US Rates Watch

Monthly rates models: October '23 edition

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Rates Research
United States

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October rates models update

We update some of the rates models we use to gauge risk bias, positioning, and RV across duration, curve, real yields, breakevens, and front-end spreads. Nominal & real yields look cheap to macro fundamentals, breakevens slightly wide, risks to SOFR/FF increasingly symmetric, and portfolios downgraded their view on risk.

Duration & curve – buyers strike

Fair values for 10yT c.4.1-4.15% currently, a c.10-15bp upgrade over Sep, reflecting further positive surprises in macro data and a bearish bias in global yields. 10yT yields trade c.40bp cheap to fair values consistent with US fundamentals and global yields, reflecting expectations for a further macro upgrade over the next 3-6m. Demand shock drove 50% of selloff since June = monetary policy, risk and inflation shocks combined.

On the curve, dynamic suggests c.3% neutral. Bear steepening continues to dominate the dynamic. Fed driving less of the dynamic as market prices shift top on-hold.

Breakevens, TIPS & real yields – less about inflation

10y breakevens trade c. 5bp wide vs fundamentals. A more orthodox BE dynamic suggests expectations for a recoupling of growth and inflation fundamentals. 10y real yields are c.45bp cheap vs our macro framework. The BE dynamic suggests 59% odds of reacceleration vs 19% odds assigned to lower growth and lower inflation scenarios. Uncertainty around the outlook at highest level since late '18 and early '19.

Front end – SOFR/FF risks increasingly symmetric

SOFR moves suggest further moves in the SOFR/FF basis are now symmetric with potential for SOFR lifting off vs ON RRP before take-up has been significantly reduced.

Allocations – flows suggest recent risk downgrade

Futures across asset classes show broadly supportive risk backdrop over Sep, but ETF flows show some downgrade of risk over last couple of weeks. ERP is at the tightest levels since '17, suggesting potential for negative feedback between risk and yields.

Glossary:

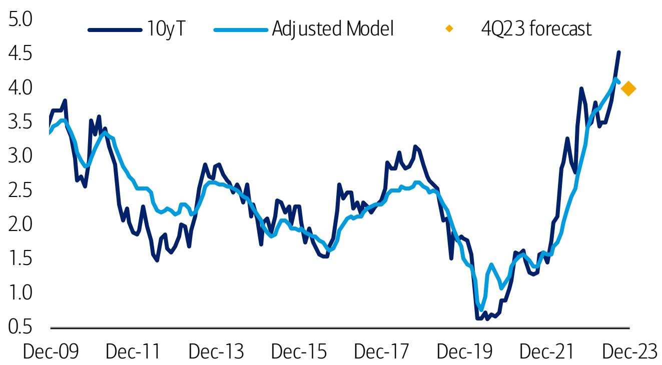
10y – 10-year
10yT – 10-year Treasury
BE – Breakeven
c. – Circa
DM – Developed Markets
EM – Emerging Markets
EFFR – Effective Federal Funds Rate
ERP – Equity Risk Premium
ETF – Exchange Traded Funds
FF – Fed funds
GDP – Gross Domestic Product
IORB – Interest Rate on Reserve Balances
LC – Large Cap
ON RRP – Overnight Reverse Repo facility
PCA – Principal Component Analysis
QT – Quantitative Tightening
RV – Relative Value
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%



Source: BofA Global Research; Bloomberg

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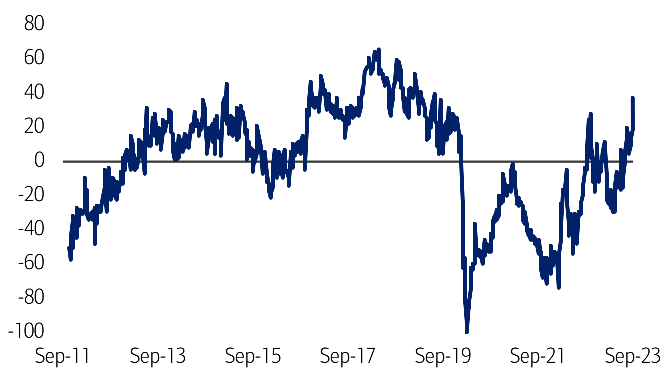
Our macro framework suggests a 10yT fair value consistent with current US fundamentals c.4.1%. This is c.15bp higher since early-Sep (see Monthly rates models: Sep '23 edition) and follows an upgrade of c.5bp in the prior month (see Monthly rates models: Aug '23 edition). These upgrades reflect recent positive surprises in macro data.

Treasury yields trade c.40-45bp cheap to fundamental fair value, significant vs the standard deviation of historical residuals (c.1.2σ), suggesting expectations for a further upgrade of fundamentals over the next 3-6 months.

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 the dynamic of global yields c.4.15%. This is 20bp higher vs. early Sep, after a 10bp move higher in Aug. (+30bp over last 2 months). The upward drift continues to reflect both a broad cheapening of sovereign bond yields and a cheapening of US yields vs global yields.

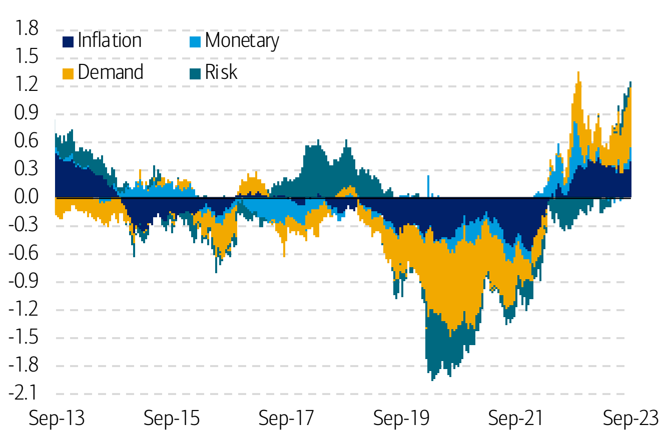
The late cycle bias should be for USTs to trade fair to rich to global yields. A more significant 10yT selloff beyond fair value levels would therefore likely need to be supported by a broader bearish momentum in global yields, However, expectations for US decoupling may be playing a role also.

The 10yT yields are trading c.35-40bp cheap relative to global yields, favoring a buy the dip stance.

Decomposition of the 10yT dynamic

Exhibit 3: Decomposition of the 10yT dynamic

Monetary policy c.20bp, Risk c.10bp; Inflation c.45bp & Demand c.65bp



Source: BofA Global Research

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Steady state upgraded from c.2% in early 2022 to 2.6% currently, suggesting an upgrade of neutral rate expectations. We expect the steady state to increase further to c.2.75-3%.

Since early June:

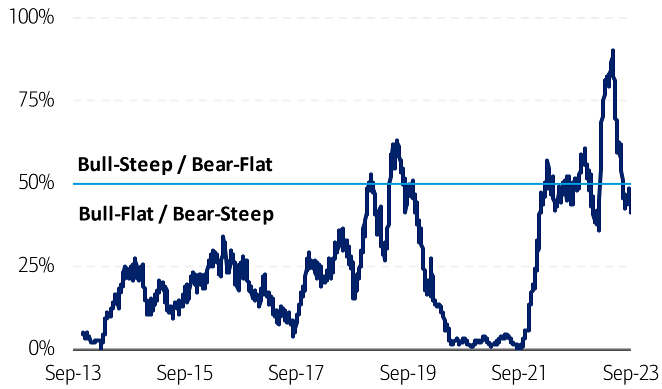
- Monetary policy shock 15bp
- Risk shock +10bp
- Demand shock +35bp
- Inflation shock: +10bp

Demand shock has driven 50% of the selloff since early June, as much as monetary policy, risk and inflation shocks combined.

Curve

Curve directionality

Exhibit 4: 2s10s directionality Index
Recent dynamic biased toward bear steepening



Source: BofA Global Research

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Front-end driving only c.19% of the 2s10s curve dynamic over the last two weeks, down from 34% over the last month, reflecting the pricing of an on-hold Fed stance.

Curve directionality continues to be biased towards bear steepening, driven by term premium and neutral repricing.

Exhibit 6: Decomposition of the 2s10s dynamic
Dynamic reflecting Fed shift to on-hold

2Y/10Y	bull-Steep	bear-Flat	bull-Flat	bear-Steep
2w	11%	8%	19%	62%
1m	14%	20%	12%	54%
2m	16%	24%	16%	43%
3m	19%	23%	15%	43%

Source: BofA Global Research

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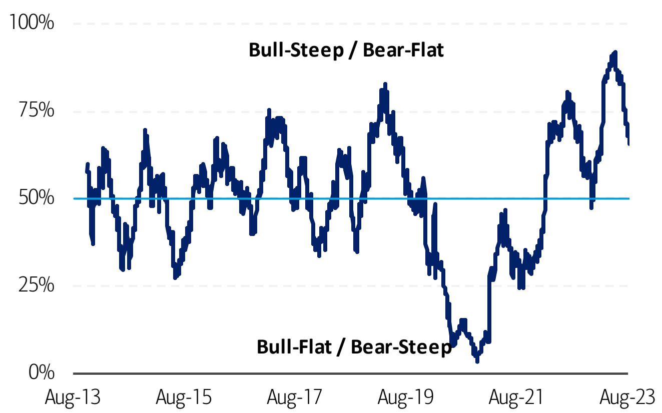
Exhibit 6: 5s30s directionality Index
Bear flattening still dominating, but bear steepening catching up in last 2w



Source: BofA Global Research

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Belly drives 70% of the 5s30s curve dynamic over the last two weeks, down from 76% over the last month. Bias still for the belly to underperform, but the bear-steepening dynamic catching up over the last 2w.

Exhibit 8: Decomposition of the 5s30s dynamic
Belly continues to lead the bearish dynamic, backend catching up

	bull-Steep	bear-Flat	bull-Flat	bear-Steep
2w	31%	39%	0%	30%
1m	50%	26%	9%	15%
2m	37%	40%	15%	8%
3m	33%	46%	14%	8%

Source: BofA Global Research

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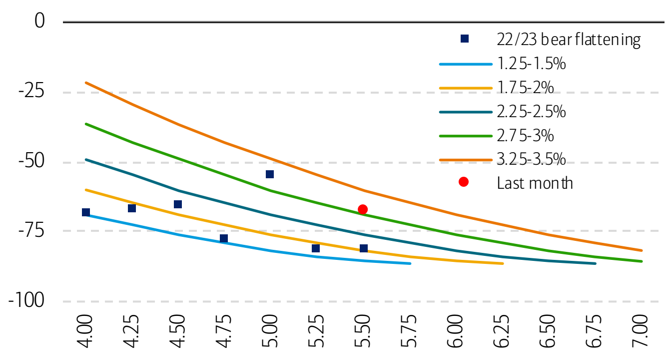
Flattening dynamic in the cycle vs neutral rate view

Exhibit 8: 2s10s bear flattening dynamic vs neutral rate assumptions
Recent 2s10s (y-axis) bear steepening vs fed funds (x-axis) suggests neutral upgrade to c.3%



Source: BofA Global Research

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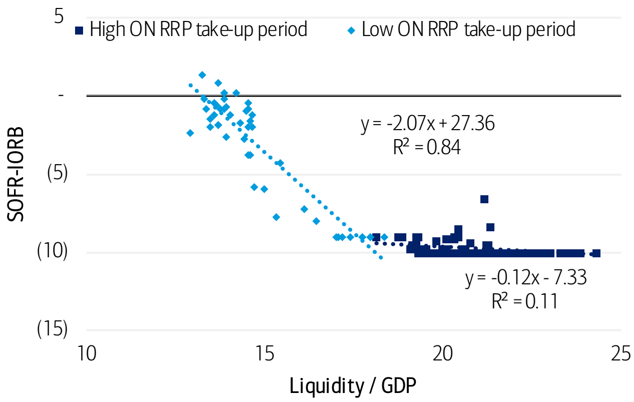
The 2s10s bear flattening trajectory observed over most of the recent tightening seems consistent with a neutral rate view c.2%, slightly lower in the early stages of the cycle and converging to this range as the cycle progressed.

The recent bear steepening reflects an upgrade of neutral expectations to c.3% if we consider the average level for the curve over Sep (roughly -65bp average).

Front end

SOFR/FF basis

Exhibit 9: 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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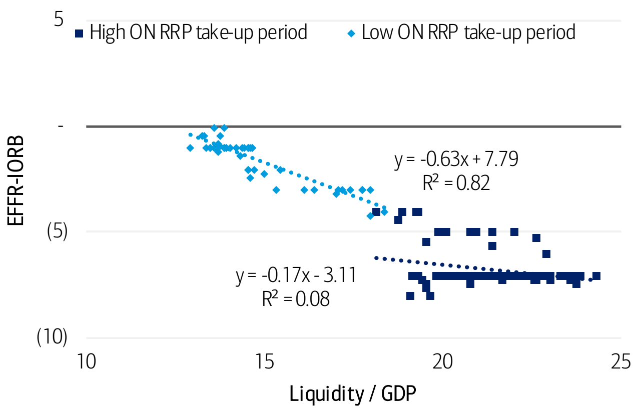
We forecast SOFR-IORB spread via a linear regression of ON RRP + Fed Reserves (Fed liquidity) over GDP & Marketable debt to GDP. We break out the regression into two periods, a high and low ON RRP take-up period with the high take-up referring to anything above $200bn in ON RRP take-up.

Upward pressure on SOFR will be prompted by Fed liquidity drain occurring alongside higher collateral issuance. This will be first seen in bilateral repo, which comprises two-thirds of SOFR. We have begun to see this recently on large collateral settlement dates that coincide with a reduction in liquidity, such a tax dates and month-ends

Tri-party repo (one-third of SOFR) will continue to be anchored to the ON RRP until MMFs have drained their excess cash from the ON RRP.

Exhibit 10: EFFR-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

BofA GLOBAL RESEARCH

We forecast EFFR-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 $200bn in ON RRP take-up.

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

We are beginning to see consistent upward pressure in the 75th percentile for Fed funds, which is now printing 1bp above EFFR. This could reflect higher domestic bank demand for funding as liquidity is being drained.

We expect upward pressure to continue with FF lifting off slowly but before SOFR, contributing to the basis (FF-SOFR) widening before it tightens in the low ON RRP take-up period.

Exhibit 12: Regression outputs for FF-SOFR spread (bps)
We forecast a shift from the high ON RRP take-up period to the low take-up period in 2H of '24 where we start to see the spread quickly narrow

Date	SOFR-IORB	EFFR-IORB	FF-SOFR
Sep-2023	-9	-7	2
Dec-2023	-9	-6	3
Mar-2024	-9	-6	3
Jun-2024	-9	-6	3
Sep-2024	-6	-4	1
Dec-2024	-3	-3	-1

Source: BofA Global Research, Bloomberg, Federal Reserve. Note: numbers are rounded to the nearest whole number; Gray indicates low ON RRP take-up period

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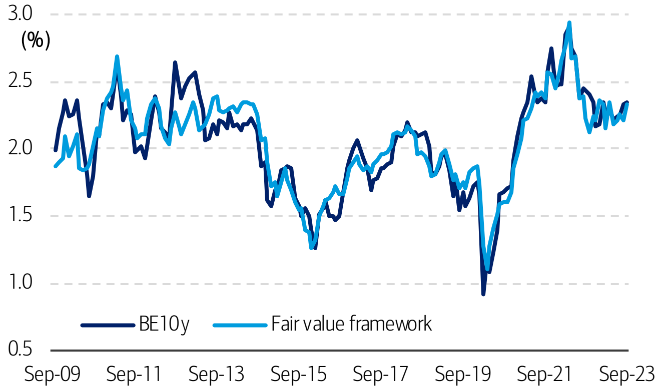
Combining our regressions to predict the FF-SOFR spread shows SOFR and FF remaining relatively range bound until we reach the low ON RRP take-up period in the 2H of 2024.

Once ON RRP is <$200b, both SOFR and EFFR are likely to move upward much faster within the target range, with SOFR rising above EFFR by end 2024.

TIPS

Macro framework for breakevens (BEs)

Exhibit 12: Macro framework for 10y BE
10y BE fair value c.230bp, market trading marginally wide vs fundamentals



Source: BofA Global Research; Bloomberg

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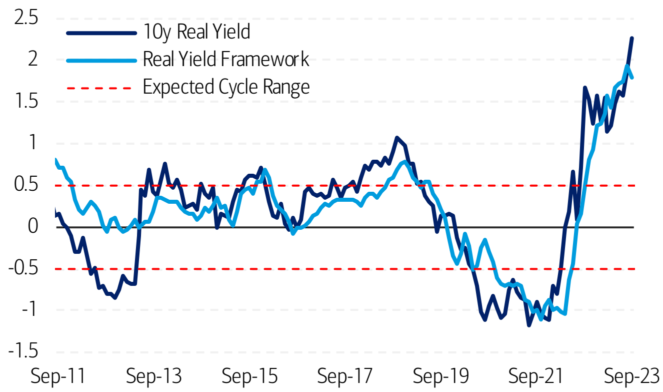
We model 10y BE as a function of inflation expectation, inflation risk premium, and inflation liquidity premium components.

US 10y breakevens fair value c.230bp, c.5bp higher over the last month. The market is trading c.5bp wide vs fair value, from wide levels of up to c.10-15bp in August.

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

Exhibit 13: 10y real yield framework
Fair value for 10y real yields in macro framework c.180bp



Source: BofA Global Research

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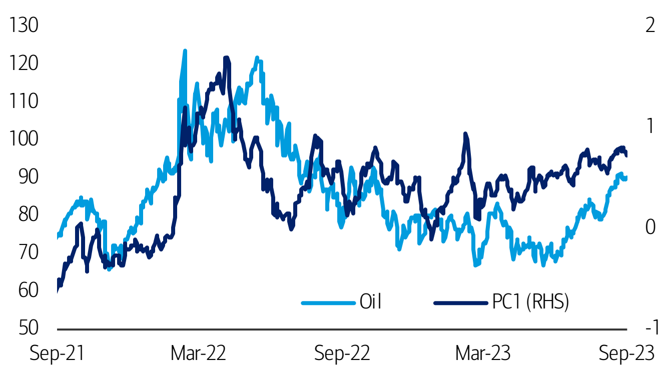
US 10y real rate fair value is c.180bp, c.20bp higher over the last month. The market is trading 10y real yields c.45bp cheap to the fair value level suggested by our macro framework.

PCA on global 10y BEs

Exhibit 14: First breakeven trends well with 1st crude oil futures
Oil has been a primary driver of global inflation expectations



Source: BofA Global Research

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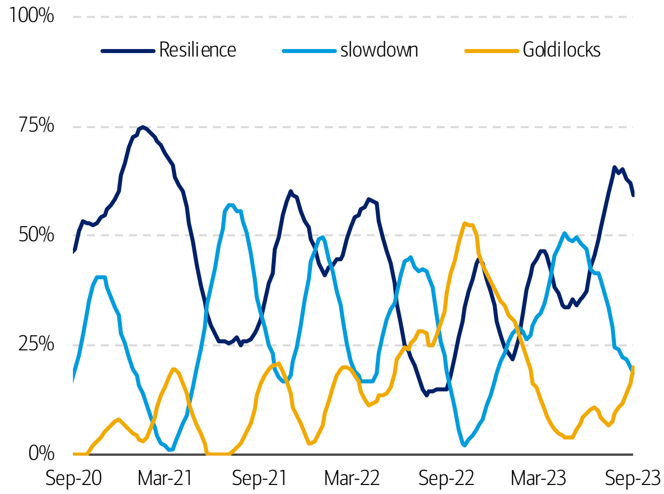
1st principal component (PC) of global 10y BEs moves in trend with oil, overall oil explains 55% of the variation in 1st PC.

This suggests oil remains one of the main factors driving global inflation expectations.

Directionality of 10y BEs

Exhibit 15: Odds of soft landing + expansion vs. slowdown (last 2m)
c.60% odds of soft landing + expansion vs <25% for slowdown scenarios



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.78%) at roughly historical frequencies, suggesting market expectations for a higher correlation and causality between growth and inflation in '23.

Bear widening continues to dominate the dynamic of 10y BEs, suggesting increasing expectations for soft landing + reacceleration scenarios. Goldilocks scenarios (higher growth and lower inflation) correspond to c.20% of the recent dynamic.

Exhibit 17: 10y Breakeven directionality
Bull tightening and bear widening driving the 10yBE dynamic again

	bull-Tight	bear-Wide	bull-Wide	bear-Tight
Current	19%	59%	3%	20%
1m	23%	63%	1%	12%
2m	33%	43%	9%	15%
3m	28%	38%	11%	23%

Source: BofA Global Research

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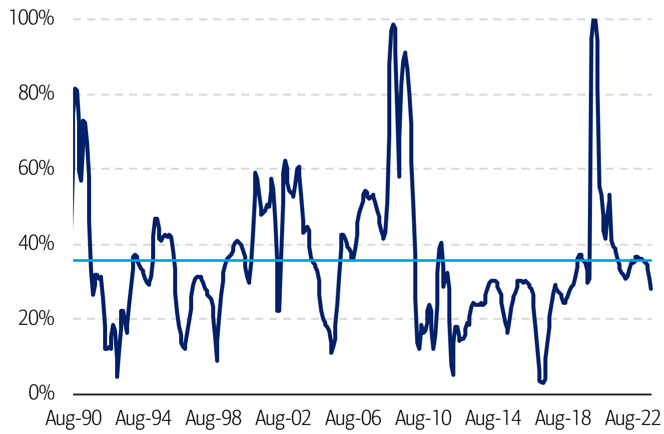
Market conviction

Exhibit 17: Measure of market conviction
Conviction at the lowest levels since late '18 / early '19



Source: BofA Global Research

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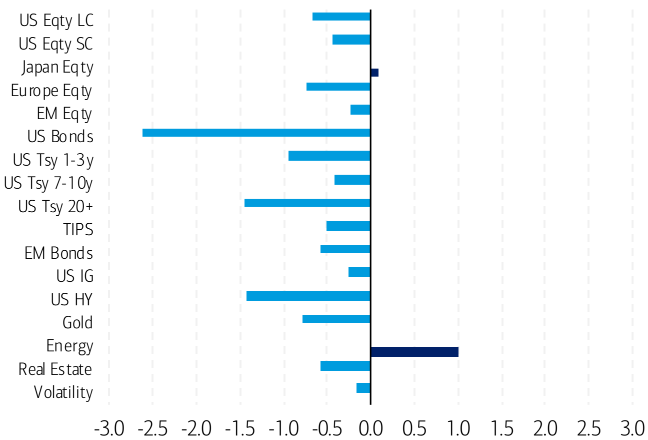
Dispersion of probabilities across different scenarios for the outlook at the highest level (lowest conviction) since late '18 and early '19.

Asset allocation

Flows and allocation bias

Exhibit 18: Gauge of risk profile obtained from ETF flows
Profile suggests some re\versal of risk on sentiment recently



Source: BofA Global Research

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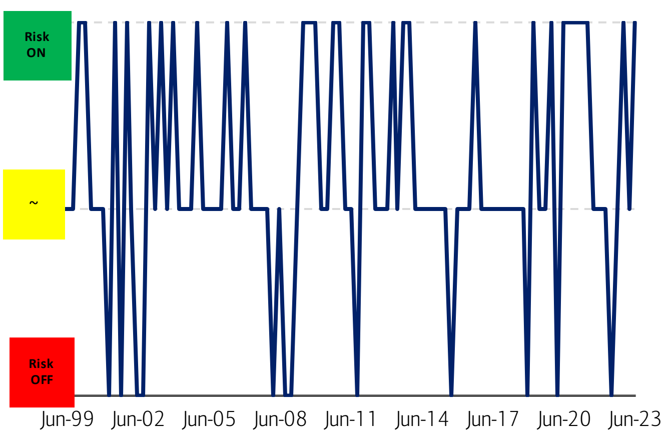
Gauge of risk profile and allocations obtained from ETF flows continues to show some reversal of risk sentiment, and the potential for negative feedback from bond yields to risk:

- Bonds – Short USTs across the curve, short TIPS short, Short EM.
- Equities – Short US LC & SC, Europe, and EM. Small long Japan.
- Credit – Small short IG & short HY
- Alternatives – Short gold & Real Estate, long Energy
- Volatility – marginal short in equity volatility

Exhibit 19: Three-state framework for asset class returns...
... suggests an upgrade of risk over 2Q23



Source: BofA Global Research

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Upgrade of risk in 2Q vs 1Q23. Allocation profiles still consistent with a transition market dynamic in 2Q23.

Market dynamic over 3Q is likely to continue to drive optimal asset allocations profiles between those implied by risk-off/recession and transition states. Demand for duration is likely to stay robust over 3Q in our baseline view.

Exhibit 21: 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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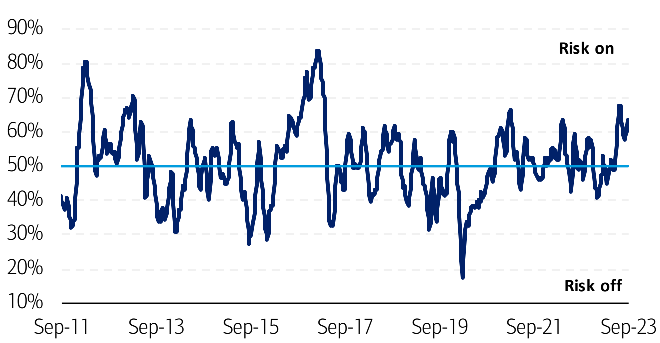
Exhibit 21: Positioning bias extracted from futures across assets
Upgrade of risk-on bias over Sep, still around highest levels since 1Q21



Source: BofA Global Research

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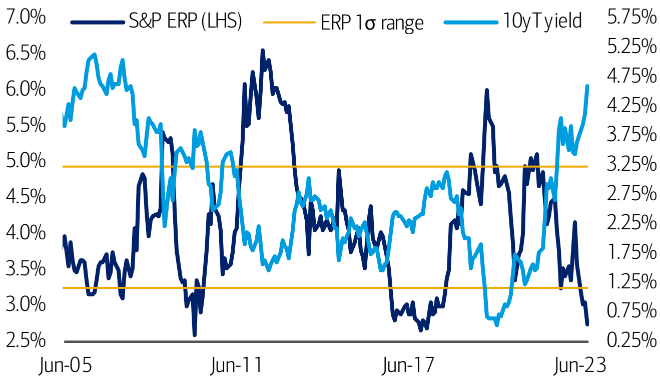
Positioning bias extracted from futures across asset classes suggests an upgrade of risk sentiment over Sep – c.63% currently vs 58%% in early Sep and 66% in early Aug. Risk on bias continues to be around then highest levels since 1Q21

Equity Risk Premium (ERP)

Exhibit 22: S&P ERP vs. 10yT yields

Tightest levels for the S&P ERP since late '17 and early '18



Source: BofA Global Research

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Equity risk premium since late '17 and early '18, increasing the risk of negative feedback loops between risky asset valuations and bond yields in a further selloff.

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:

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

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

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

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