

## US Rates Watch

## Monthly rates models update

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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.

## Duration &amp; curve

Rates had a roundtrip into cheap territory over the 2H of May (see [Postcard from Europe](#)), but are back to trading slightly rich (c.5-10bp) to fundamentals and global yields (reflecting expectations for a steady macro backdrop over the next 3-6 months). The frontend continues to drive the curve dynamic, but the bias shifted towards bear flattening as Fed cuts faded from the near-term policy trajectory.

## Breakevens, TIPS &amp; real yields

10y breakevens trade in line with fundamentals. A more orthodox BE dynamic suggests expectations for a recoupling of growth and inflation fundamentals. 10y real yields are fair in our macro framework. The BE dynamic suggests 52% odds assigned to lower growth and lower inflation scenarios, and only 34% odds to reacceleration.

## Front end

SOFR/FF framework suggests that in the current environment of high ON RRP take-up SOFR will likely remain low relative to FF, which is likely to rise under the Fed's QT regime. We expect this trend to continue at least until Fed liquidity is <16% of GDP.

## Allocations

A mean variance analysis of 1Q23 returns and covariances across asset classes shows a downgrade of optimal allocations from profiles consistent with a risk-on market dynamic in 4Q22 into profiles consistent with a transition market dynamic in the last quarter. Gauges of risk appetite and allocations obtained from ETF flows and futures positions show an upgrade of risk over May.

**Duration:** (1) Macro model for 10yT; (2) Global yield framework; (3) Decomposition of the 10yT dynamic.

**Curve:** Curve directionality 2s10s & 5s30.

**Front End:** SOFR/FF basis.

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

**Asset Allocation:** (1) Flows and allocation bias; (2) 3-state framework for portfolio allocation; (3) Positioning bias extracted from futures across assets classes.

**Appendix:** Model descriptions.

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## Glossary

10y – 10-year  
10yT – 10-year Treasury  
BE – Breakeven  
c. – Circa  
DM – Developed Markets  
EM – Emerging Markets  
EFFR – Effective Federal Funds Rate  
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  
RV – Relative Value  
SC – Small Cap  
SOFR – Secured Overnight Financing Rate  
VAR – Vector Auto-Regressive

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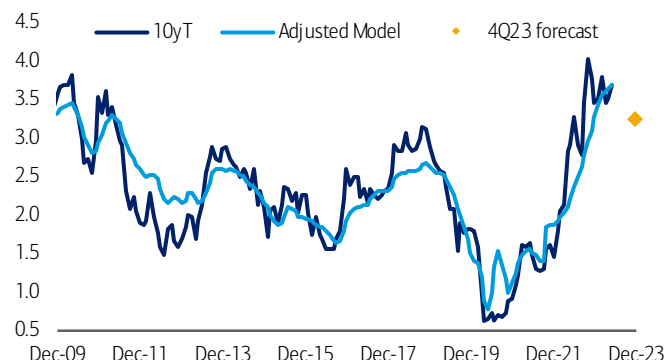
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# Duration

## Macro model

### Exhibit 1: 10yT macro fair value

10yT fair value consistent with current fundamentals c.3.65%



Source: BofA Global Research

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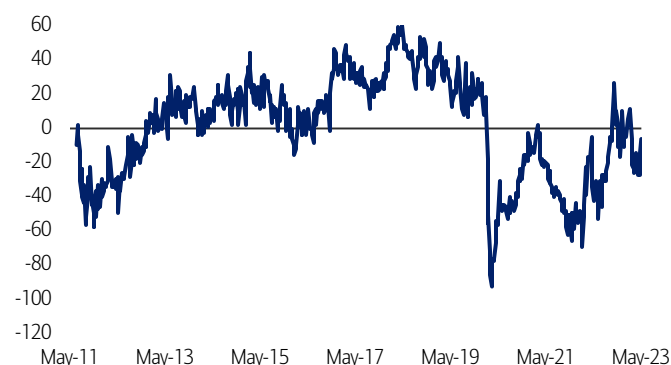
Our macro framework suggests that the 10yT fair value consistent with current fundamentals is c.3.65%.

Treasury yields trade fair to slightly rich to fundamental fair value, suggesting expectations for relatively anchored fundamentals over the next 3-6 months, with a slight slowdown bias.

## Global yield framework

### Exhibit 2: Residual of 10yT Global yield model

10yT fair value consistent with current global yields c.3.7%



Source: BofA Global Research

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10yT yields are trading c.10bp rich relative to global yields.

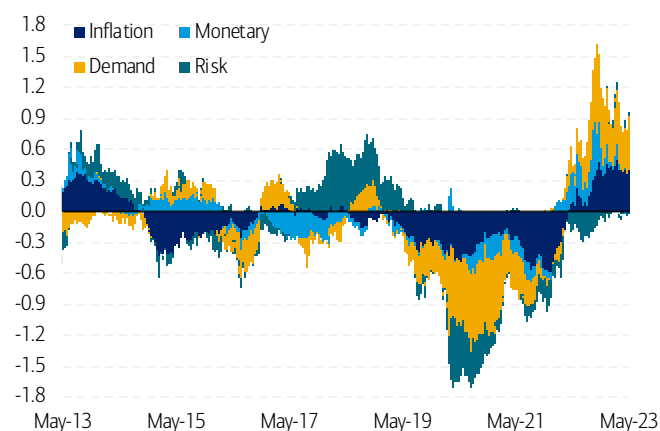
Richness relative to global yields reflects a context of reduced risk appetite.

Late cycle the bias should be for USTs to trade rich to global yields. A more significant selloff for 10yT beyond c.3.7% levels would therefore likely need to be supported by a broader bearish momentum in global yields.

## Decomposition of the 10yT dynamic

### Exhibit 3: Decomposition of the 10yT dynamic

Monetary policy c.5bp, Risk c.0bp; Inflation c.45bp & Demand c.55bp



Source: BofA Global Research

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Steady state upgraded from c.2% in early 2022 to 2.5% currently, suggesting an upgrade for neutral rate expectations. We expect it to increase further towards c.2.75-3%.

10yT yield range likely shifted higher from 0.75-3.25% (125bp envelope around a 2% steady state) over the last cycle to a range c.1.25-4.24% over the next 1-3 years (125-150bp envelope around a 2.75-3% steady state).

Monetary policy and risk shocks are currently flat, and demand (c.55bp) and inflation (c.45bp) continue to drive some cheapening versus the steady state.

# Curve

## Curve directionality

### Exhibit 4: 2s10s directionality Index

Dynamic shifted back to bear-flattening as cuts faded from the curve

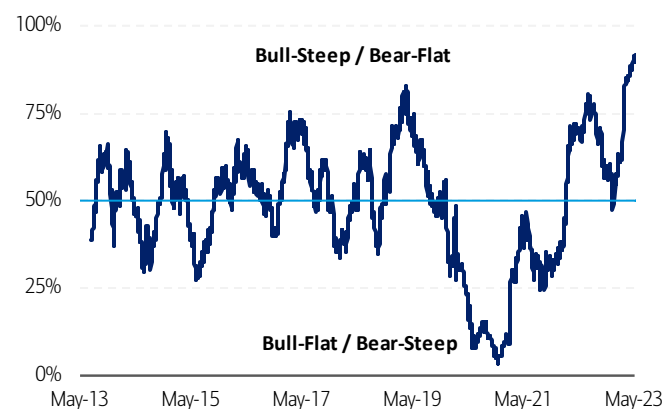


Source: BofA Global Research

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### Exhibit 6: 5s30s directionality Index

Dynamic shifted back to bear flattening over the last month



Source: BofA Global Research

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Front-end drives 80% of the 2s10s curve dynamic over the last two weeks, up from 71% of the dynamic over the last month.

Curve directionality shifted from bull steepening over the last 3m back to bear flattening more recently as cuts faded from the curve.

### Exhibit 5: Decomposition of the 2s10s dynamic

Frontend continues to lead the dynamic

	bull-Steep	bear-Flat	bull-Flat	bear-Steep
<b>2w</b>	5%	75%	13%	7%
<b>1m</b>	8%	63%	13%	15%
<b>2m</b>	24%	50%	11%	15%
<b>3m</b>	47%	43%	4%	6%

Source: BofA Global Research

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Belly drives 81% of the 5s30s curve dynamic over the last two weeks. Curve directionality as also shifted from a predominant bull steepening dynamic over the last 3m to a dominant bear flattening dynamic more recently.

### Exhibit 7: Decomposition of the 5s30s dynamic

Belly continues to lead the dynamic

	bull-Steep	bear-Flat	bull-Flat	bear-Steep
<b>2w</b>	32%	49%	16%	3%
<b>1m</b>	23%	57%	11%	10%
<b>2m</b>	41%	45%	8%	6%
<b>3m</b>	54%	37%	5%	3%

Source: BofA Global Research

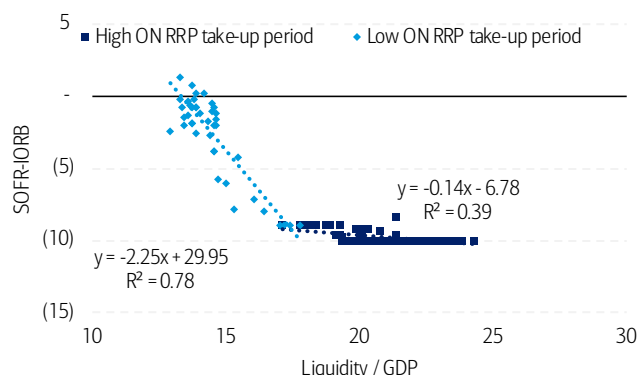
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# Front end

## SOFR/FF basis

### Exhibit 8: SOFR-IORB spread versus Liquidity / GDP

When ON RRP take-up is high, SOFR is anchored to ON RRP



Source: BofA Global Research, Bloomberg, Federal Reserve

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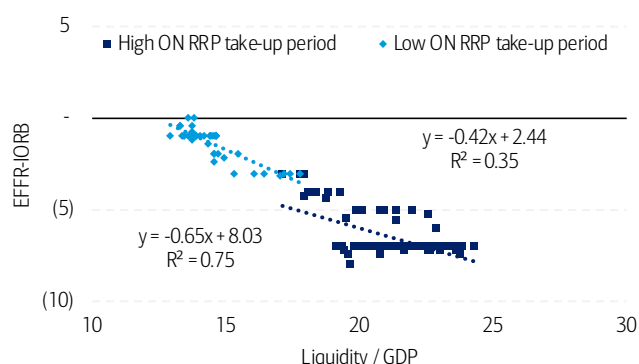
We forecast SOFR-IORB spread via a linear regression of ON RRP + Fed Reserves (Fed liquidity) over GDP & Marketable debt to GDP.

We break out the regression into two periods, a high and low ON RRP take-up period with the high take-up referring to anything above \$500bn in ON RRP take-up.

We find that when ON RRP take-up is high, SOFR is anchored to ON RRP, 10bps below SOFR. We expect this trend to continue at least through year-end.

### Exhibit 9: EFR-IORB spread vs Liquidity / GDP

EFFR is less sticky versus SOFR but curve is less steep in low ON RRP period



Source: BofA Global Research, Bloomberg, Federal Reserve

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We forecast EFR-IORB spread via a linear regression of ON RRP + Fed Reserves (Fed liquidity) over GDP & Marketable debt to GDP.

We break out the regression into two periods, a high and low ON RRP take-up period with the high take-up referring to anything above \$500bn in ON RRP take-up.

We find that EFR is less sticky than SOFR, but the curve is less steep relative to SOFR-IORB in the low ON RRP take-up period.

### Exhibit 10: Regression outputs for FF-SOFR spread (bps)

In high ON RRP take-up period, FF-SOFR spread widens as FF lifts faster

Date	Low ON RRP take-up			High ON RRP take-up		
	SOFR-IORB	EFFR-IORB	FF-SOFR	SOFR-IORB	EFFR-IORB	FF-SOFR
Dec-2022	-16	-5	11	-10	-6	4
Mar-2023	-18	-6	12	-9	-7	2
Jun-2023	-14	-5	9	-9	-6	3
Sep-2023	-8	-3	5	-9	-5	4
Dec-2023	-4	-2	2	-8	-4	4
Mar-2024	-1	-1	0	-8	-4	4
Jun-2024	0	-1	-1	-8	-4	4
Sep-2024	1	-1	-2	-8	-3	5
Dec-2024	2	0	-2	-7	-3	4

Source: BofA Global Research, Bloomberg, Federal Reserve

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Using the regression inputs for both periods, we forecast FF-SOFR spread based on our forecast for ON RRP, Reserves, Marketable debt ex Fed and GDP.

In the high ON RRP take-up regression output, FF-SOFR spread widens as EFFR lifts off faster than SOFR.

In the low ON RRP take-up regression output, FF-SOFR spread narrows as SOFR lifts off faster than EFFR.

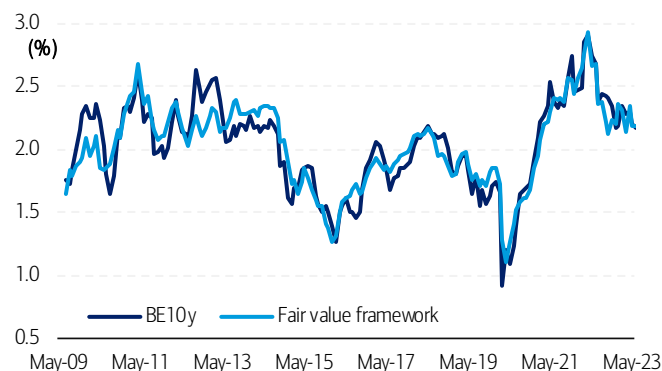
Recent upward pressure on SOFR, which we incorporate into our model, has pulled forward the projected tightening in SOFR-IORB.

# TIPS

## Macro framework for breakevens (BEs)

### Exhibit 11: Macro framework for 10y BE

10y BE fair value c.220bp, market trading in line with fundamentals



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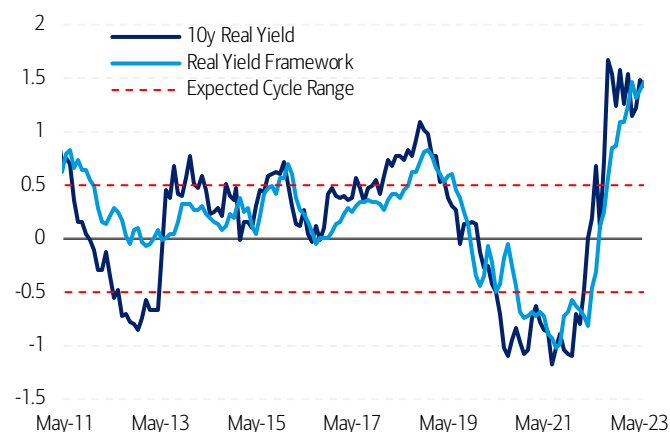
We model 10y BE as a function of inflation expectation, inflation risk premium, and inflation liquidity premium components.

US 10y breakevens fair value c.220bp, down from c.235bp in early May. The market is trading in line with fundamentals.

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

### Exhibit 12: 10y real yield framework

Fair value for 10y real yields in macro framework c.145bp



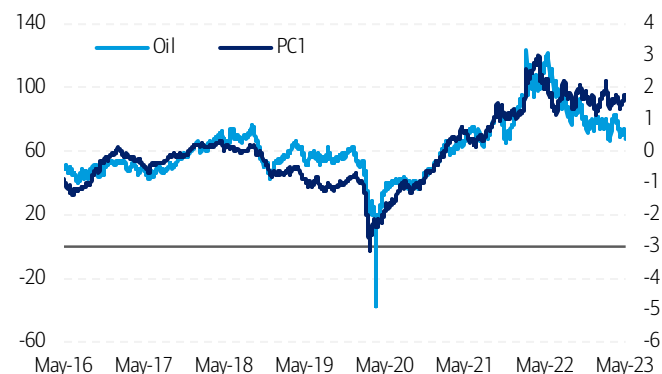
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US 10y real rate fair value is c.145bp. The market is trading 10y real yields in line with fair value suggested by our macro framework.

## PCA on global 10y BEs

### Exhibit 13: First breakeven closely matches 1st crude oil futures

Oil is a primary driver of global inflation expectations



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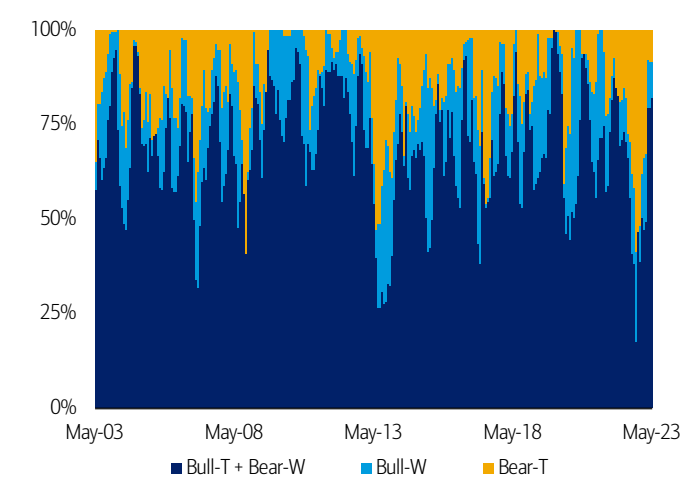
1st principal component of global 10y BEs suggests that oil has become the main driver of global inflation expectations for several years now.

This also implies that any single central bank may have very limited impact on its domestic inflation expectation markets.



Directionality of 10y BEs

**Exhibit 14: Breakeven directionality breakdown**  
10y breakevens showing a more standard directionality now



Source: BofA Global Research

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10y BEs are showing a more standard directionality. Orthodox moves (bull tightening & bear widening) are back to dominating the dynamic (c.86%) and in line with historical frequencies, suggesting market expectations for a higher correlation and causality between growth and inflation in '23.

Bull tightening dominated the dynamic over the last two weeks, suggesting expectations for lower growth and lower inflation. We see only 34% frequency associated to a bear-widening dynamic, which generally reflects reacceleration expectations.

**Exhibit 15: 10y Breakeven directionality**  
Bull tightening and bear widening driving the 10yBEDynamicagain

	bull-Tight	bear-Wide	bull-Wide	bear-Tight
Current	52%	34%	10%	4%
1m	37%	35%	13%	15%
2m	26%	32%	14%	28%
3m	28%	34%	13%	25%

Source: BofA Global Research

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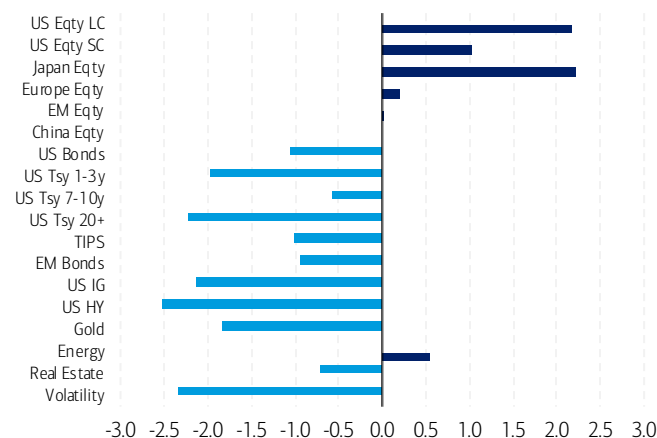


# Asset allocation

## Flows and allocation bias

### Exhibit 16: Gauge of risk profile obtained from ETF flows

Profile suggests upgrade of risk appetite over May

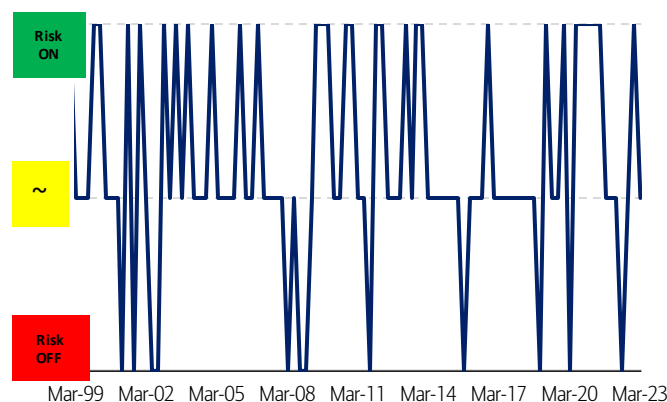


Source: BofA Global Research

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### Exhibit 17: Regimes for quarterly performance across asset classes

Market dynamic in 4Q22 was closer to risk on.... shift towards a transition dynamic in 1Q23

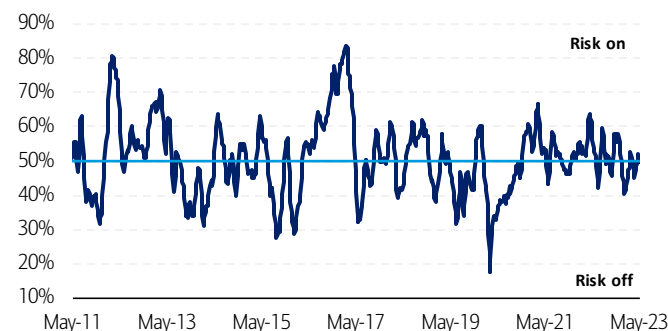


Source: BofA Global Research

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### Exhibit 19: Positioning bias extracted from futures across assets

Recent bias neutral



Source: BofA Global Research

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Gauge of risk profile and allocations obtained from ETF flows shows upgrade of risk over the last couple of weeks:

- Bonds – Short USTs, particularly frontend and backend, TIPS and EM bonds.
- Equities – Long US LC & SC, Japan, and Europe. Neutral EM and Chinese equities.
- Credit – Short IG & HY
- Alternatives – Short gold & long Energy
- Volatility – Short equity volatility

Broadly, these suggest a moderate bias towards risk on.

Downgrade of optimal allocations from profiles consistent with a risk-on market dynamic in 4Q22 shifted to profiles consistent with a transition market dynamic in 1Q23.

Market dynamic over 2Q is likely to push optimal asset allocations profiles between those implied by risk-off/recession and transition states. Demand for duration is likely to stay robust over 2Q in our baseline view.

### Exhibit 18: Transition probabilities between different states for the market dynamic

Transition probability from risk-off/recession to risk-on (57%) is much larger than the transition probability from risk-on to risk-off

	Risk off	~	Risk on
Risk off	14%	29%	57%
~	16%	61%	23%
Risk on	6%	61%	32%

Source: BofA Global Research

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Positioning bias extracted from futures across asset classes suggests a neutral risk bias recently (c.50% currently versus vs 45% - slightly risk off – at the end of April).

## 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:

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

Where  $y(t)$  is the  $M \times 1$  vector of endogenous variables,  $a0$  is the  $M \times 1$  vector of constants,  $A_i$  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  $\Sigma$ .

In our formulation, we adapt an existing European Central Bank (ECB) framework<sup>1</sup> 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](#)).

<sup>1</sup>European Central Bank, Financial Stability Review, Nov. 2018, [www.ecb.europa.eu/pub/pdf/fsr/ecb.fsr201811.en.pdf](http://www.ecb.europa.eu/pub/pdf/fsr/ecb.fsr201811.en.pdf)

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