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North America Fixed Income Strategy

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J.P.Morgan

Interest Rate Derivatives

Term Funding Premium and the Term Structure of SOFR Swap Spreads

- In a post-Libor world with SOFR as the floating rate benchmark, swap spreads are - to a considerable extent - a reflection of a kind of term premium. This is because the swap rate reflects the annualized return that can be locked in today from a strategy of rolling overnight risk-free loans over some horizon (say, 10 years), while the corresponding Treasury yield reflects the return on a term risk-free loan to that same horizon. The swap spread, being the difference between the two, is a reflection of the premium associated with committing funding to term
- Term Funding Premium is directly visible in the case of Treasury FRNs, which are floating rate notes that are linked to 3M Tbills but typically price and trade at a positive spread over that benchmark. This positive spread is the investor's compensation for lending for a 2Y period, rather than rolling 3M Tbills - Term Funding Premium, in other words. In the much broader nominal Treasury market, Term Funding Premium is less directly visible, but nevertheless observable through swap spreads
- Of course, there are other factors that drive swap spreads in various different tenors. But this "Term Funding Premium" (or TFP for short) is a key determinant of the term structure of swap spreads - the higher the TFP on any given day, the more steeply inverted the term structure of spreads
- Motivated by this observation, we can measure the TFP on any given day as the negative of the slope of a regression line that fits maturity matched swap spreads on benchmark tenors (2s, 3s, 5s, 7s, 10s, 20s and 30s) versus their corresponding modified durations
- The intercept of this same fit also has an interpretation, as the maturity matched swap spread of a Treasury with zero duration. We call this the zero-duration swap spread
- Our new empirical fair value framework for swap spreads begins with the term structure. Specifically, we start by developing empirical models for the Term Funding Premium and zero-duration swap spreads. This gives us a way to project the slope and the intercept of the term structure of swap spreads …
- … but we cannot stop here. Swap spreads can, and do, deviate from the baseline value that would be indicated by the linear fit of the term structure. Moreover, these deviations are not noise-like, and can be systematic in nature. Therefore, we build a family of secondary empirical models (one for each major tenor, i.e., 2s, 5s, 10s and 30s) that explain much of the deviation in swap spreads from the term structure
- We describe all of these empirical models in this piece. Collectively, they define a 2-step empirical fair value framework for swap spreads across different maturities, but in a way that puts the term structure front and center. In principle, this should lead to better projections of swap spreads, when compared to individual fair value models for swap spreads in each sector that are calibrated without recognition of systematic term structure impacts
- Armed with these models, and projections for all the drivers, we project swap spreads in major benchmark tenors over the near term (~1H24 horizon) as well as the medium term (YE24). Our current projections from such a framework point to wider swap spreads across much of the curve, except for the long end

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Term Funding Premium and the Term Structure of SOFR Swap Spreads

Since benchmark transition, swap spreads have become more tricky to model in stable fashion. To a considerable extent, this is because SOFR rates do not contain a credit element like Libor did, and that has made SOFR swap spreads somewhat less "macro" in nature. Instead, swap spreads - which now represent a differential between a risk free Treasury bond yield and expectations of a risk free benchmark rate - have become much more nuanced. Thankfully, it has not been entirely resistant to modeling, and we have indeed been able to find workable models for swap spreads in various sectors. We have described these models in detail (see, for instance, Interest Rate Derivatives 2024 Outlook) and they have proven reasonably useful in helping us to take forward looking views on swap spreads in each sector. But somewhat interestingly, it has been our experience that these models have been less accurate when it comes to taking views on the spread curve between two different maturity points. Said differently, there appear to be macro phenomena that impact all swap spreads in a way that is not fully captured by focusing on swap spreads in individual maturity sectors. This suggests that a more holistic approach is needed to understand the behavior of swap spreads across the curve.

To address this current limitation, we describe here a fundamentally different and novel way to think about swap spreads across the curve. Our approach begins with the very essence of what swap spreads represent in a world with risk free benchmark rates. We then add in sector specific elements to fully capture the effects of all the drivers of swap spreads in each maturity sector.

The term structure of swap spreads embeds term funding premium

We begin by noting that swap spreads are essentially a form of term premium. Taking the 10-year sector as an example, it is worth noting that the maturity matched swap spread (defined as 10Y swap yield minus 10Y UST yield) reflects the difference in returns between (i) rolling 1-day risk-free loans in repo markets for ten years, and (ii) a risk-free 10-year term investment in the form of a US Treasury note. Thus, the negative of the swap spread (as we normally define it in the US) can be thought of as a form of term premium.

This notion of term premium is different from the term premium that is sought to be measured by metrics such as ACM term premium. Conceptually, **the 10Y UST yield, which reflects the market's currently demanded return on a 10-year risk free term investment, can be thought of as the sum of three parts** (see **Figure 1**):

- (a) the (unobservable) expected compounded average of risk free overnight returns over a ten year period,
- (b) the (also unobservable) compensation for fixing the borrower's rate for ten years, thereby absorbing interest rate risk that would otherwise rest with the borrower, and finally
- (c) a separate compensation for guaranteeing the borrower term funding for ten years, rather than being subject to rolling overnight borrowings for ten years.

Common measures of term premium attempt to estimate (b) plus (c) in the context of some model. But in a sense the last component (just (c) alone) here is also a form of term premium - or perhaps we can more appropriately call it a **term funding premium (TFP), since it represents the market's price for guaranteeing term funding to the borrower**.

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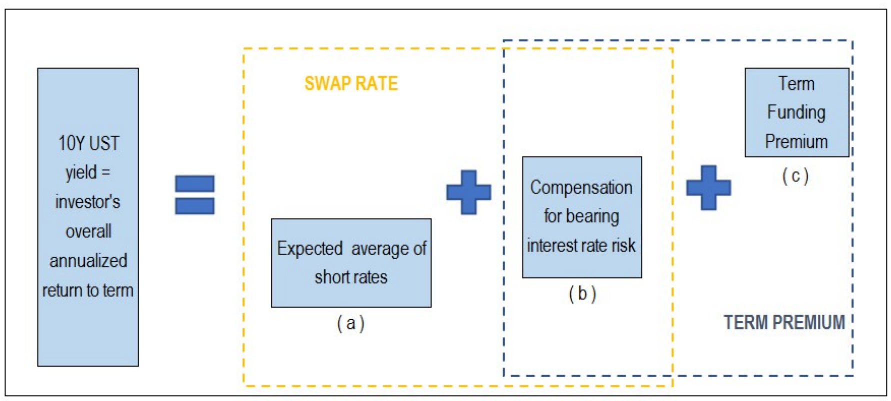
One place where this term funding premium is directly observable is in the case of Treasury FRNs. These 2-year term floating rate notes (FRNs are currently issued only with 2-year maturity) pay coupons that are linked to 3M T-bill yields plus a spread. Thus, they produce returns that are similar to a strategy of rolling 3M T-bills over a 2-year horizon, but the (generally positive) spread represents the investor's compensation for pre-committing to lend for 2 years, as opposed to only lending for 3 months at a time. To be sure, there are other elements that go into the FRN spread, such as scarcity and/or liquidity premia. But they do represent a rare case of term funding premia that is directly visible.

Of course, the bulk of the Treasury market is not FRNs. Fortunately, TFP is still somewhat observable from swap spreads. This is because the 10Y SOFR swap yield (in our example) reflects the sum of (a) and (b). Thus, the maturity matched swap spread gives us information about the term funding premium (or more specifically, the negative of term funding premium). To be sure, swap spreads are not pure measures of term funding premium. They can also reflect idiosyncratic factors such as recent flows in the market, liquidity preference for certain USTs over others, and more. But recognizing the link between swap spreads and TFP is our starting point for modeling swap spreads.

Figure 1: A conceptual illustration of term premium and term funding premium, and their connection to Treasury and SOFR swap rates

Diagram illustrating the breakdown of 10Y UST yields into its conceptual components



Source: J.P. Morgan.

In particular, **even though the swap spread on any particular tenor can include various other effects, we note that the full term structure of swap spreads on any given day sheds light on term funding premium on that day**. We illustrate this in **Figure 2**, which shows OTR maturity matched swap spreads (for 2s, 3s, 5s, 7s, 10s, 20s and 30s) plotted versus the modified duration of each OTR bond, as of two different selected dates. As can be seen, this term structure was fairly flat in late 2021, with a slope of minus 2.3. We can interpret this to mean that the market's term funding premium on that day was 2.3bp for each year of duration. Thus, all else equal, 10-year notes (with a duration of ~9 years) would need to deliver returns that are ~16bp higher than 2-year notes (with a duration of ~2 years) on a swap spread basis. The same term structure as of today is much steeper - the current term structure has a slope of -4.8, which implies a TFP of 4.8bp per year of duration risk. Thus, **the slope of the fitted term structure, times minus 1, can be thought of as a measure of Term Funding Premium**. A time series of this measure is shown in **Figure 3**.

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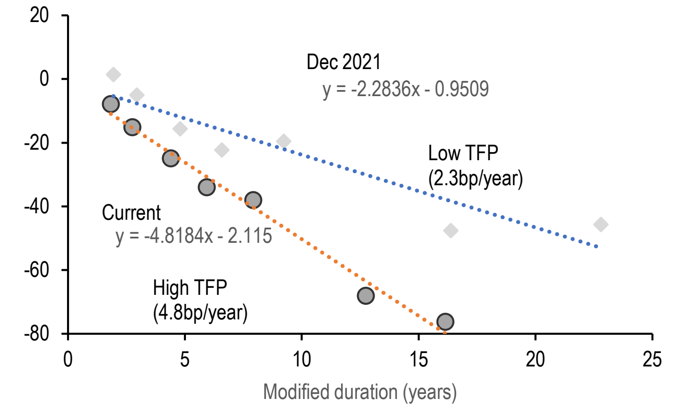
Figure 2: The term structure of maturity matched swap spreads on any given day sheds light on Term Funding Premium

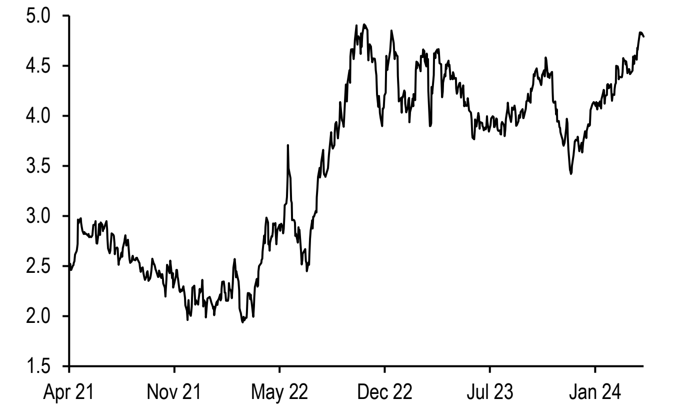
Maturity matched swap spread values in the 2Y, 5Y, 7Y, 10Y, 20Y, and 30Y sectors (y-axis, bp) versus the respective modified durations (x axis, years) as of two different selected dates (Dec 2021 and current), cross-sectional regression statistics and Term Funding Premium* (bp/yr) values indicated in each period



Source: J.P. Morgan.
* Term Funding Premium is defined as the negative of the slope of a regression of maturity matched swap spreads versus modified duration in benchmark sectors (2Y, 3Y, 5Y, 7Y, 10Y, 20Y and 30Y) on any given day

Figure 3: Term Funding Premium has risen considerably in recent years

Term funding premium*, Apr 2021 - Apr 2024; bp/year



Source: J.P. Morgan.
* Term Funding Premium is defined in the Figure 2 footnote

Modeling Term Funding Premium

Thus far **this measure of term funding premium is merely a distilled version of the term structure of swap spreads**. We must find a way to model this based on underlying fundamental drivers for it to become a useful framework for modeling swap spreads themselves. We do this below.

One might logically expect this term funding premium to depend on factors that reflect supply and demand. This is indeed the case, and we include four factors that help to explain the variation in TFP over the past three years. The underlying drivers that we use are:

- **UST monthly duration supply**, measured in 10Y equivalents. We use a 6-week moving average for smoothing purposes. We would expect TFP to depend on this with a positive coefficient.
- **The size of the Fed balance sheet**, to capture QE/QT and its effect on term premia. We would expect TFP to depend on this with a negative coefficient as a result.
- **The aggregate AUM at core bond funds**. As we have noted elsewhere (see 2024 Interest Rate Derivatives Outlook, 11/21/2023), bond funds are typically benchmarked to an index, and AUM growth has a fairly natural and passive demand-side effect of compressing term premia. Here too, we would expect TFP to depend on this factor with a negative coefficient.
- Lastly, we use the **RRP balance** (in $Tn) as a fourth factor. The sign of the dependence here is not obvious *a priori*. But it appears to matter through a substitution channel. A larger RRP balance, all else equal, has the effect of draining cash that would otherwise be available for deployment into bond markets. As such, higher RRP balances have an empirical partial beta that is positive.

Our model for term funding premium, based on these four factors, explains a significant portion of the variation over the past three years (**Figure 4**). In addition, as visually demon-

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strated in **Figure 5**, these factors appear to have been successful in capturing swings in term funding premia over this period of time.

Figure 4: An empirical model for Term Funding Premium

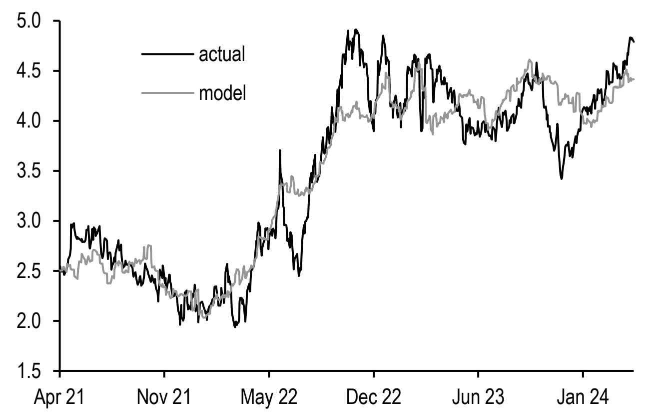
Statistics from regressing* term funding premium (TFP)** versus its drivers (units as indicated)

	Coefficient	T-stat
Fed balance sheet size ($Tn)	-1.42	-20.5
AUM at top 20 core bond funds ($bn)	-0.0145	-19.4
Monthly UST supply ($bn 10s)	0.0077	7.4
RRP ($Tn)	0.836	15.8
Intercept	18.8	53.7
Model stats		
R-sqrd	88%	
Std. error	0.30	

Source: J.P. Morgan.
* Regression period from Apr 2021 - Apr 2024
** Term Funding Premium is defined in the Figure 2 footnote

Figure 5: Our empirical model for Term Funding Premium has been reasonably effective in tracking its target in recent years

Term Funding Premium (TFP)*, actual versus fair value**, Apr 2021 - Apr 2024; bp/year



Source: J.P. Morgan.
* Term Funding Premium is defined in the Figure 2 footnote
** Fair value for TFP is calculated as per the model detailed in the previous exhibit.

Modeling zero duration swap spreads

The next step in our journey towards modeling the term structure of swap spreads is to find an empirical model for the intercept from the regression shown in Figure 2, since knowing the intercept as well as the slope of that regression gives us a first approximation of the term structure of swap spreads. As we have already discussed, the slope of that regression can be interpreted as term funding premium. Similarly, **the intercept also has a natural interpretation - it represents the value of swap spreads on a hypothetical zero-duration Treasury**.

Our model for this zero duration swap spread is shown in Figure 6. **We use three factors to explain** much of the variation in this quantity. The first of these is **term funding premium itself**, and it reflects a substitution effect - rising term funding premium would likely reflect an environment where investors are shortening spread duration, which would have the consequence of richening zero duration swap spreads. In other words, as the term structure becomes more inverted, the intercept tends to increase. A second factor in our model is the **RRP balance** - given its positive correlation to term funding premium, it is unsurprisingly also positively correlated to zero duration swap spreads. Finally, **front end yield levels** also appear to matter for zero duration swap spreads, with higher front end yields causing a decline in zero duration swap spreads. This model has been quite effective in tracking zero duration swap spreads, as shown in **Figure 7**.

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Figure 6: Our empirical model for zero-duration swap spreads ...

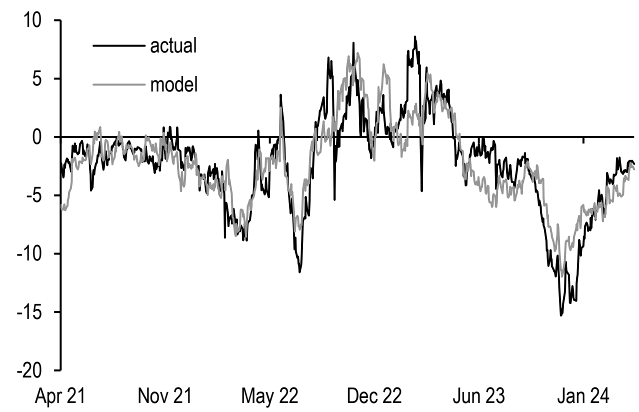
Statistics from regressing* zero duration swap spreads** versus its drivers (units as indicated)

	Coeff	T-stat
Term funding premium (bp/year)	8.09	37.8
RRP ($Tn)	4.23	31.5
3Mx3M OIS rate	-3.35	-37.0
Intercept	-27.3	-46.6
Model stats		
R-sqrd	73%	
Std. Error	2.21	

Source: J.P. Morgan.
* Regression period from Apr 2021 - Apr 2024
** Zero-duration swap spread is defined as the intercept from a regression of maturity matched swap spreads versus modified duration in benchmark sectors (2Y, 3Y, 5Y, 7Y, 10Y, 20Y and 30Y) on any given day

Figure 7: ... has also been reasonably effective in tracking the actual value in recent years

Zero duration swap spreads*, actual versus fair value**; bp



Source: J.P. Morgan.
* Zero-duration swap spread is defined in the Figure 6 footnote
** Fair value for the zero duration swap spread is calculated as per the model detailed in the previous exhibit.

We now have empirical models for projecting the slope as well as the intercept of the term structure of maturity matched swap spreads versus duration. **Having parametrized the shape of the term structure of swap spreads, we can estimate a baseline value for swap spreads of any tenor. But we cannot stop here** - as we noted above, **swap spreads in any given tenor can deviate from this term structure baseline, due to factors that are idiosyncratic to that sector**. Thus, what remains is to find ways to **project deviations from this baseline, using sector-specific empirical models** for each maturity point. We do this below, by sector.

Swap spread deviation from the term structure in the 2Y sector

Deviations between 2Y maturity matched swap spreads and the baseline value from the term structure model can be significant as well as persistent over reasonably lengthy periods - as seen in **Figure 8**, swap spreads in the 2Y sector widened by as much as 10-15 bp relative to the fitted term structure of swap spreads in the first year of this hiking cycle. Thus, it is important to understand the factors that can cause such deviations, and use projected deviations as an additional overlay in arriving at a final estimate of the fair value for 2Y maturity matched swap spreads.

Our model for 2Y swap spread deviations from the fitted term structure is shown in **Figure 9**. The factors in our model are:

- **RRP balances**, although we have already used RRP balances in modeling the term structure's parameters, front end spreads retain a residual dependence on RRP balances making this factor necessary here
- **2Y UST yield levels**, and **medium term Fed expectations** (which we measure as the 3Mx3M / 15Mx3M forward swap curve)
- **T-bill issuance**, which we measure as simply the **rolling 3M percentage change in the stock of outstanding T-bills**
- **1Yx1Y swaption implied volatility**, to account for impact that volatility can have on

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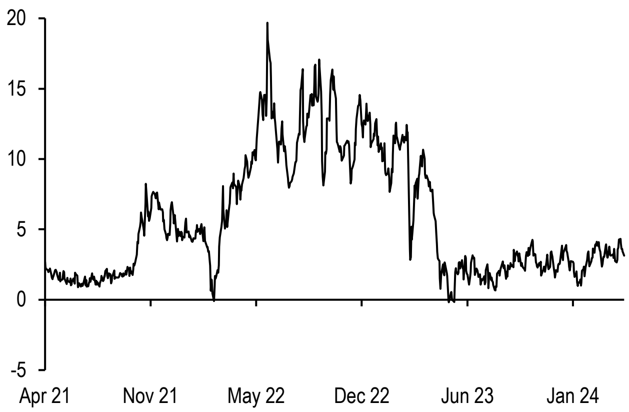
leverage, and therefore swap spreads

As can be seen, the dependence on all these factors has the intuitively expected sign where applicable, and the variables have all been significant over the **3Y history** used in this fit. Lastly, **Figure 10** shows that the residual from the model is fairly tight and mean reverting - this suggests that adding a modeled deviation to the term-structure baseline ought to produce a reasonably good fair value estimate for 2-year swap spreads.

Figure 8: In the first year of this hiking cycle, maturity matched swap spreads in the 2Y sector widened significantly relative to the term structure of swap spreads …

2Y swap spread deviation* relative to the term structure of swap spreads, Apr 2021 - Apr 2024



Source: J.P. Morgan.
* 2Y swap spread deviation relative to the term structure of swap spreads is calculated for any given day as the actual 2Y maturity matched swap spread minus the fitted value as of that day. The fitted value is calculated from a cross sectional regression of maturity matched swap spreads at benchmark tenors (2s, 3s, 5s, 7s, 10s, 20s, 30s) versus their modified durations, and evaluated at the OTR 2Y note's modified duration.

Figure 9: … making it important to build an empirical model for deviations

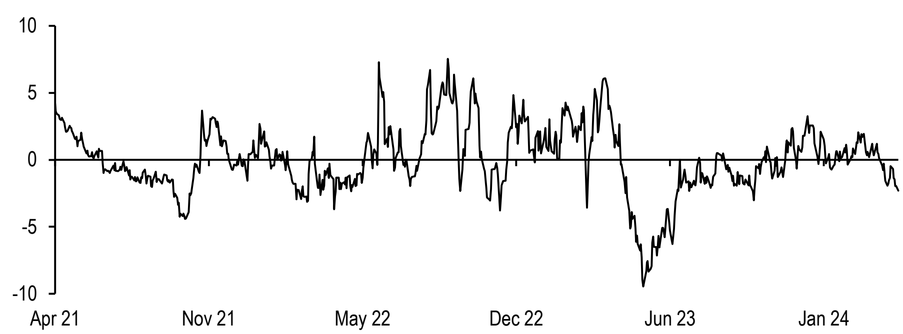
Statistics from regressing* 2Y swap spread deviations relative to the term structure of swap spreads** versus its drivers (units as indicated)

	Coeff.	T-Stat
RRP ($Tn)	4.1	19.8
1Yx1Y imp. Vol (bp/day)	-0.7	-7.2
T-bill stock, 3M pct chg	-0.3	-19.6
2Y UST yield (%)	3.2	16.2
1st/5th 3M SOFR futures curve, %	2.8	15.6
Intercept	-4.2	-13.5
Model stats		
R-sqr	67%	
Std. error	2.5	

Source: J.P. Morgan.
* Regression period from Apr 2021 - Apr 2024
** 2Y swap spread deviation relative to term structure of swap spreads is calculated for every day in this historical period, using the definition in Figure 8

Figure 10: After accounting for the systematic deviation in 2Y swap spreads from the term structure, the residual is relatively contained and mean reverting

Residual from the regression of 2Y swap spread deviation* relative to the term structure of swap spreads versus their drivers**, Apr 2021 - Apr 2024



Source: J.P. Morgan.
* 2Y swap spread deviation relative to the term structure of swap spreads is defined in Figure 8
** Drivers are detailed in Figure 9

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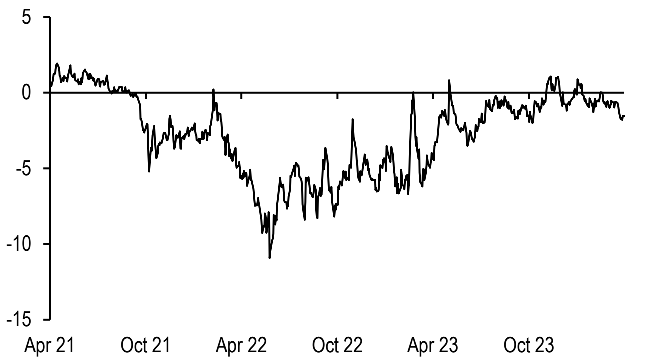
Swap spread deviation from the term structure in the 5-year sector

Here too, maturity matched swap spreads have deviated from the fitted term structure in systematic ways (**Figure 11**), making it necessary to model these deviations separately like we did in the 2Y sector . To model these deviations, we use an empirical model estimated over **3 years of history** using 2 factors: (i) **2Yx2Y implied volatility** (to account for the impact that volatility can have on leverage, and therefore swap spreads) and (ii) **near-term Fed expectations** (which we measure as 6Mx1M minus 1M OIS yields), which can affect the demand for fixed income assets from various different investor types. Details of the model are shown in **Figure 12**, and as **Figure 13** shows, the residual that remains after accounting for these factors is no longer trending and/or persistent, but much more noise-like.

Figure 11: Maturity matched swap spreads in the 5Y sector have deviated from the fitted term structure in recent years

5Y swap spread deviation* relative to the term structure of swap spreads, Apr 2021 - Apr 2024



Source: J.P. Morgan.
* 5Y swap spread deviation relative to the term structure of swap spreads is calculated for any given day as the actual 5Y maturity matched swap spread minus the fitted value as of that day. The fitted value is calculated from a cross sectional regression of maturity matched swap spreads at benchmark tenors (2s, 3s, 5s, 7s, 10s, 20s, 30s) versus their modified durations, and evaluated at the OTR 5Y note's modified duration.

Figure 12: An empirical model for the deviation in 5Y spreads from the fitted term structure

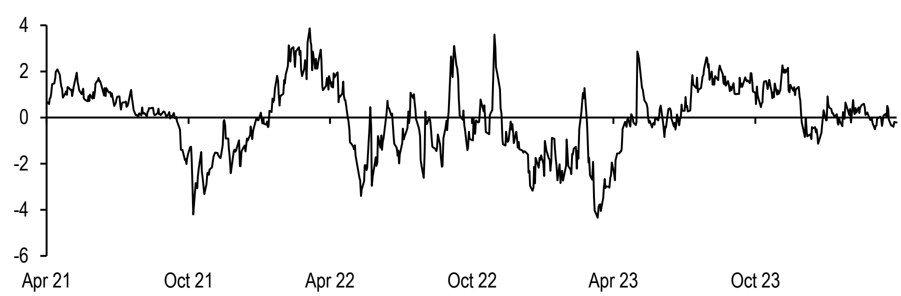
Statistics from regressing* 5Y swap spread deviations relative to the term structure of swap spreads** versus its drivers (units as indicated)

	Coeff	T-stat
2Yx2Y implied vol (bp/day)	-0.6	-16.9
6Mx1M - 1M OIS rate (%)	-2.6	-32.6
Intercept	2.3	9.5
Model stats		
R-sqr	70%	
Std. error	1.5	

Source: J.P. Morgan.
* Regression period from Apr 2021 - Apr 2024
** 5Y swap spread deviation relative to term structure of swap spreads is defined in Figure 11

Figure 13: The residual deviation in 5Y spreads that remains after accounting for its drivers is both mean-reverting and smaller in size

Residual from the regression of 5Y swap spread deviation* relative to the term structure of swap spreads versus its drivers**, Apr 2021 - Apr 2024



Source: J.P. Morgan.
* 5Y swap spread deviation relative to the term structure of swap spreads is defined in Figure 11
** Drivers are detailed in Figure 12

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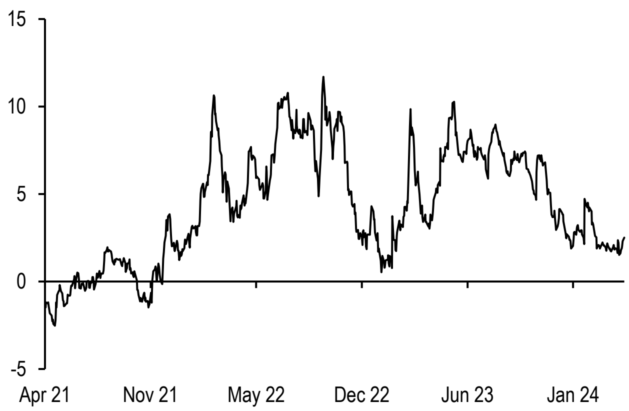
Modeling 10Y maturity matched swap spread deviations from the term structure

In the 10Y sector as well, maturity matched swap spreads have deviated from the fitted term structure by significant amounts and in non-mean-reverting ways (**Figure 14**). To model these deviations, we use an empirical model estimated over **3 years of history**, that is based on 3 factors - (i) **monthly duration supply in USTs** (measured in 10Y equivalents) to capture any remaining supply-side impacts, (ii) **10Y UST yield levels, to account for directional exposure in spreads**, and (iii) **the overnight SOFR minus IOER differential** (we use a 6 week moving average for smoothing). The last of these factors seeks to capture the inverse relationship between sharp increases in financing costs (perhaps because of rising cost of balance sheet, Reserve scarcity or other related phenomena) and swap spreads. Details of our model are shown in **Figure 15**, and this model's usefulness is seen in the fact that after accounting for these factors, the residual deviation that remains is both smaller and mean reverting (**Figure 16**).

Figure 14: Maturity matched swap spreads in the 10Y sector can significantly deviate from the fitted term structure

10Y swap spread deviation* relative to the term structure of swap spreads, Apr 2021 - Apr 2024



Source: J.P. Morgan.
* 10Y swap spread deviation relative to the term structure of swap spreads is calculated for any given day as the actual 10Y maturity matched swap spread minus the fitted value as of that day. The fitted value is calculated from a cross sectional regression of maturity matched swap spreads at benchmark tenors (2s, 3s, 5s, 7s, 10s, 20s, 30s) versus their modified durations, and evaluated at the OTR 10Y note's modified duration

Figure 15: An empirical model for the deviation in 10Y swap spreads from the fitted term structure

Statistics from regressing* 10Y swap spread deviations relative to the term structure of swap spreads** versus its drivers (units as indicated)

	Coeff	T-stat
Monthly UST supply ($bn 10s)	-0.036	-8.7
10Y UST yield, %	0.92	7.6
SOFR minus IOER (6wk movavg.), bp	-1.0	-18.0
Intercept	-0.5	-0.3
Model stats		
R-sqrd	62%	
Std. Error	2.0	

Source: J.P. Morgan.
* Regression period from Apr 2021 - Apr 2024. We use 6-week moving averages of Monthly UST duration supply as well as the SOFR-IOER differential for smoothing purposes
** 10Y swap spread deviation relative to term structure of swap spreads is defined in Figure 14

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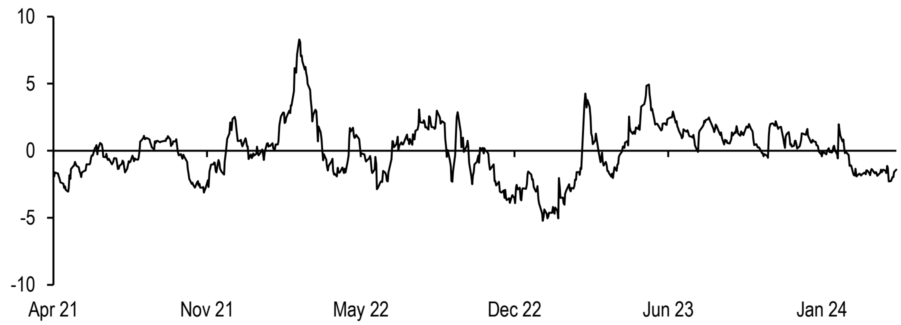
Figure 16: The residual deviation in 10Y swap spreads that remains after accounting for systematic factors is both smaller and mean reverting

Residual from the regression of 10Y swap spread deviation* relative to the term structure of swap spreads versus its drivers**, Apr 2021 - Apr 2024



Source: J.P. Morgan.
* 10Y swap spread deviation relative to the term structure of swap spreads is defined in Figure 14
** Drivers are detailed in Figure 15

Modeling 30Y maturity matched swap spread deviations from the term structure

As with all the other previously discussed sectors on the spread curve, 30Y maturity matched spreads have also deviated from the fitted term structure. As **Figure 17** shows these deviations have consistently been large (to the tune of 5-10bp) and have not been mean-reverting. Our empirical model for modeling these deviations uses 2 factors:

- **Fed balance sheet size**. As the Fed balance sheet grows, this works to increase demand for USTs, thus widening spreads and as expected this factor comes in with a positive coefficient
- **The aggregate duration of the Variable Annuity universe**. While duration needs from the VA hedger community have been muted lately due to the rally in equities over the past year and higher rates, this factor can become very significant at lower yields and at lower equity market prices. It is in part for this reason that we use an expanded history for modeling this sector

Details of the model are shown in Exhibit **Figure 18**, and **Figure 19** shows the residual after we account for these two factors. As can be seen, the residual is much more mean-reverting, and smaller in size. Finally, we note that while we have used 3 years of history to estimate all the other models seen so far, we use a slightly expanded 4-year window for this mode. This is because swap spreads in the 30-year sector can be significantly impacted by receiving flows from variable annuity hedgers, but these demands only pick up significantly when equity valuations are much lower. Therefore, given the strength of equities in recent years, we use an expanded window to capture the effects of this factor over a wider range of equity valuations and yield levels.

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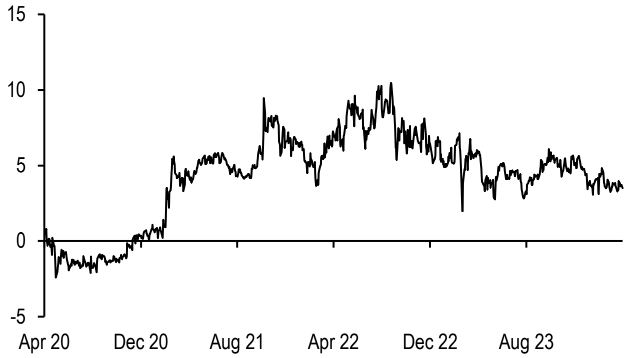
Figure 17: Maturity matched swap spreads in the 30Y sector have persistently deviated from the fitted term structure in recent years

30Y swap spread deviation* relative to the term structure of swap spreads, Apr 2021 - Apr 2024



Source: J.P. Morgan.
* 30Y swap spread deviation relative to the term structure of swap spreads is calculated for any given day as the actual 30Y maturity matched swap spread minus the fitted value as of that day. The fitted value is calculated from a cross sectional regression of maturity matched swap spreads at benchmark tenors (2s, 3s, 5s, 7s, 10s, 20s, 30s) versus their modified durations, and evaluated at the OTR 30Y bond's modified duration

Figure 18: An empirical model for the deviation in 30Y spreads from the fitted term structure

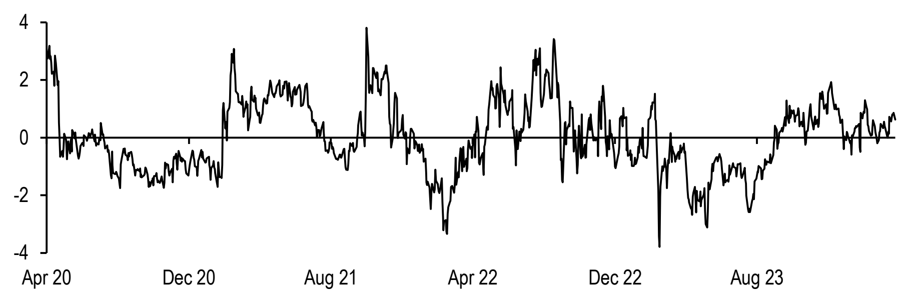
Statistics from regressing* 30Y swap spread deviations relative to the term structure of swap spreads** versus its drivers (units as indicated)

	Coeff	T-stat
Fed balance sheet size ($tn)	2.9	35.4
VA hedging needs ($bn20s)	0.0	-17.3
Intercept	-17.3	-22.2
Model stats		
R-sqr	82%	
Std. error	1.2	

Source: J.P. Morgan.
* Regression period from Apr 2020 - Apr 2024. Aggregate Variable Annuity duration, in $bn 20s, is estimated using an approach developed and described in a separate JPMorgan Research Note - *Interest Rate Risk in Variable Annuities*, Sep 2011. Available upon request.
** 30Y swap spread deviation relative to term structure of swap spreads is defined in Figure 17

Figure 19: The residual deviation in 30Y spreads that remains after accounting for the drivers is both mean-reverting and smaller in size

Residual from the regression of 30Y swap spread deviation* relative to the term structure of swap spreads versus its drivers**, Apr 2020 - Apr 2024



Source: J.P. Morgan.
* 30Y swap spread deviation relative to the term structure of swap spreads is defined in Figure 17
** Drivers are detailed in Figure 18

Implications for swap spreads

To recap, we have noted the connection between the slope of the swap spread term structure and Term Funding Premium. We have also observed that the intercept from the same regression (i.e., a cross-sectional regression on any given day of maturity matched swap spreads in different benchmark sectors versus the modified duration of the corresponding bonds) can be interpreted as zero-duration swap spreads. These two quantities are important parametric descriptors of the term structure of swap spreads, and we have developed empirical fair-value models that allow us to take views on both of these.

In practice, swap spreads in any given maturity sector can (and do) deviate from such a term structure in ways that can be large as well as non-mean reverting. Therefore, it is necessary to develop secondary models for the deviation from term structure in each sector, and we have done this for major benchmark sectors (2s, 5s, 10s and 30s).

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Armed with all of these empirical models, as well as near term as well as medium term projected/assumed values for all the drivers, we can project the parameters of the term structure of spreads, as well as deviations, to form a view on swap spreads going forward. **First**, we estimate that term funding premium will modestly rise further in the near term, before retracing to still-elevated but lower levels by year end (**Figure 20**). It is worth highlighting that even relatively small moves in TFP can mean large impacts on 10- and 30-year swap spreads - the 0.35 decline in TFP that we project over 2H24 translates into ~3bp and ~6bp impacts on swap spreads in those sectors, respectively. We also note that in these projections, we assume that one fourth of the actual-versus-model difference for TFP and zero-duration spreads will converge by 1H24, and these differences will fully converge to zero by year end.

Figure 20: We estimate a modest increase in term funding premium in the near term, before retracement to still-elevated but lower levels by year end

Current, 1st half 2024, and year end 2024 forecasts for Term Funding Premium* (bp/year), Zero-duration swap spread **(bp), and Term structure baseline swap spreads*** (bp) in the 2Y, 5Y, 10Y, and 30Y sectors, current as of 4/25/2024

	Term Structure Parameter Projections		
	Current	Near term fair value (1H24)	Medium term fair value (YE24)
Term Funding Premium (bp/year)	4.91	5.10	4.74
Zero-duration swap spread (bp)	-0.74	2.41	-0.21
Term structure baseline swap spread			
2Y	-10.0	-7.2	-9.1
5Y	-22.4	-20.1	-21.1
10Y	-39.5	-37.9	-37.7
30Y	-79.3	-79.2	-76.1

Source: J.P. Morgan.
* Term Funding Premium (TFP) is defined as the negative of the slope of a regression of maturity matched swap spreads versus modified duration in benchmark sectors (2Y, 3Y, 5Y, 7Y, 10Y, 20Y and 30Y) on any given day
** Zero-duration swap spread is defined as the intercept from a regression of maturity matched swap spreads versus modified duration in benchmark sectors (2Y, 3Y, 5Y, 7Y, 10Y, 20Y and 30Y) on any given day
*** Term structure baseline swap spreads is defined as minus 1 times TFP times the respective sector's bond's modified duration plus the zero-duration swap spreads

Second, again using projected values for our drivers in each sector, we can project the deviations between actual swap spreads and the baseline value from the term structure. Current deviations, as well as projected deviations at 1H24 and YE24 horizons are shown in **Figure 21**. **Finally**, we can add the deviations projected in Figure 21 to the baseline from the swap spread term structure that is presented in Figure 20, to arrive at our final projections for swap spreads going forward. We show this in **Figure 22**. As can be seen, these projections argue in favor of a swap spread widening view in the near term across much of the curve, with the impact likely to be more muted at the very long end. **Therefore, we maintain our widening bias on swap spreads across much of the curve, except at the long end where we remain neutral**.

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Figure 21: We look for near term widening in swap spread deviations relative to the term structure across much of the curve by the end of the first half of 2024

Current, 1st half 2024, and year end 2024 forecasts for selected swap spread deviation relative to the term structure of swap spreads*, current as of 4/25/2024; bp

	Deviation from term structure baseline		
	Current	Near term fair value (1H24)	Medium term fair value (YE24)
2Y	2.7	3.0	2.4
5Y	-1.2	-0.1	-0.6
10Y	2.2	3.7	3.6
30Y	3.5	2.6	1.4

Source: J.P. Morgan.
* Swap spread deviation relative to the term structure of swap spreads is calculated for any given day as the actual maturity matched swap spread for a particular sector minus the fitted value as of that day. The fitted value is calculated from a cross sectional regression of maturity matched swap spreads at benchmark tenors (2s, 3s, 5s, 7s, 10s, 20s, 30s) versus their modified durations, and evaluated at the selected swap spread sector's bond's modified duration

Figure 22: We look for near term widening in swap spreads across much of the curve by the end of the first half of 2024, with the long end being the exception

Current, 1st half 2024, and year end 2024 forecasts* for selected maturity matched swap spreads, current as of 4/25/2024; bp

	Swap spread projections		
	Current	Near term fair value (1H24)	Medium term fair value (YE24)
2Y	-7.3	-4.2	-6.7
5Y	-23.7	-20.2	-21.7
10Y	-37.4	-34.2	-34.1
30Y	-75.9	-76.7	-74.7

Source: J.P. Morgan.
*Forecasts are calculated by adding the forecasts for the baseline term structure, as detailed in Figure 20, and forecasts for the deviations from this term structure, as detailed in Figure 21

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