US Rates Watch

Monthly rates models: Mar ’24 edition

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Rates Research
United States

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Rates models update

We update some of the rates models we use to gauge risk bias, positioning, and relative value across duration, curve, real yields, breakevens, and front-end spreads. Nominal yields continue to trade in a relatively tight range around fundamental fair value. Real yields look rich and breakevens wide. SOFR softened recently but we still expect cheapening alongside QT & higher UST supply, which should tighten the SOFR/FF basis. Portfolios were broadly risk-on over 4Q23 & stayed positive risk into ’24 with carry bias.

Duration & curve

Fair value for 10yT is c.4.1-4.15%, marginally higher over the last month. 10yT yields trade marginally cheap to fair values, despite rising expectations for delayed landing. Curve dynamic reflects neutral rate expectations c.3-3.25%. Front-end driving more of the recent 2s10s dynamic (particularly though bull steepening moves).

Breakevens, TIPS & real yields

10y BE trade c.10-20bp wide vs fundamentals. 10y RY c.10-15bp rich vs our macro framework. Dynamic reflects persistence of some disconnect between inflation and growth fundamentals near-term + higher likelihood of expansion (c.60-65% resilience + reacceleration) vs. lower growth (c.35-40% soft + hard-landing) scenarios.

Front end

We update our forecasts for SOFR/FF basis. We weight 3 regression outputs of SOFR-IORB spread vs Fed liquidity to GDP from 3 liquidity periods: (1) 25% for 3Q20-1Q21= ON RRP take-up < $200b, (2) 50% 2Q21-3Q23 = ON RRP take-up > $200b, (3) 25% for 4Q23 to today = current period of ON RRP decline.

Allocations

Gauges of risk appetite show risk-on bias, albeit with a slight downgrade of momentum over the last couple of months. Bias for carry seems to persist. ERP is tight suggesting potential for negative feedback between yields and risk.

Duration: (1) 10yT macro model; (2) Global yield framework; (3) 10yT decomposition.

Curve: Curve directionality 2s10s & 5s30; curve dynamic versus neutral rate expectations.

Front End: SOFR/FF basis.

TIPS: (1) Macro model for Breakevens; (2) real yield (10y BE versus 10y nominal model); (3) PCA Breakevens; (4) 10y BE directionality.

Asset Allocation: (1) Flow & allocation bias; (2) 4-state framework for portfolio allocations; (3) positioning bias from futures across assets classes; (4) Equity RP.

Appendix: Model descriptions.

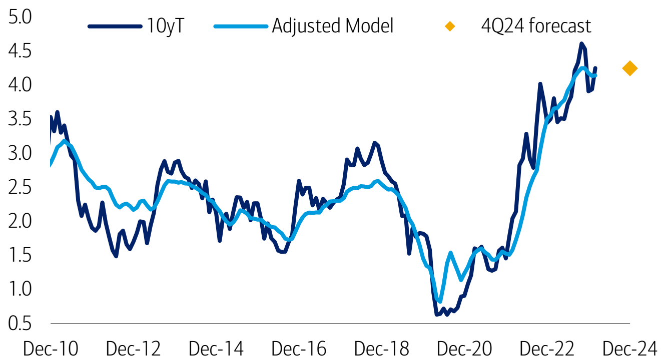
Glossary

10y – 10-year
10yT – 10-year Treasury
BE – Breakeven
c. – circa
DM – Developed Markets
EFFR – Effective Federal Funds Rate
EM – Emerging Markets
ERP – Equity Risk Premium
ETF – Exchange Traded Funds
FF – Fed funds
GDP – Gross Domestic Product
IORB – Interest Rate on Reserve Balances
LC – Large Cap
ON RRP – Overnight Reverse Repo facility
PCA – Principal Component Analysis
QT – Quantitative Tightening
RP – Risk Premium
RV – Relative Value
RY – Real Yield
SC – Small Cap
SOFR – Secured Overnight Financing Rate
VAR – Vector Auto-Regressive

Duration

Macro model

Exhibit 1: 10yT macro fair value
10yT fair value consistent with current fundamentals c.4.1-4.2%



Source: BofA Global Research; Bloomberg

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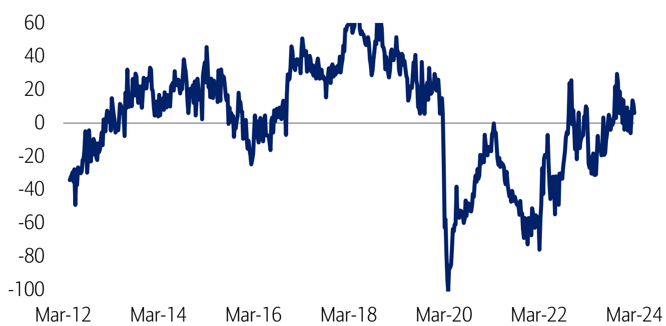
Our macro framework suggests that the 10yT fair value consistent with current US fundamentals is c.4.1-4.2%. This is only marginally higher over the last month (see the report, Monthly rates models: Feb '23 edition).

Treasury yields trade just marginally cheap vs fundamentals, after an excursion away from fair values where we saw up to 75bp of cheapness at the peak in mid-October.

Global yield framework

Exhibit 2: Residual of 10yT Global yield model
10yT fair value consistent with current global yields c.4.15%



Source: BofA Global Research

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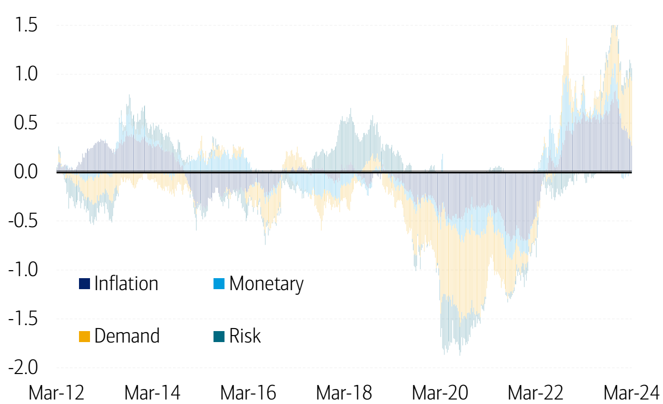
10yT fair value consistent with global yields is c.4.15%. This is c.10bp higher over the last month.

The late-cycle bias should be for USTs to trade fair to rich to global yields. In this framework, a more significant 10yT selloff beyond fair value levels likely needs to be supported by either: (1) a broader bearish momentum in global yields; or (2) a decoupling of US growth with the DM complex.

The 10yT yields are trading c.5-10bp cheap relative to the global yield dynamic.

Decomposition of the 10yT dynamic

Exhibit 3: Decomposition of the 10yT dynamic
Monetary policy c.0bp, Risk c.15bp (+5bp); Inflation c.30bp (-10bp) and Demand c.65bp (+5bp)



Source: BofA Global Research

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Steady state is up from c.2% in early '22 to 2.7% currently, suggesting an upgrade of the neutral rate view. We expect it to increase further towards c.2.75-3%. Current shocks:

- Monetary policy c.0bp, steady in the last couple of months
- Risk c.15bp; +5bp over Feb
- Inflation c.30bp, -10bp over Feb
- Demand c.65bp, +5bp over Feb

The moves reflect some fading of the inflation shock over the last month, but at the same time some upgrade of demand mostly driven by an upgrade of the risk backdrop expressed in the dynamic of yields. The monetary policy shock remains steady at flat levels reflecting a Fed on-hold.

Curve

Curve directionality

Exhibit 4: 2s10s directionality Index
Frontend driving more of the curve dynamic over the last month

Source: BofA Global Research

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Front-end drives 75% of the 2s10s curve dynamic over the last two weeks, marginally higher from the 72% over the last month. Bull steepening moves, in particular, have dominated over the last 2-4 weeks.

Exhibit 5: Decomposition of the 2s10s dynamic
Frontend (bull steepening and bear flattening moves) driving more of the 2s10s curve dynamic over the last month

	bull-Steep	bear-Flat	bull-Flat	bear-Steep
2w	52%	23%	23%	1%
1m	40%	32%	18%	10%
2m	28%	28%	20%	24%

Source: BofA Global Research

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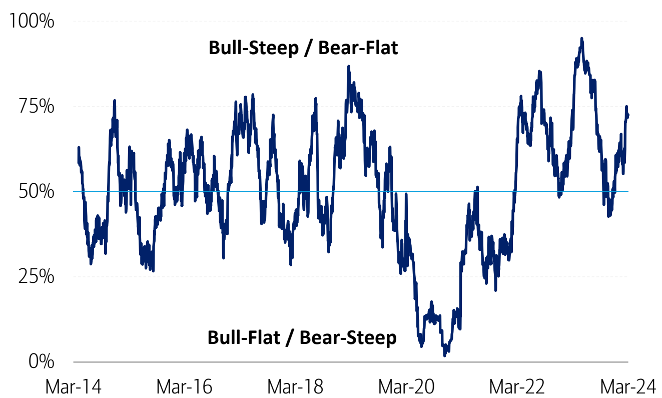
Exhibit 6: 5s30s directionality Index
Frequency of bull steepening moves increased at backend over last 2 weeks



Source: BofA Global Research

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Belly drives 68% of the 5s30s curve dynamic over the last two weeks, lower than the 83% over the last month. The bias, however, has shifted from higher bull steepening frequencies over the last two weeks (belly outperformance) from higher bear flattening frequencies over the last month (belly underperform).

Exhibit 7: Decomposition of the 5s30s dynamic
Belly continues to lead the dynamic

	bull-Steep	bear-Flat	bull-Flat	bear-Steep
2w	39%	29%	19%	12%
1m	36%	47%	10%	8%
2m	36%	36%	14%	13%

Source: BofA Global Research

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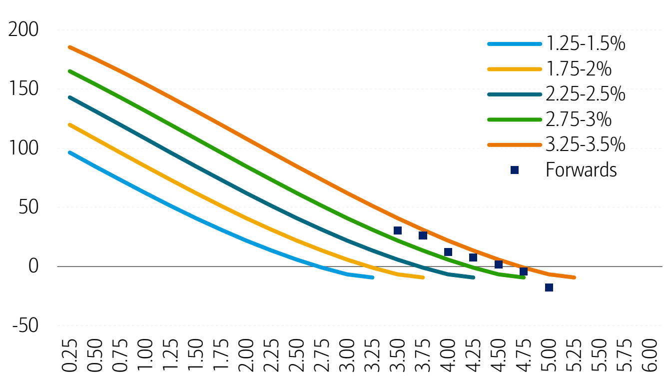
Flattening dynamic in the cycle vs neutral rate view

Exhibit 8: 2s10s bull steepening dynamic vs neutral rate view
Curve levels (y-axis) vs fed funds (x-axis) … curve forwards consistent with neutral rate expectations c.3-3.25%%



Source: BofA Global Research

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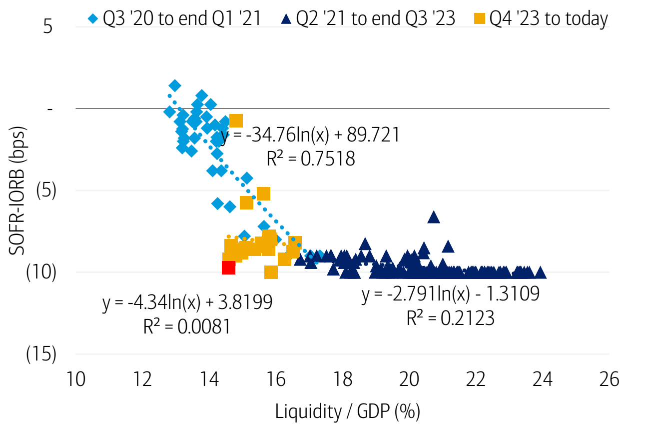
The 2s10s bull steepening trajectory priced in curve forwards vs 3m OIS fwds seems to be consistent with a neutral rate assumption around 3-3.25%.

Front end

SOFR/FF basis

Exhibit 9: SOFR-IORB spread versus Liquidity / GDP

As liquidity has declined, SOFR has begun to print higher in the range



Source: BofA Global Research, Bloomberg, FRB. Note, red dot implies latest week of data

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We update our regression for SOFR-IORB spread using a log linear regression of ON RRP + Fed Reserves (Fed liquidity) over GDP. We break out the regression into 3 periods, (1) 3Q20-1Q21: ON RRP take-up < \$200b, (2) 2Q21-3Q23: ON RRP take-up > \$200b, (3) 4Q23 to today: recent ON RRP period.

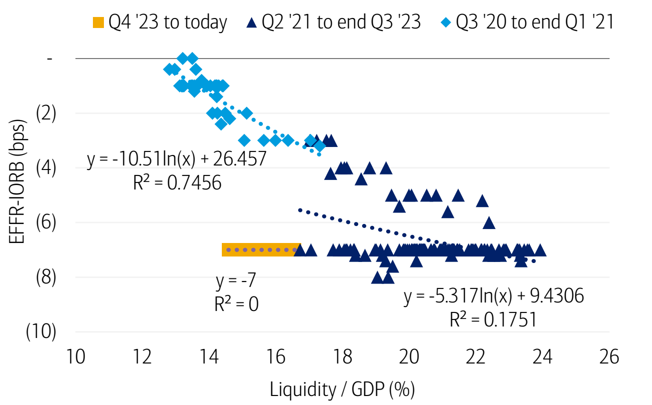
We began to see SOFR print higher as liquidity drained via QT, primarily on large settlement dates. However, we have since seen an easing in funding conditions with less upward pressure on settlement dates.

The most recent data point, in the red dot, shows that even at the lowest level of liquidity to GDP, we are not yet at the steeper part of the curve that we observed in the lower RRP take-up period of 3Q20 to 1Q21.

We expect to see liquidity continue to decline going forward, which should eventually put upward pressure on SOFR.

Exhibit 10: EFFR-IORB spread vs Liquidity / GDP

EFFR has been sticky despite liquidity drain



Source: BofA Global Research, Bloomberg, FRB. Note, red dot indicates latest week of data

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We also updated our regression for EFFR-IORB spread. We use a log linear regression of ON RRP + Fed Reserves (Fed liquidity) over GDP. Similarly, we break out the regression into three periods, 3Q20-1Q21: ON RRP take-up < \$200b, 2Q21-3Q23: ON RRP take-up > \$200b, and 4Q23 to today: current period of ON RRP decline.

We find that EFFR has been sticky at 7bps below IORB despite the rapid reduction in Fed liquidity since June and upward pressure in SOFR on settlement dates.

The 75th EFFR percentile is also steady at 7bps below IORB, that EFFR is likely to be steady here for the time being.

Going forward we expect EFFR to eventually move upward in the range as cash is drained and smaller domestic banks have to start bidding up for reserves. The increase in EFFR is likely to be lagged to SOFR

Exhibit 11: Regression outputs for FF-SOFR spread (bps)

Using equal weights for 3 regression periods we forecast SOFR/FF basis tightening

Date	SOFR-IORB	EFFR-IORB	FF-SOFR
Mar-2024	-5	-7	-2
Jun-2024	-5	-6	-1
Sep-2024	-3	-6	-3
Dec-2024	-3	-6	-3
Mar-2025	-4	-6	-2
Jun-2025	-4	-6	-2
Sep-2025	-1	-5	-4
Dec-2025	0	-5	-5

Source: BofA Global Research

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To calculate our regression output, we weight the 3 regression periods as follows: (1) 25% for 3Q20–1Q21, (2) 50% for 2Q21–3Q23, (3) 25% 4Q23 to today.

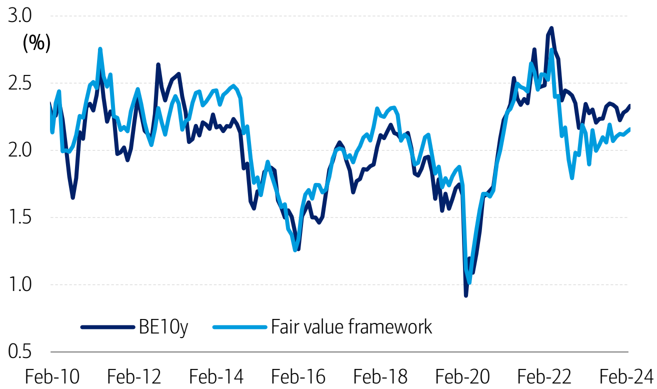
We overweight the higher ON RRP take-up period given the recent slowdown in ON RRP and easing in funding conditions. Our forecasts show EFFR as stickier than SOFR, which is likely to drift higher over time. We believe the spread to IORB for both SOFR and EFFR is too tight but are comfortable with the FF-SOFR spreads.

The SOFR-FF basis is likely to tighten with risk of widening in 1H25 due to TGA drain from debt limit dynamics.

TIPS

Macro framework for breakevens (BEs)

Exhibit 12: Macro framework for 10y BE
10y BE fair value c.215bp, market trading wide versus fundamentals



Source: BofA Global Research; Bloomberg

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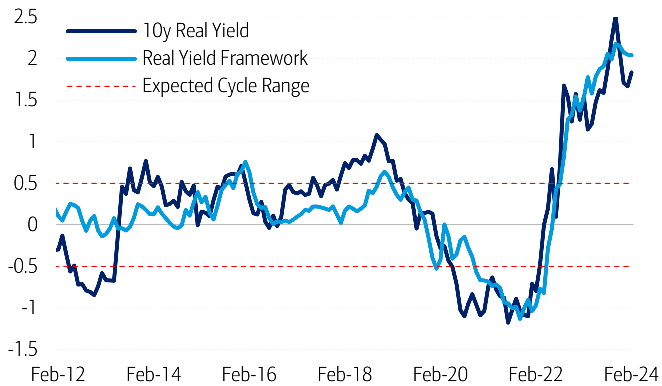
We model 10y BE as a function of inflation expectations, inflation risk premium, and inflation liquidity premium components.

US 10y breakevens fair value is c.215bp, roughly 5bp higher over the last month (15bp higher since December). Market trading 15-20bp wide versus fundamentals.

Real yield (10y BE vs 10y nominal model)

Exhibit 13: 10y real yield framework
Fair value for 10y real yields in macro framework c.200-205bp



Source: BofA Global Research

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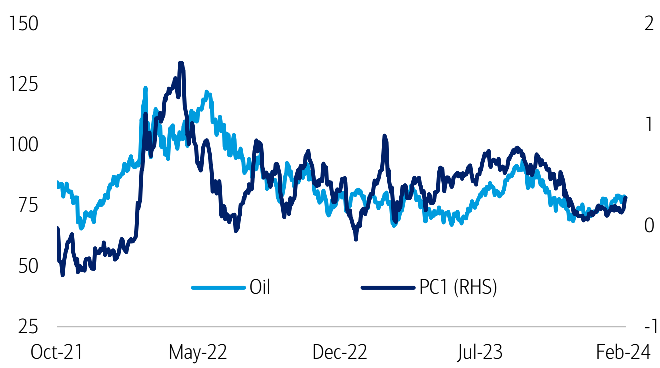
US 10y real rate fair value is c.200-205bp, unchanged over Feb but down 25bp since December. The market is trading 10y real yields c.10-15bp rich to the fair value level suggested by our macro framework.

PCA on global 10y BEs

Exhibit 14: PC1 of breakeven trends well with 1st crude oil futures
Oil remains a key driver for global inflation expectations



Source: BofA Global Research; PC1 = first principal component

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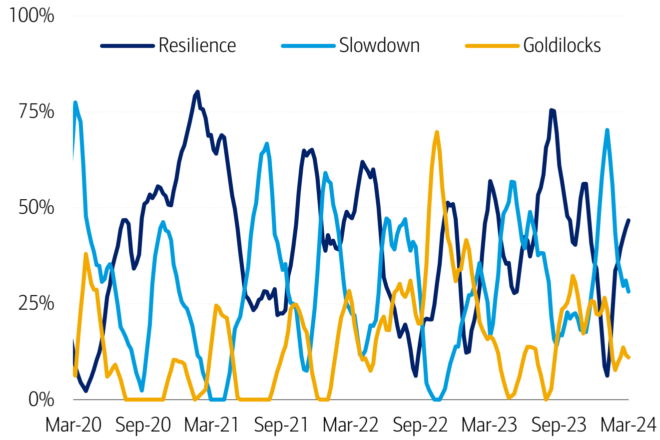
The 1st principal component (PC) of global 10y BEs is in line with 1st crude oil futures. This suggests oil has been one of the main factors driving global inflation expectations.

Directionality of 10y BEs

Exhibit 15: Probability of slowdown vs resilience and goldilocks scenarios (2m average frequencies)
We see higher likelihood of expansion scenarios priced in the 10y BE dynamic over the last month vs slowdown scenarios



Source: BofA Global Research

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10y BEs are showing a higher frequency of non-orthodox moves (bull widening in particular) over the last month. Frequencies of orthodox moves are slightly below historical averages. This may suggest market expectations for some disconnect between inflation and growth fundamentals to persist near-term.

Likelihood of expansion scenarios priced in the 10y BE dynamic over the last couple of months are now outpacing that of slowdown scenarios. Normalized frequencies over the last month stand at 62% expansion vs 38% slowdown.

Exhibit 17: 10y Breakeven directionality
Orthodox moves driving 69% of 10y BE dynamic vs 75-80% historically

	bull-Tight	bear-Wide	bull-Wide	bear-Tight
Current	28%	41%	21%	11%
1m	28%	47%	14%	11%
2m	32%	41%	16%	10%
3m	45%	30%	11%	15%

Source: BofA Global Research

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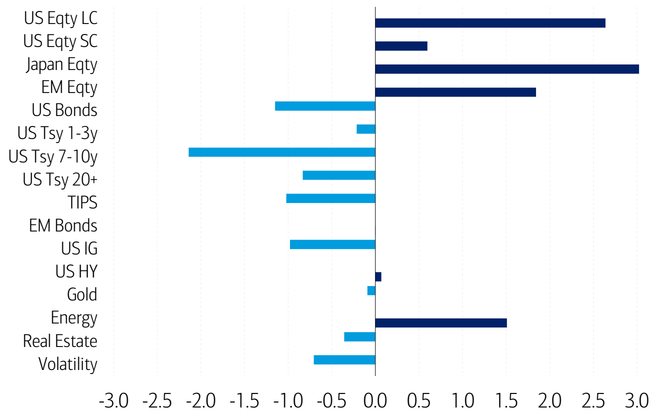
Asset allocation

Flows and allocation bias

Exhibit 17: Gauge of risk profile obtained from ETF flows
Profile suggests broadly a risk on context and bias towards carry



Source: BofA Global Research

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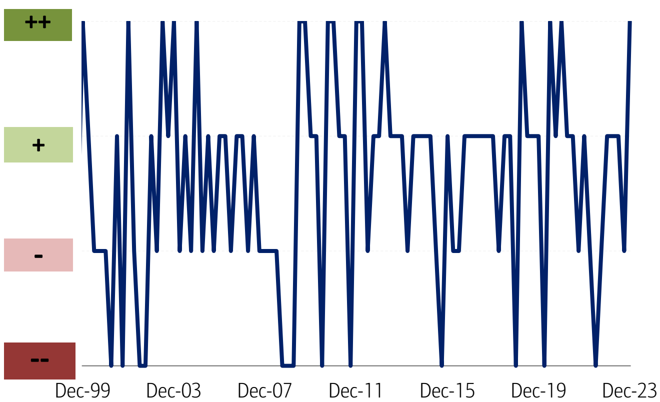
Gauge of risk profile and allocations obtained from ETF flows suggests risk on bias:

- Bonds – Short bias in USTs across the curve (more in the belly) and TIPS, marginal long in EM bonds.
- Equities – Long US LC & SC, Japan, and EM.
- Credit – Short IG & marginal long in HY
- Alternatives – Marginal short in gold, long Energy and short Real Estate
- Volatility – Short equity volatility suggesting a bias towards carry.

Exhibit 18: Regimes for quarterly performance across asset classes
US market dynamic in 4Q23 was closer to a risk-on regime



Source: BofA Global Research

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Historical transition probabilities from risk-on suggest: (1) c.0% odds of a shift to risk off (hard-landing); (2) c.25% possibility of a shift to moderate risk-off (soft-landing); (3) c.50-55% possibility of a shift to moderate risk-on; and (4) c.20% of staying risk-on (reacceleration in the current context).

Exhibit 20: Transition probabilities between different states for the US market dynamic
From risk-on the highest transition probabilities are either into a moderate risk-on state (53%) or moderate risk-off (26%)

	--	-	+	++
--	21%	7%	21%	**50%**
-	**19%**	**23%**	**46%**	**12%**
+	13%	33%	**46%**	9%
++	0%	26%	**53%**	21%

Source: BofA Global Research

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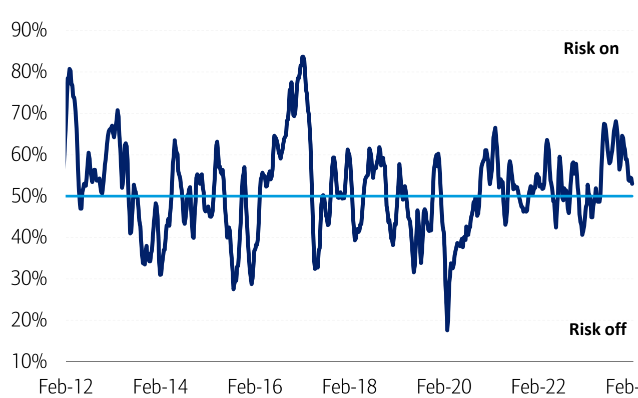
Exhibit 20: Positioning bias extracted from futures across assets
Risk-on bias faded only slightly over February



Source: BofA Global Research

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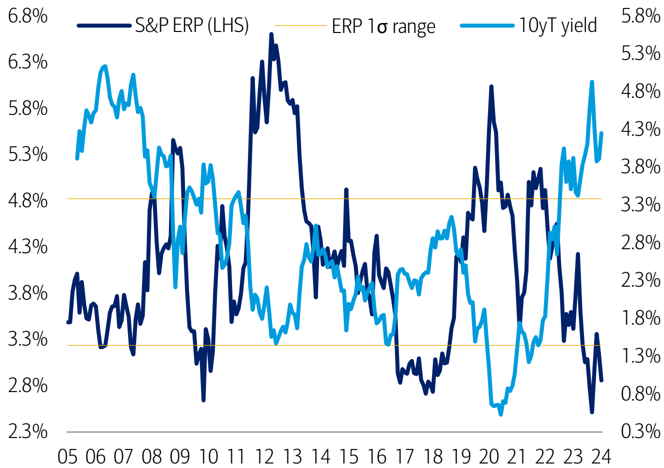
Positioning bias extracted from futures across asset classes suggests the persistence of a risk on bias over the last few months, fading only marginally from c.54% to c.53% over February and from a peak of c.60-65% in Oct/Nov.

Exhibit 21: Equity Risk Premium (ERP) framework
ERP at historically relatively tight levels



Source: BofA Global Research

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Tight ERP levels create scope for negative feedback loops between bond yield selloffs and risky assets, and the potential for that feedback to close into a bid for USTs in scenarios where further bond selloffs are not accompanied by an upgrad to earnings.

Appendix: Model descriptions

Macro model

In our macro framework for the dynamic of Treasuries, we calculate the first two PCs of the rates curve (2s, 5s, 10s and 30s), and regress each of these on Fed funds (to define cycle dynamic) and the principal components of growth variables, inflation variables, and employment variables (see our report, A hitchhikers guide to RV on the UST curve).

Macro models are calibrated over long historical windows, generally longer than the average cycle length (somewhere between 7 years and 15 years) to capture the broader dynamic of Treasuries throughout the cycle. Significantly, these models tend to break down in periods of significant non-economic buying of Treasuries. We have seen several of these periods over the last couple of cycles, for example the following:

- The Greenspan conundrum, when we saw the back end of the Treasury curve rallying even as the Fed hiked rates in the early stages of the 2004-06 tightening cycle, driven foreign central bank buying.
- Quantitative easing (QE) periods, when the Fed acts as a non-economic buyer. Indeed, in general, these periods drive a negative correlation between growth and yields, and it is a challenge to avoid solutions that converge to these sorts of non-economic betas in macro frameworks for the dynamic of yields
- Global yield demand in a context of very low global yields. Indeed, global demand for USTs may be driven less by US fundamentals but more by yield differentials to other DM yields and the cost of hedging the FX exposure

To account for the pressures on the Treasury curve from these non-economic distortions, we include in our independent data set the dynamic of the Fed balance sheet and the first principal component of global DM rates. In our framework, therefore, we converge to two solutions: one whereby we express fair value consistent with US macro fundamentals alone and an adjusted framework whereby we incorporate the impact of overseas demand on the Treasury curve.

Global yield framework

This framework is an alternative approach to PCA, which addresses the shortcoming of PCA not being able to capture trends in the data to a large extent. The framework can achieve this by capturing the shared covariances in the dataset through hidden state processes and also allows for the modeling of the time-varying dynamic of these factors explicitly. In a relatively simple specification, a number of factors (determined a-priori) are defined through a given state equation:

$$x(t) = B * x(t - 1) + w(t)$$

while the independent variables are modeled as a function of these factors:

$$y(t) = Z * x(t) + v(t)$$

where:

$$w(t) \sim MVN(0, Q)\ ,\ \ v(t) \sim MVN(0, R)\ ,\ x(0) \sim MVN(X0, V0)$$

The factors (*x's*) are calibrated to explain the dynamic of the independent variables (*y's*) through the linear combinations defined by the calibrated projection matrix (*Z*). The projection matrix Z can be constrained to add more intuition to the interpretability of the factors.

Decomposition of the 10yT dynamic

In statistics, the traditional frequentist approach assumes that each parameter has a "true" value, and the goal is to find a close estimate to that (fixed) value. In contrast, the Bayesian approach views each parameter as a random variable, characterized by some underlying probabilistic distribution, along with constraints on the relative dynamic of the different parameters. The latter allows the analyst to avoid non-economic solutions, for example models where Treasury yields are negatively correlated with growth.

The vector auto-regressive framework is used to capture the relationship between multiple time series as they evolve over time, versus lagged levels. A *p*th-order VAR refers to a VAR model with a time lag for the last *p* time periods and is denoted VAR(*p*). This can be expressed as follows:

$$y(t) = a0 + A1 * y(t-1) + \ldots + Ap * y(t-p) + \varepsilon(t) \quad \text{with} \quad \varepsilon(t) \sim N(0,\Sigma)$$

Where $y(t)$ is the $M \times 1$ vector of endogenous variables, $a0$ is the $M \times 1$ vector of constants, Ai is the $M \times M$ time-variant coefficient matrix, and $\varepsilon(t)$ is the $M \times 1$ exogenous factor or the error terms with a Gaussian distribution with mean zero and variance-covariance matrix Σ.

In our formulation, we adapt an existing European Central Bank (ECB) framework[1] to decompose the dynamic of 10yT yields in terms of monetary policy, demand, risk, and inflation shocks. The key in this model is to define the sign restriction priors that transform the dynamic of the underlying variables in the model (10yT yields, 5y5y inflation, real effective exchange rate for the dollar, and cyclical adjusted P/E ratios) into the shocks below (see our report, A hitchhikers guide to RV on the UST curve).

Curve directionality

One framework that adds to the understanding of the dynamic of the curve is a measure of how frequent the different modes for the curve (bull flattening, bear steepening, bear flattening, and bull steepening) have been in recent history. One can do this by constructing 4 indices, one for each mode, that measure the number of bp moves that can be attributed to that mode in a given historical window versus the sum of absolute moves on the curve over the same period. Those 4 indices can be grouped into short leg (2yT leg in the 2s10s dynamic) driven moves (adding the bear-flattening and bull steepening indices) and belly (10yT in the 2s10s dynamic) driven moves (adding bull flattening and bear steepening moves). This framework is useful to gauge the prevailing modes on the curve and understand the periods when the curve is undergoing a shift in its dynamic.

PCA on global 10y BEs

We run a 2-factor PCA on 10y breakevens across US, UK, AU, JP, EU, and CAD with at least 6 years of history. While central bank policy is certainly a factor for the global inflation market, especially around pivots or other surprises, we find that the first principal component (PC1) explains 85% of the variance in global breaks and is highly correlated with the price of oil. The second principal component of breakevens accounts for 9% of the variance, which results in a total of 94% covered by 2 factors. We find that PC2 correlates well to global financial stress and the Fed's published real rate term premium (see our report, Rates relative value update with PCA, 14 December 2022).

[1] *European Central Bank, Financial Stability Review, Nov. 2018,* www.ecb.europa.eu/pub/pdf/fsr/ecb.fsr201811.en.pdf

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