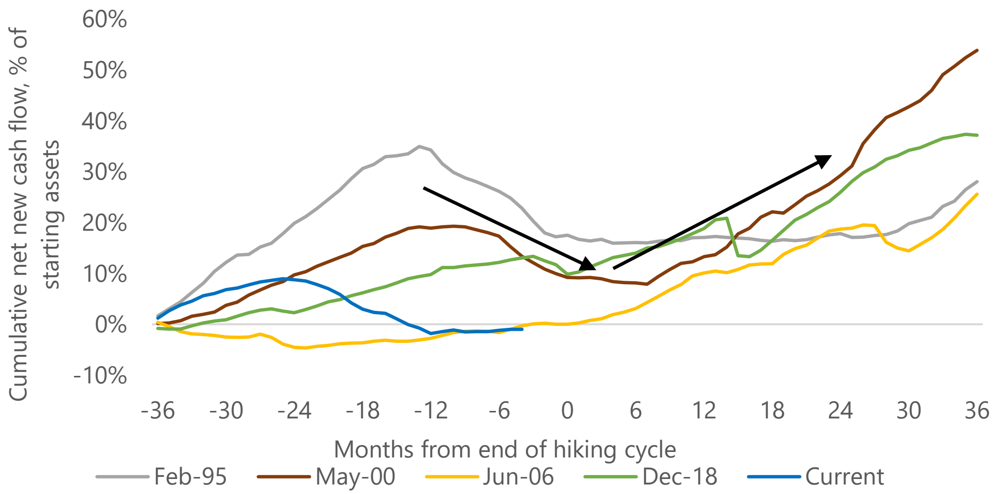
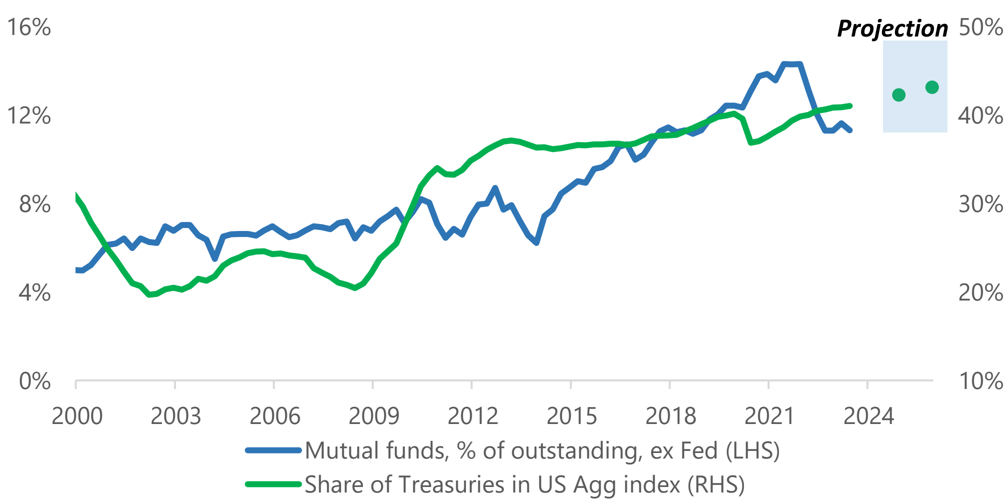
Mutual fund demand to largely reflect AUM growth and index composition

Bond mutual funds tend to experience outflows in hiking cycles. Flows tend to pickup once the cycle ends



Source: ICI, Macrobond

Mutual funds[1] have allocated more to Treasuries, in line with increase in the share of Treasuries in US Agg index



Source: Bloomberg

Recent trends

- Mutual fund demand for Treasuries was tepid in 2023, accounting for 5% (down from 12-15% historically) of the increase in marketable debt outstanding, ex-Fed
- The soft demand is in line with expectations given the negative net new cash flows in bond funds in 2022 and in the first half of 2023
- Lower demand is likely a function of negative investment returns in fixed income and the lack of correlation benefit to risk assets that Treasuries provided during the sharpest hiking cycle in decades

Outlook for demand

- Near-term flows will continue to be dictated by economic scenarios. Historically, bond funds experience outflows during hiking cycles and inflows subsequently
- Structurally, share of Treasuries outstanding held by mutual funds has risen steadily over the past 20 years, reflecting the increasing weight of Treasuries in the benchmark indices
  - Currently, Treasuries are ~41% of the index – this could rise to ~43% by 2025
  - ~$3.5T[2] ($4.8T including categories that invest in international sectors) in assets in active and passive taxable bond funds and ETFs are benchmarked to the US Aggregate index or its subcomponents
  - Together, a 1% increase in weight of Treasuries in the index could represent an additional demand of ~$40bn

1) Includes fixed income and equity mutual funds and ETFs
2) Source: Morningstar

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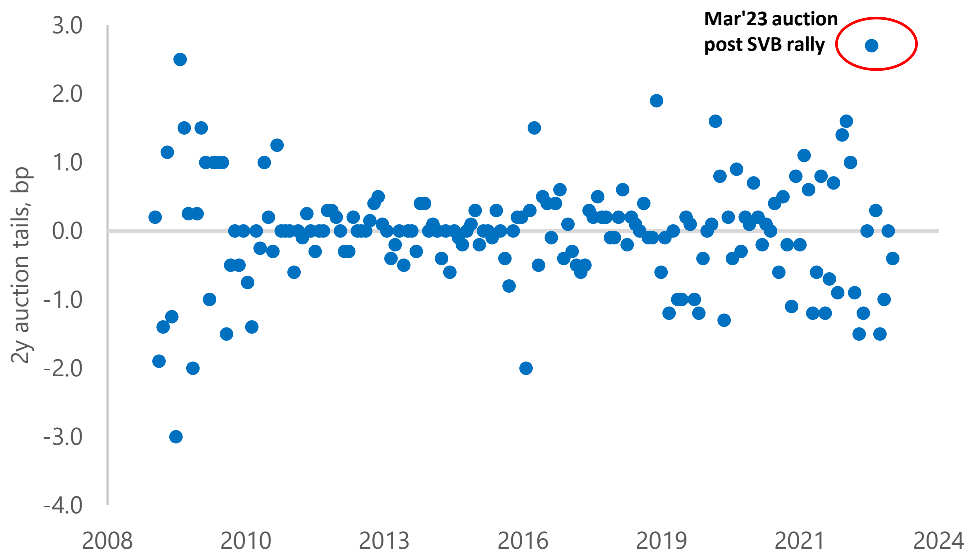
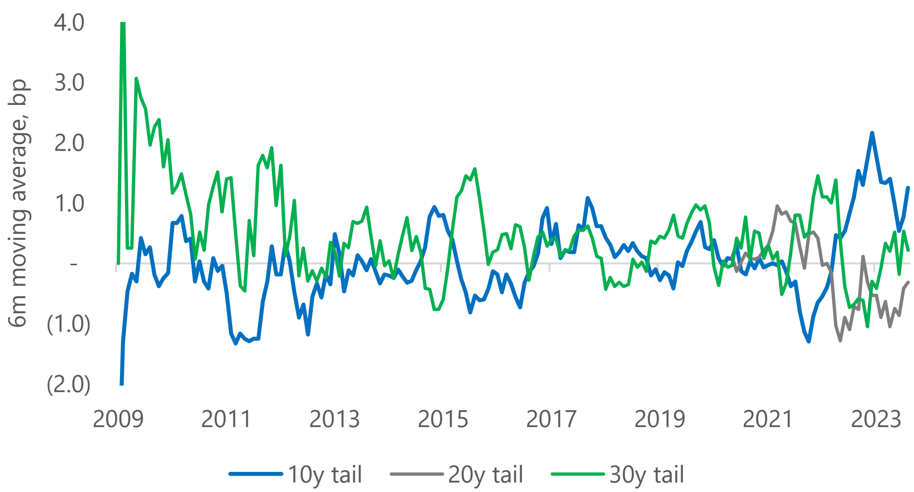
Treasury auctions have been well subscribed and have performed adequately

Auction performance has remained strong at the front end. Volatility of tails has gone up



Source: Barclays

Auction tails have worsened a little at the 10y sector but likely reflects a typical lack of auction concession in this sector



Source: Barclays

<u>Auction performance</u>

- Despite evolving demand base over the past two years, Treasury auctions have performed well with respect to the WI yields
- While the volatility of auction results has increased, the average "tail" at auctions has not. The increased volatility of auction tails is in line with the increase in yield volatility since 2021
- The exception to this pattern is 10y auctions but given the 10y's status as the bellwether point on the curve, it perhaps has different auction dynamics than other points on the curve
- In longer tenor auctions such as 20y and 30y, where auctions provide a more critical liquidity point for investors, tails have not shown an increase
- With more price sensitive investors becoming a larger share of the demand base, cheapening of Treasuries ahead of the supply and subsequent richening post auctions has become more prominent, but unevenly across different tenors

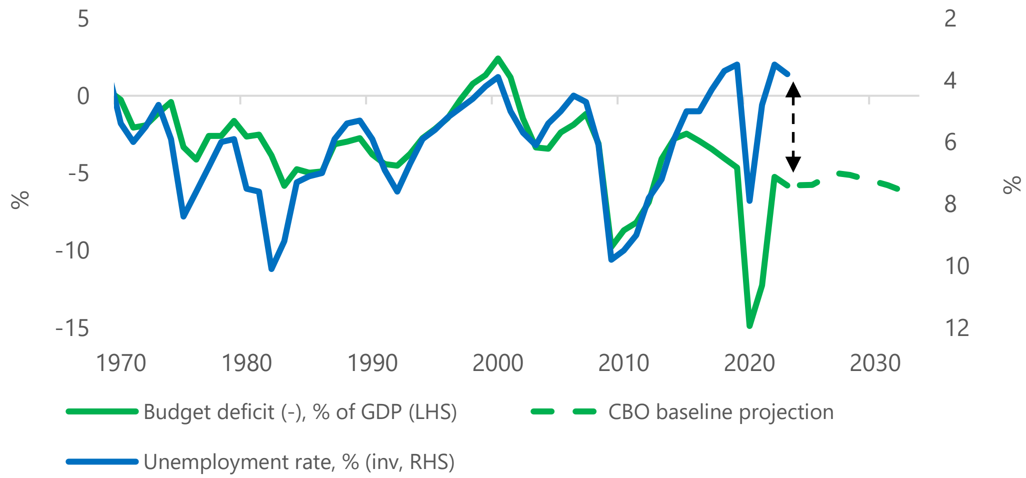
2

What factors should Treasury consider when evaluating domestic and foreign demand?

2

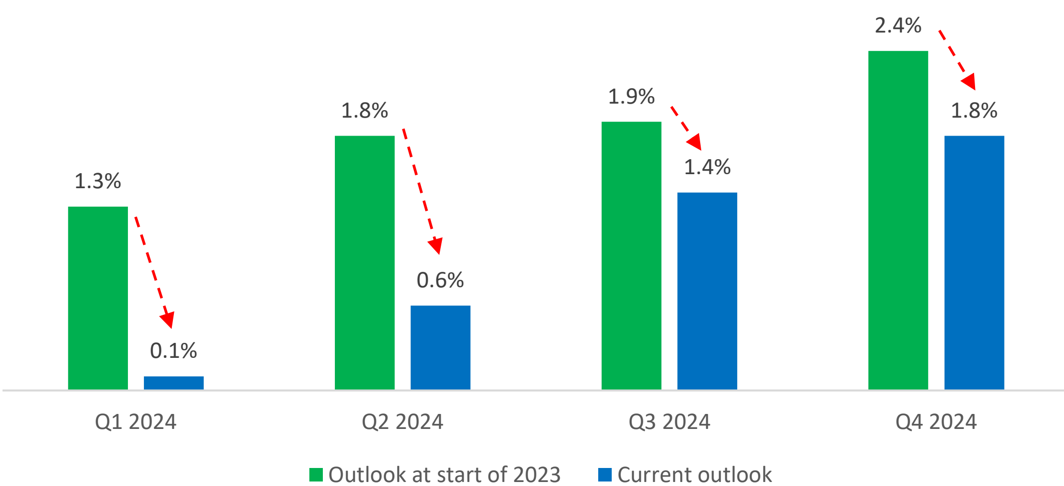
Factor 1: Evolution of global macroeconomic outlook
Large deficits have magnified the effects of a changed demand base

Current fiscal deficits are procyclical in nature and CBO projects them to remain high over the medium term



Source: CBO

Consensus growth forecasts have continued to trend down, suggesting the possibility of higher deficits



Source: Bloomberg

Cyclical and structural factors have contributed to the shifting demand base to more price sensitive investors:

Cyclical

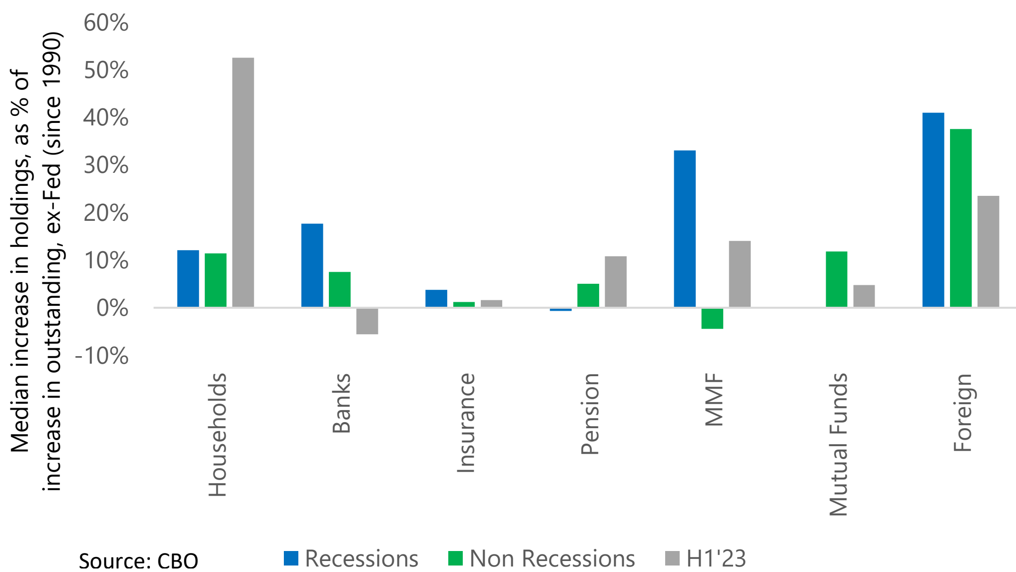
- Private investors have absorbed supply in an environment of considerable economic uncertainty and sharply rising interest rates. These factors are likely to moderate over the medium term

Structural

- Deficits have historically moved in line with unemployment rate. However, recent fiscal policy has led to a divergence between deficits and unemployment. Deficits are structurally higher across economic scenarios, and could go higher in the event of a recession
  - Under baseline CBO projections of 1.8%, 2.7% and 2.4% real GDP growth over the next 3 years, deficits are likely to exceed 5% of GDP.
  - An economic contraction next year may further raise deficits as deficits typically rise 2-5% of GDP in recessions
- Decreasing securities allocation as percentage of bank assets and declining share of holdings by foreign investors are likely structural in nature

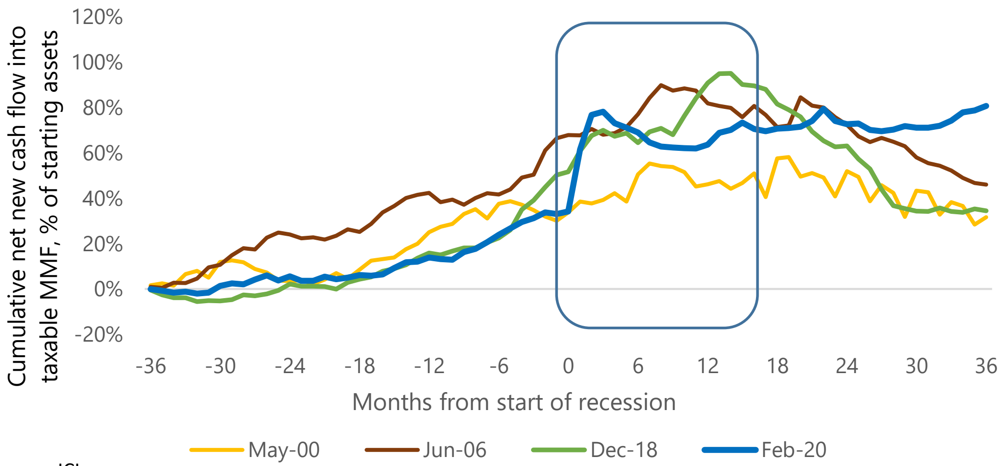
Factor 1: Evolution of global macroeconomic outlook
Demand base is likely to evolve differently in different macroeconomic outlooks

Demand profile varies according to macroeconomic scenarios. Due to structural reasons, current profile might evolve differently



Source: Federal Reserve, Macrobond

Money market funds experience strong inflows in recessionary environments, driving increased demand for T-bills



Source: ICI

Evaluation the demand base across macroeconomic and monetary policy scenarios can be instructive:

Should a recession occur:

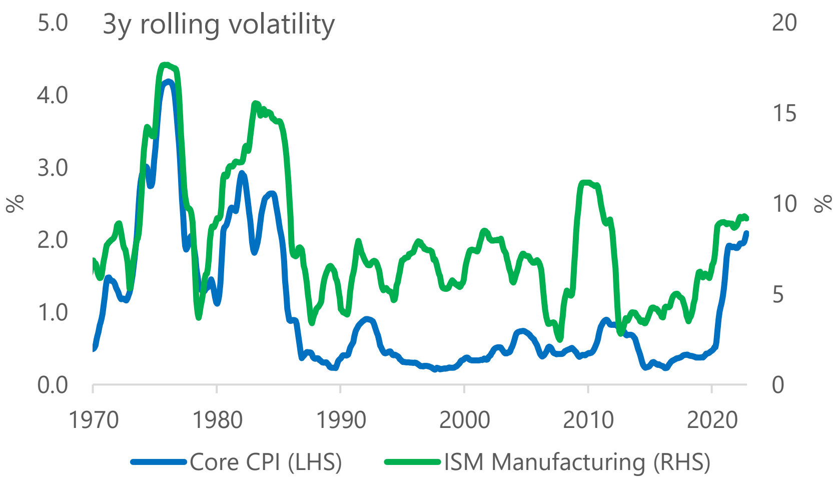
- The demand base broadens as Treasuries act as a flight to quality asset class, with diversifying properties for domestic and global portfolios
- MMFs experience strongly positive net new cash flow around / preceding the start of a recession, as investors seek capital preservation
- Comparison of the MMF fund flows to those of bond funds show a strong preference for MMFs in recessionary environments
- During monetary policy easing, banks tend to increase their allocations to securities overall, and increase Treasuries as a percentage of securities held

Should a soft landing or "higher for longer" scenario be realized:

- A greater share of the borrowing needs may have to be financed domestically than historically
- Macroeconomic stability and higher return expectations are needed to drive inflows into mutual funds. In this environment, mutual funds may absorb a greater share of Treasuries than today
- Household investors are also likely to maintain a greater share of demand in this environment

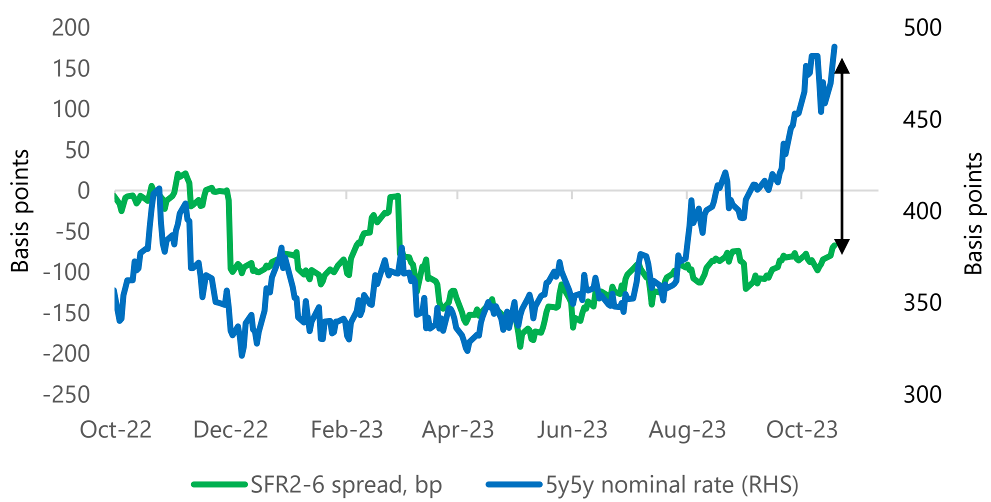
Factor 2: Assessment of structural nature of higher term premium: Several factors have driven term premium higher and may not revert equally

Macroeconomic data has been volatile, contributing to the rise in term premium



Source: Bloomberg, calculations

Rising term premium is evident in divergence between 5y5y nominal rate and Fed expectations over the next year



Source: Bloomberg

- Large borrowing needs have been a key driver of the rise in term premium. However, several other factors have also contributed. These factors may revert only to varying degrees over the medium term

<u>**Drivers of higher term premium**</u>

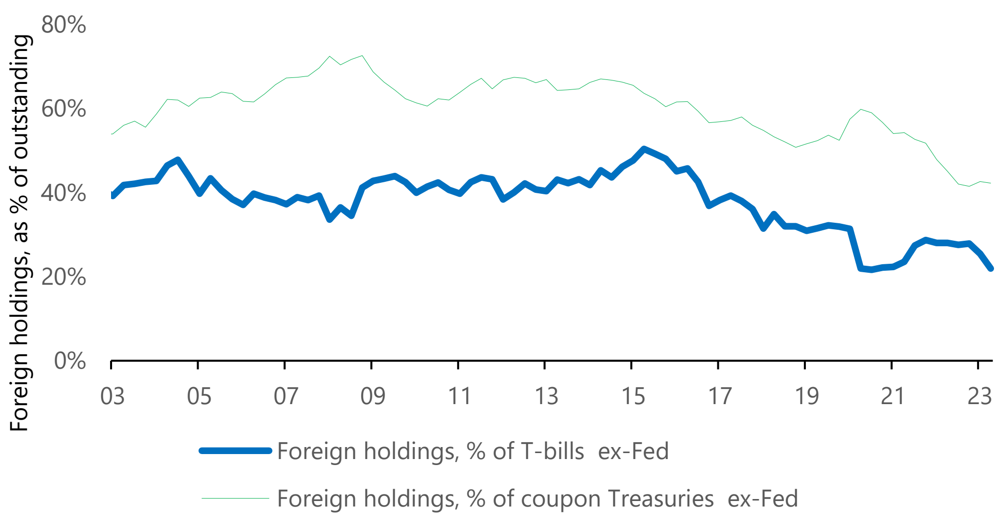
- **Macroeconomic volatility:**
  - Three years after the pandemic, macroeconomic data continues to be volatile. Surprise indices however are far less volatile now, indicating that forecasters have adjusted to the higher macroeconomic volatility, and it is reflected in term premium
  - Macroeconomic data volatility is likely to subside over the medium term
- **Global monetary policy**
  - Over the past year, 5y5y nominal Treasury yields moved with expected near-term Fed tightening
  - However, over the past quarter longer term rates including 5y5y have risen, likely due to increased issuance expectations, changes in BOJ’s Yield Curve Control (YCC) policy, and other factors. While the former is a structural driver of term premium, the latter may prove to be more cyclical

Factor 2: Assessment of structural nature of higher term premium

Less negative correlation between Treasuries and risk assets has contributed to rise in term premium

Source: Bloomberg

Foreign investor share of holdings are now lower than in 2015



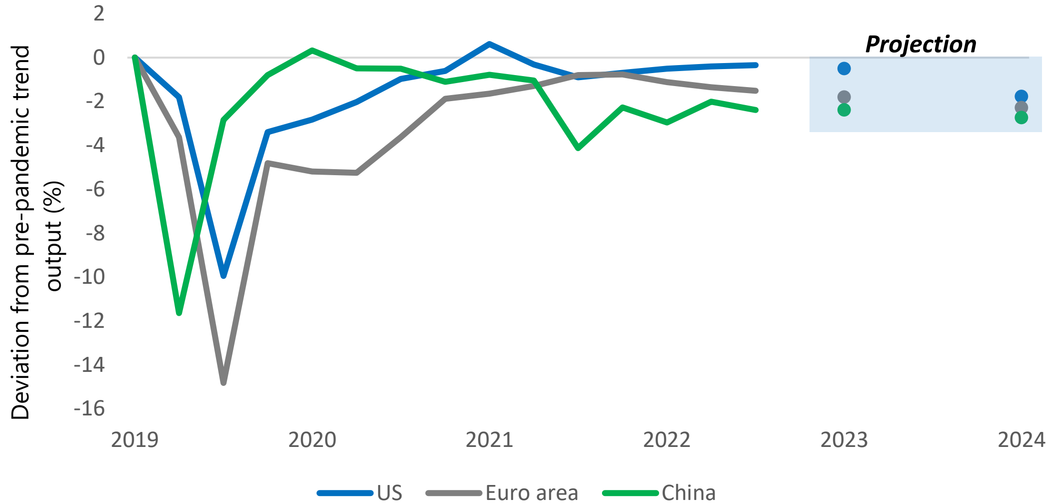
Source: Federal Reserve

<u>**Drivers of higher term premium (continued)**</u>

- **Treasury risk asset correlation**
  - Correlation of Treasuries and equities returns has become positive over the past year; a departure from patterns since the 2000s
  - This has reduced the diversification benefit of Treasuries in portfolio construction and contributed to a rise in term premium
- **Lower foreign participation**
  - Despite stronger demand in 2023 YTD, foreign demand may face structural headwinds
  - Global FX reserves growth has stalled and the globalization trends of past three decades face realignment
  - These changes have led to lower official foreign demand for Treasuries relative to the increases in issuance; which may be secular
  - Foreign investors now hold ~20% of T-bills outstanding ex-Fed, compared with ~50% in 2015. Growth in foreign demand for coupon Treasuries has also not kept up with the pace of issuance, reducing the share held by foreigners
  - It is unlikely that foreign investors maintain 35%-50% of demand like in the previous decade. A greater proportion of issuance is likely to be domestically financed

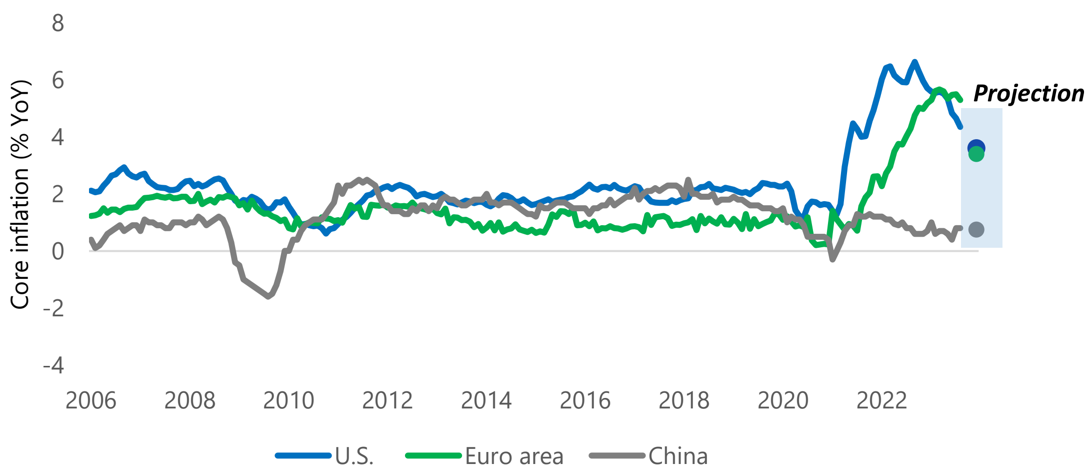
Factor 3: Potential asynchronous easing of global monetary policy: While global monetary hikes were synchronous, subsequent policy changes might not be

US economic resilience might make the Fed more patient in normalizing policy



Source: Vanguard, BEA, Eurostat and CEIC, as of 2Q 2023

Progress on taming inflation in the U.S. and Euro area has been slow, but China has faced the opposite problem[1]



Sources: Vanguard calculations using data from the U.S. Bureau of Labor Statistics, Eurostat, PBOC

- While global central banks were largely synchronous in tightening policy, economic outlooks have meaningfully diverged
- On the growth front, US growth has been more resilient than that in Euro area and China, with real GDP in the US reaching to pre-pandemic trend
- US has also made greater progress on taming inflation relative to the Euro area
- These factors may lead to asynchronous policy changes, with the Fed having the capacity to be more patient, which could alter Treasury demand profile
  - In this scenario, investors might find non-US debt relatively more attractive from a total return perspective
  - Relatively higher short rates in the US than in foreign currency would make FX hedging more expensive for foreign investors

1) Chart shows the core consumer price index (CPI). Year-end 2023 figures are Vanguard forecasts

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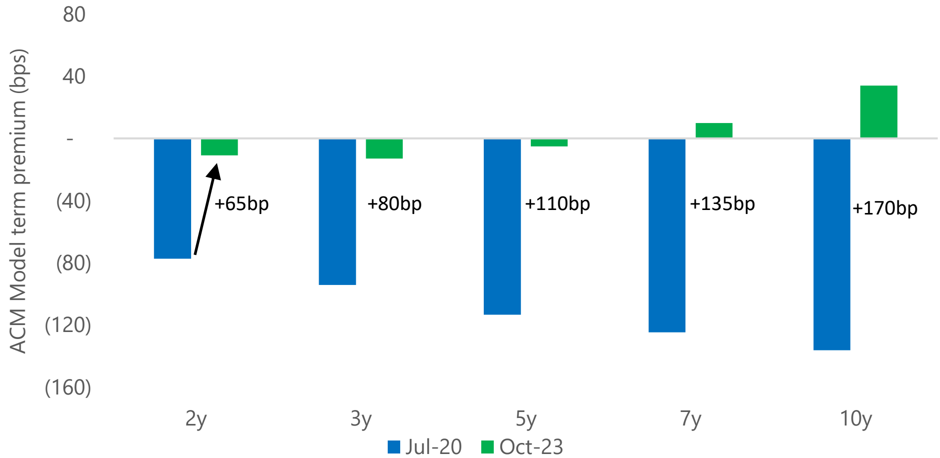
How should these views inform future issuance decisions?

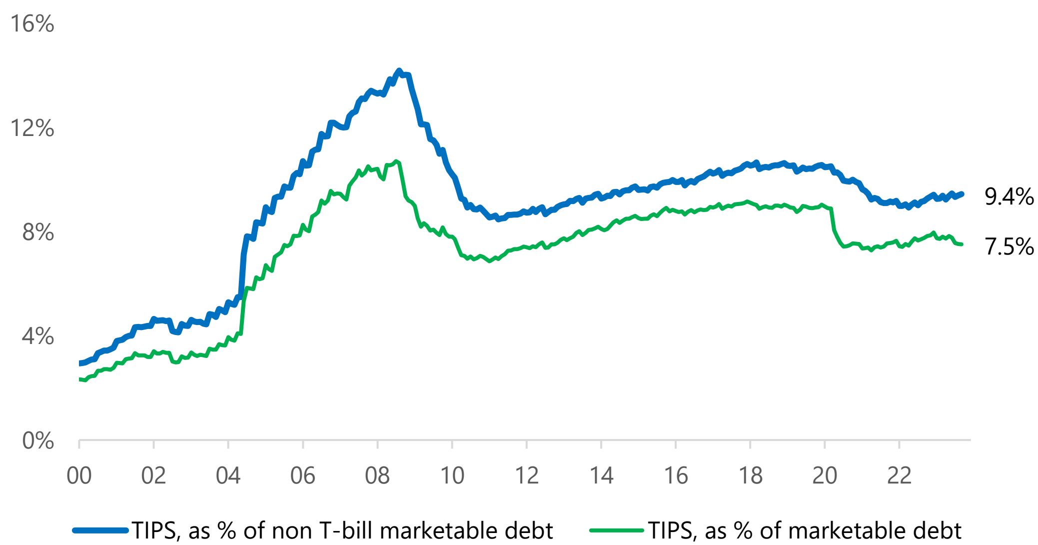
Recommendations for near term debt issuance

We recommend tilting issuance toward tenors less impacted by the rise in term premium and those with greater liquidity premium



Source: NY Fed, Bloomberg

There is room to increase TIPS ex-T-bills marketable debt outstanding



Source: Bloomberg

Recommendations

- Given the analysis of the evolving demand base shifting toward more price sensitive investors and rising term premium, we recommend greater flexibility and variation in issuance profile, within the construct of regular and predictable issuance to increase responsiveness to shifting demand
- Specifically:
- Increase auction sizes greater than pro-rata for issues less impacted by the rise in term premium (e.g., 2Y, 5Y), and issues that benefit from greater liquidity (e.g., 10Y)
- Positive inflation risk premium, which may persist, makes TIPS cheaper to issue ex-ante
  - There is room to increase TIPS universe, as a percentage of outstanding (currently less than 10%), with a focus on intermediate issuance
    - As was noted in the Q2 2023 TBAC charge 'TIPS Issuance, Demand, and Level of Supply', demand for TIPS remains structurally strong and demand for shorter duration TIPS has increased considerably over the past decade
    - While demand slowed cyclically in 2022, flows into the largest two TIPS ETFs show stabilization over the past six months, likely as the end of the hiking cycle comes into view

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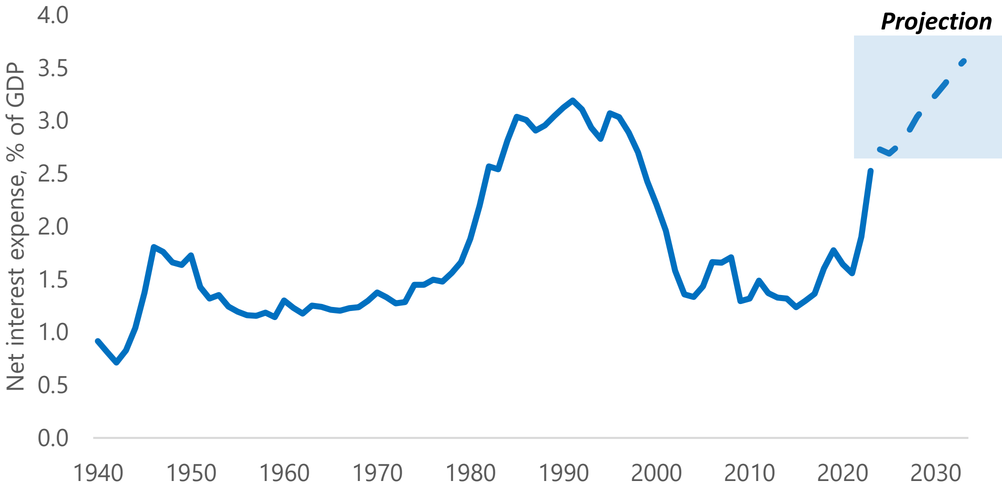
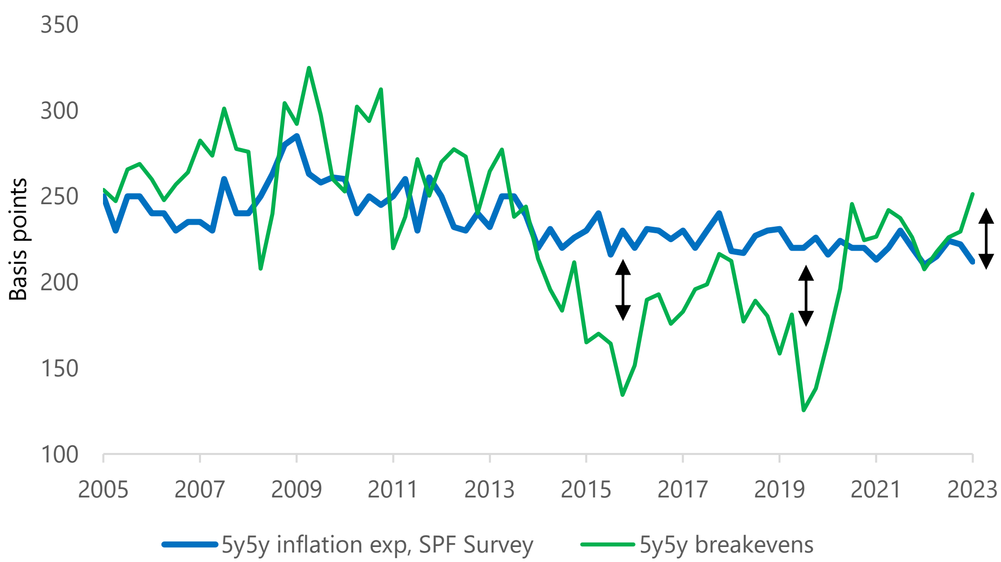
Recommendations for further study

Interest rate expense, as % of GDP, is likely to rise over the medium term



Source: CBO

Positive inflation risk premium makes TIPS cheaper to issue ex-ante



Source: Bloomberg

<u>Recommendations</u>

- While the long-term guidance of T-bills outstanding at 15-20% of total, and recent deviations to maintain regular and predictable approach to coupon issuance, are appropriate, we recommend the committee explore if more meaningful deviations are necessary
  - The analysis should evaluate patterns of inflows into MMFs, and other T-bills investor bases, under various economic scenarios, and their allocation decisions into T-bills -- This analysis could inform optimal decision making for the flexibility of the T-bills band
- Consider additional responsiveness of issuance strategy to key metrics such as interest rate expense, as % of GDP, and a reexamination of the optimal tradeoff between cost to tax-payer and rollover risk management
  - Specifically, we recommend evaluating the trade-offs between reduced interest expense vs. higher debt funding cost volatility
- We recommend evaluating the suitability of new inflation related products, such as front-end TIPS, for investors who may view increased volatility of this product to be attractive from a risk / reward perspective

Conclusions

- Composition of demand for US Treasuries has shifted toward more price sensitive investors over the past two years, contributing to a rise in term premium
- Borrowing needs, which are expected to be structurally higher across economic scenarios and could go higher still if there is a recession, have magnified the effects of a changed demand base
- Demand base evolution is a function of economic scenarios. A recession would likely result in increased demand from most key investor bases. However, a soft-landing scenario might result in a continuation of current demand patterns. Subsequent asynchronous monetary policy actions could also shape demand landscape
- In light of these conclusions, we recommend:
  - The Treasury consider tilting issuance toward tenors less impacted by the rise in term premium and those that benefit from greater liquidity premium, including TIPS (especially in intermediate maturities)
  - The committee maintain the long-term guidance that T-bills make up 15-20% of outstanding but support meaningful deviation in the medium term
  - A further study into how nimbly, and within what range, should the committee recommend the Treasury change the medium term expected interest cost to roll-over risk ratio
  - The committee conduct further analysis into new products and processes, such as those presented in the January 2019 TBAC charge “Potential Innovations in Treasury Products and Tools”, to further appeal to the needs of both new and existing investors