US Rates

CTAs impact on the rates market

Understanding CTA performance

Commodity Trading Advisors, or CTAs, are a subgroup within the hedge fund industry that focuses on trading futures contracts and options on futures contracts on a variety of commodities and financial instruments.

The size of the industry AUM is compounded by their preference for systematic strategies to create scope for a significant footprint in the market. Fortunately, their systematic approach to trading suggests that their flows and performance maybe be reasonably modeled.

Top-down approach

We use a top-down approach in this note and explain CTA performance as a function of the performance of different asset classes (commodities, rates, FX and equities) in a rolling PCA regression.

Our focus is the CTA impact on the rates market, and we are therefore particularly interested in the time-varying betas of the CTA performance on longer and shorter duration features. While the longer duration betas reveal the broader long/short duration bias of CTAs, the relationship between longer and shorter duration betas reveals their steepening/flattening bias on the curve.

We find that the time-varying betas obtained for both longer and shorter duration features (as well as most of the other assets) are broadly in line with the exposures expected in the context of the evolving macro backdrop of the last five years. Significantly, they are also consistent with the momentum signals for the asset classes, which is expected given the CTAs focus on trend following and momentum signals.

Finally, we find a strong correlation between the longer duration betas and the CFTC net 10yT futures positions for non-reportable, in line with conventional wisdom.

Current implications

One can extract information on the type and significance of CTA flows by looking at the week-on-week shifts in betas to duration exposure (first order) and curve (second order).

The results for the former show a long bias since February and few meaningful changes in beta since then (the last one was on the week of July 10 with a meaningful buildup of longs). More recently (in early August) we have seen slow shift in sentiment with a lightening up of long.

On the curve, the last big change in CTA bias was in late March, from a bull steepening bias that leveraged expectations for Fed easing, to a slight flattening bias that has persisted since. More recently, since early August, we have seen some trimming of the flattening bias from a peak in July 24.

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Key terms

PCA: Principal Component Analysis

CFTC: Commodity Futures Trading Commission

Refer to important disclosures on page 9 to 10.
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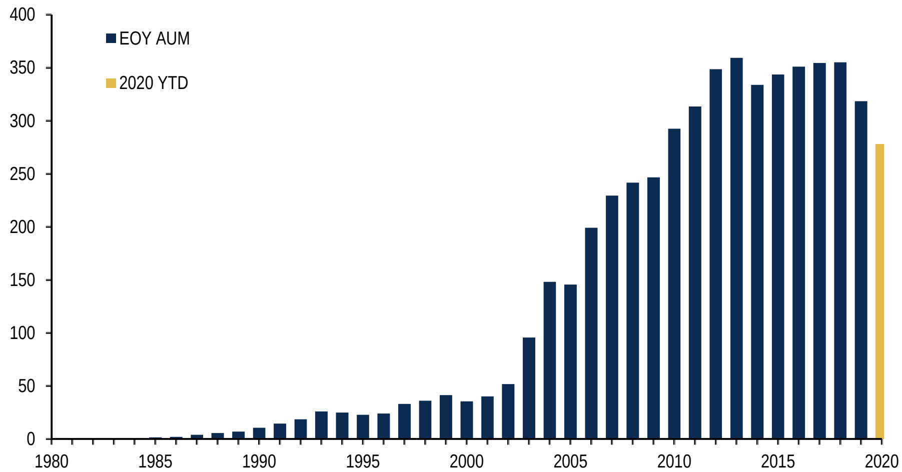
What are CTAs?

Commodity Trading Advisors, or CTAs, are a subgroup within the hedge fund industry that focuses on trading futures contracts and options on futures contracts on a variety of commodities and financial instruments.

The industry had its start in the mid-70s when the Commodity Futures Trading Commission (CFTC) was established, and CTAs take their name from these earlier years when futures markets were for the most part commodity contracts. Assets under management (AUM) increased quickly in the early 2000s (see Chart 1) as CTAs expanded the range of trading products into derivatives and other financial instruments.

Chart 1: Managed futures assets under management



Source: BofA Global Research, BarclayHedge

The positive performance during the financial crisis supported the growth in AUM in the years that followed. CTAs assets peaked in 2013 at c.$360bn despite a more challenging environment after 2008 that is clearly reflected in their performance (see Chart 2 where we use the SG CTA Index as a proxy for the broader CTA performance – more below).

To some extent the performance of CTAs in 2014, a year marked by the commodities rout and significant swings in asset prices (-47% move in WTI and 12.5% appreciation in the dollar, for example), confirmed the usefulness of trend following strategies in asset managers' toolkits. AUMs have slipped in recent years, however, dropping below $300bn earlier this year for the first time since 2010.

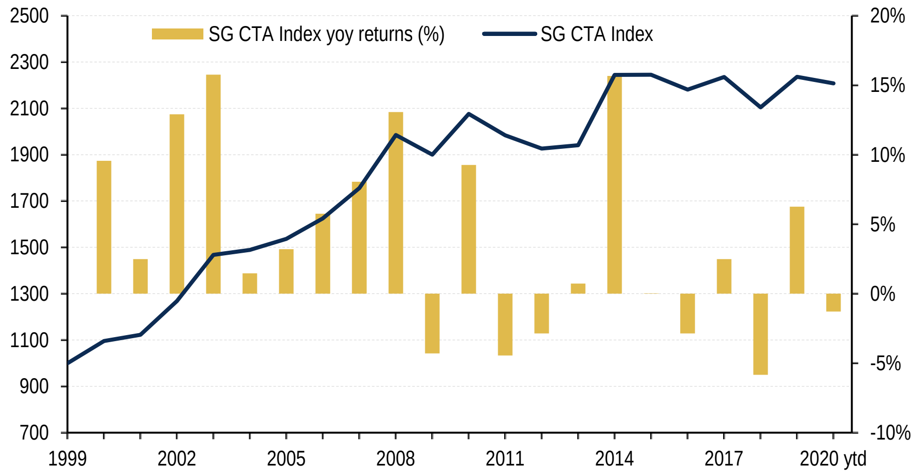
Beyond their focus on trading futures contracts and options on futures in a variety of instruments, CTAs are also characterized by their systematic approach to trading, with a relatively small scope for discretionary trades. Historically, roughly 95% of the AUM is allocated to systematic strategies, with a particular emphasis on momentum signals and trend following strategies.

Understanding CTAs performance

The CTA's systematic approach to trading suggests that their flows and performance maybe be reasonably modeled. Indeed there is a significant amount of interest and literature on replicating CTA frameworks, with some of these studies confirming their proclivity towards momentum signals and trend following strategies.

This brings us to the main motivation of this work. The size of the industry AUM is compounded by their preference for systematic strategies, to create scope for a significant footprint in the market. The objective of this work is to understand the impact of CTAs in the Treasury market, and the significance of allocation/de-allocation flows at any particular point in time.

Chart 2: CTA performance more challenging after the crisis



Source: BofA Global Research; Bloomberg

Generally, modeling approaches to these types of problems can be divided between top-down and bottom-up approached, and the choice between which one to adopt depends on the main objectives of the analysis. Bottom-up approaches provide a lot more granularity to the analysis, but are more laborious and generally involved significant approximations and a high level of contingency of the results to those approximations.

Top-down models start with a set of broad assumptions that are generally quite intuitive, and they are less complex to put together, but provide a lot less granularity in the results.

Specifically for CTAs, a bottom-up approach could for example start by defining a set of trend following strategies with different parameters for the length and significance of the trend across different assets, and calculating the performance of each of these strategies, before trying to decompose the performance of CTAs into this set. Conversely, a top-down approach could start by postulating that the performance of CTAs should be related to the performance of a set of benchmarks for each asset class, and extract positioning and flow information from the betas of CTA performance to each one of these benchmarks.

In the Trends aren't going out of fashion (March 9, 2017) report, the advantages and disadvantages of each of these approaches are discussed in more detail, but the objectives stated above suggest a top-down approach as the most appropriate framework to use here.

The analysis

In both top-down and bottom-up approaches it is necessary to define a benchmark for the CTA performance. Here we use the SG CTA Index (see Chart 2), which is an equal weighted index of the performance of a group of 20 CTAs selected from the largest managers open to new investment, and is considered to the industry benchmark.

There are however some limitations to this choice, which including:

- The increasingly sophisticated nature of the quant models developed by individual funds, which likely imply a more diversified trading flow and may pose a limit on how much of the dynamic can be captured and understood by modeling the average CTA through a top-down approach;
- Or the fact that the index performance may be subject to survivorship bias.

However, few other options are available, and we stick with this choice of proxy for CTA performance while aware of some of these limitations.

Step 1: Defining a representative set of assets for each asset class

In our top-down approach we try to explain the CTA performance with USD denominated assets class returns for: commodities, rates, FX and equities. The first step is obviously to determine the historical performance of each asset class.

This can be achieved either by using benchmark indices or by defining a representative set of assets for each asset class. Our preference goes for the latter. Benchmarks are probably too broad relative to the underlying set of assets that CTAs trade, and construction and rebalancing rules are likely to prove unhelpful in trying to decompose the performance of CTAs as a function of underlying assets. Broad benchmarks also do not allow for the long/shorts bias that is necessary to understand Treasury positioning.

In this note, we use a hierarchical clustering as a guide to define a set of representative assets for each asset class. For example, out of a set of equity indices, we find that their dynamic seems to aggregate into three different clusters (see Exhibit 1) where the first seems to reflect a link to US fundamentals, the second is perhaps a broader DM equity cluster, and the third seems to be biased towards EM. By identifying these clusters one can reduce the set of instruments to use as by definition elements of the same cluster have a significant overlap in the “information” they can contribute to the set.

We perform the same type of analysis to identify the assets that define longer and shorter duration bond sets, FX and commodities sets (which we separate between metals and energy).

Step 2: Calculate the first principal component for each set

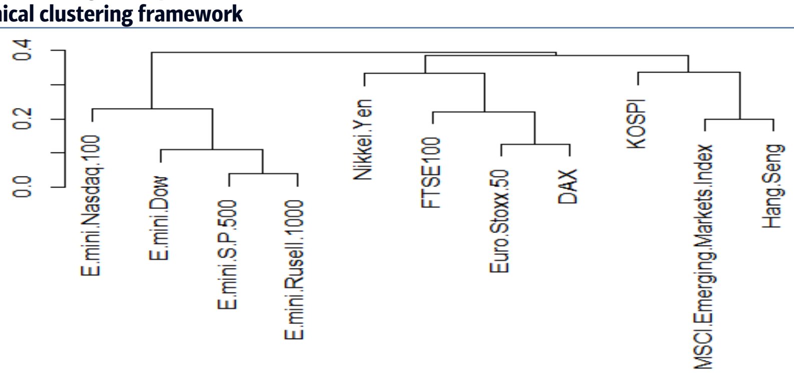
In the second step, we determine the features to use in our top-down approach by calculating the first principal component for each of the sets of assets defined in the first step. By reducing the dimensionality of the problem in the first step we are able to calculate these principal components with a limited amount of data, which makes the features more reactive to changing market trends.

We limit ourselves to the first principal component of each set to avoid the instabilities that are frequent in the estimation of higher order eigenvectors, which would likely impact the estimation of betas in the next step.

Step 3: Rolling OLS regression

The result of steps 1 and 2 are six features that represent the performance of equities, longer and shorter duration bonds, metals and energy to represent the commodities sector, and FX. We use these features in a rolling ordinary least squares (OLS) regression to calculate time-varying betas of the CTA performance to each asset class. We choose a rolling 2m window for the OLS regressions that allows betas to respond relatively quickly to changing market trends but avoids the noise in estimations on shorter windows.

Exhibit 1: Defining the representative set of assets for each asset class (equities in this case) using a hierarchical clustering framework



Source: BofA Global Research

Results and discussion

We obtain rolling betas for CTA performance to each of the six features above, and we can project those features betas back into the assets to obtain the CTA sensitivity to each individual asset.

We tried two versions of the framework, one with the FX feature defined as above, and another where we just use the DXY index instead, which is an index for the dollar vs. other major currencies and to some extent already an eigenportfolio. The average R2 for the latter is slightly better at 66% on 2m rolling windows since 2015, and the results that follow reflect this version.

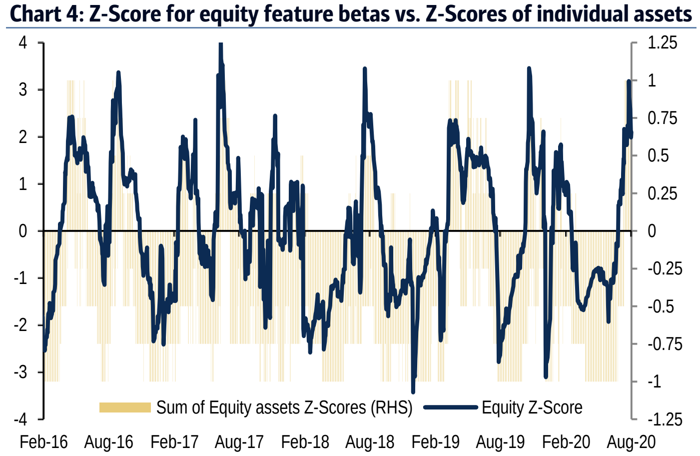
Equity betas

We show the CTA performance betas to the equity feature in Chart 3, and the Z-Scores for the betas in Chart 4. The equity betas are generally positive, which makes sense in the context of a global equities market that has broadly trended higher over the period. The beta Z-Scores provide some insight on the over/under-weight relative to the average 3m beta, and the changes in CTA positioning. In Chart 4, we also overlay an index of the significance of the Z-scores for the individual asset betas (1/-1 representing periods where all assets have significant over/under-weight Z-Scores at a 1.5σ level), and this indeed what you expect from the transformation between the betas to the feature into the betas to the assets using the inverse of the first PC transformation.

Chart 3: Rolling equity feature betas

Source: BofA Global Research

Chart 4: Z-Score for equity feature betas vs. Z-Scores of individual assets



Source: BofA Global Research

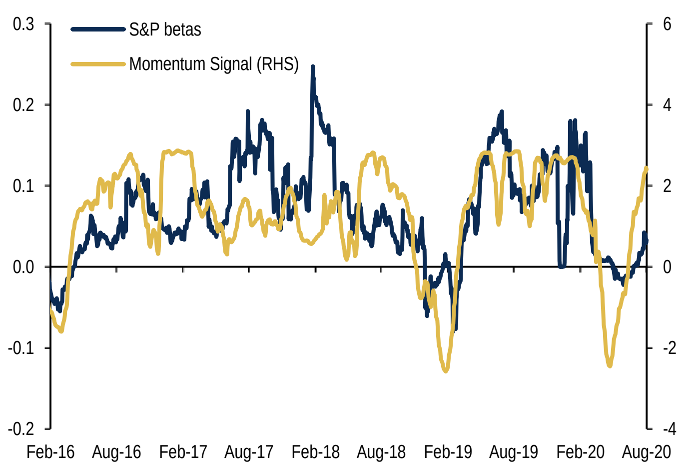
Because the CTAs are known to focus on trend following and momentum signals, it follows that the features and asset betas should show a significant correlation to momentum signals. As a sanity check, we calculate a momentum signal with multiple cross-overs, and compare this signal with the S&P betas in Chart 5. We do observe a significant correlation between the two, although a lead/lag effect is expected given that the time scales that are involved in the two series are different (2m rolling OLS regression for the betas and a multiple cross-over with different time decays for the momentum signals). We estimate the lead/lad to be around 15-20 days, where the two series achieve maximum correlation.

Bond betas

We show the CTA performance betas to both the longer and shorter duration bond features in Chart 6. While the longer duration betas reveal the broader long/short duration bias of CTAs, the relationship between longer and shorter duration betas reveals the steepening/flattening bias on the curve.

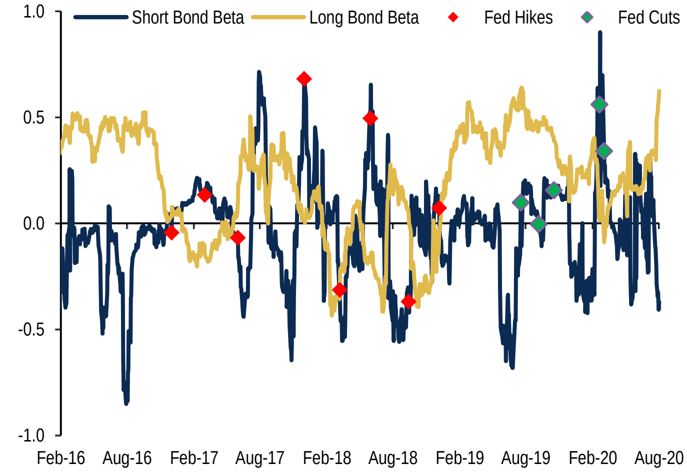
In 2016, for example, the bias was clearly skewed towards long duration and flatteners (long longer duration bonds vs. short shorter duration bonds), which makes perfect sense in a Fed tightening context at the same time as neutral rate expectations were being downgraded (see Mini-cycle vs. end-cycle).

Chart 5: S&P betas vs. multiple cross-over momentum signal



Source: BofA Global Research

Chart 6: Rolling longer and shorter duration bond features betas



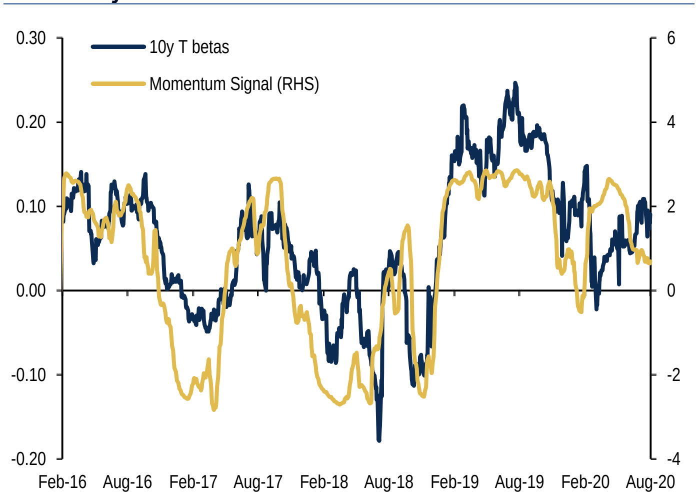
Source: BofA Global Research

The momentum out of the 2016 presidential elections reflected expectations of fiscal and regulatory easing and contributed to a change in the dynamic of the curve towards steepeners (short longer duration bonds vs. long shorter duration ones), which is clearly captured in our results.

It is also interesting to observe how the longer duration betas seem to be more stable over time, while the shorter duration betas seem to be more volatility and dependent on the monetary policy path, which also makes perfect sense.

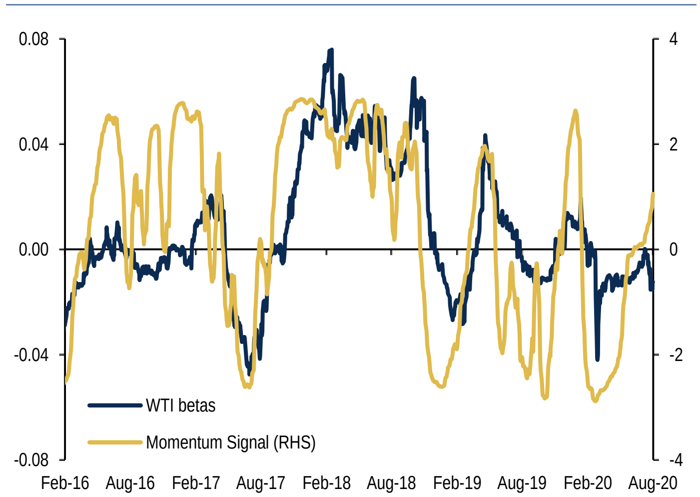
On that note, while the 2019 flattening pressure was less driven by monetary policy tightening and more by a less orthodox downgrade of neutral rate expectations (see [Anatomy of a bullish inversion]), our results suggest that this dynamic seems to have been well captured in the performance of CTAs.

Chart 7: 10yT betas vs. cross-over momentum indicator



Source: BofA Global Research

Chart 8: WTI betas vs. cross-over momentum indicator



Source: BofA Global Research

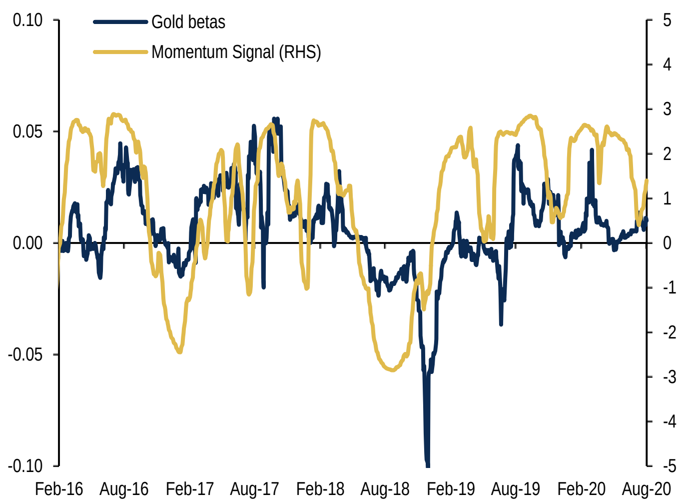
Finally, when we compare the 10y Treasury betas with a cross-over momentum signal we also see a significant correlation. The period in early 2020 is particularly remarkable as we see a decay of betas in a risk-off environment. This reflects the liquidity episode in late-1Q (marked by a selloff in Treasuries and Gold at the peak of the coronavirus turmoil as portfolios were forced to sell the crown jewels in a scramble for cash in extremely poor liquidity conditions). Despite being relatively short-lived, we see this episode captured in our results confirming to some extent the appropriateness of the 2m window in the rolling OLS regression step.

Commodity and FX betas

In Chart 8 and Chart 9, we show the CTA performance betas to WTI and Gold, respectively, along with the corresponding momentum signals. The lower level of correlation between the Gold betas and the momentum signal is likely a reflection of the higher idiosyncratic context of the metals feature, which contains both base and precious metals.

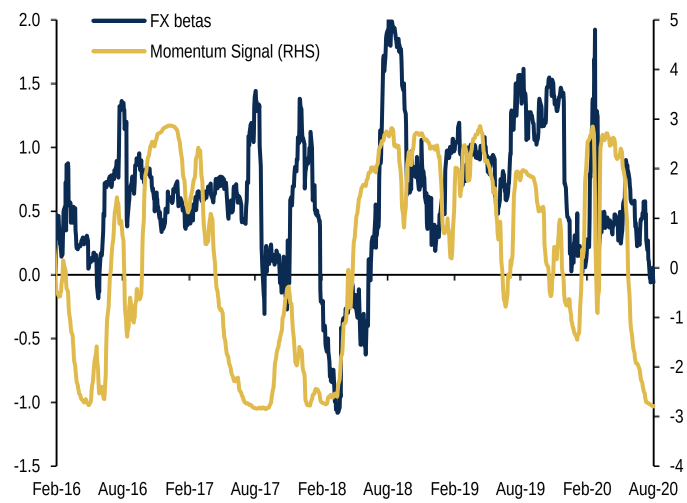
The sensitivities to the dollar index are perhaps the ones that show the lowest correlation with the corresponding momentum signal (see Chart 10), but this is to be expected as strong momentum in the dollar is already incorporated in the momentum for each of the features included above.

Chart 9: Gold betas vs. cross-over momentum indicator



Source: BofA Global Research

Chart 10: FX betas vs. cross-over momentum indicator

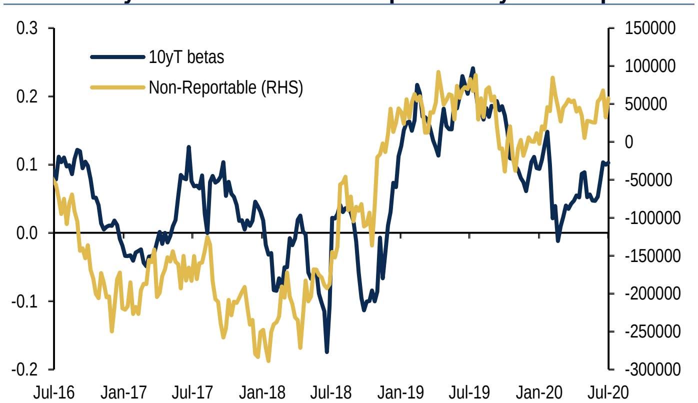


Source: BofA Global Research

Current implications

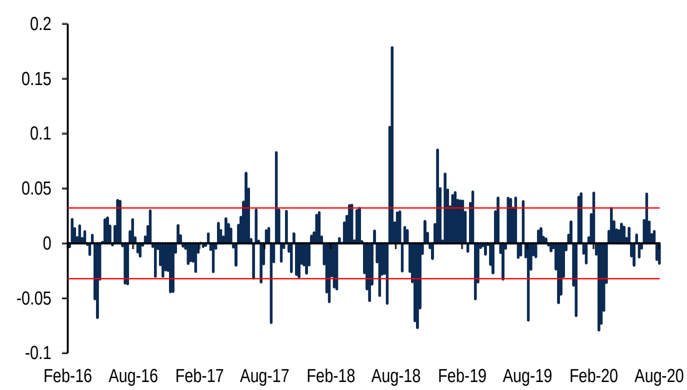
Conventional wisdom suggests that CTA positioning for Treasuries should be correlated with CFTC data on non-reportable futures positions, and indeed our results confirm this view. When we look at the correlation between the 10yT betas obtained here and net 10yT futures positions for commercial, non-commercial, institutional, levered funds, other reportable and non-reportable, we find the highest correlation of trends with non-reportable net positions at roughly 60% (see Chart 11, although in terms of absolute levels and implications for a long/short duration view there seems to be some mismatch), followed by other reportable at only 20%.

Chart 11: 10yT betas vs. CFTC net non-reportable 10yT futures positions



Source: BofA Global Research

Chart 12: Bi-weekly changes in 10yT betas

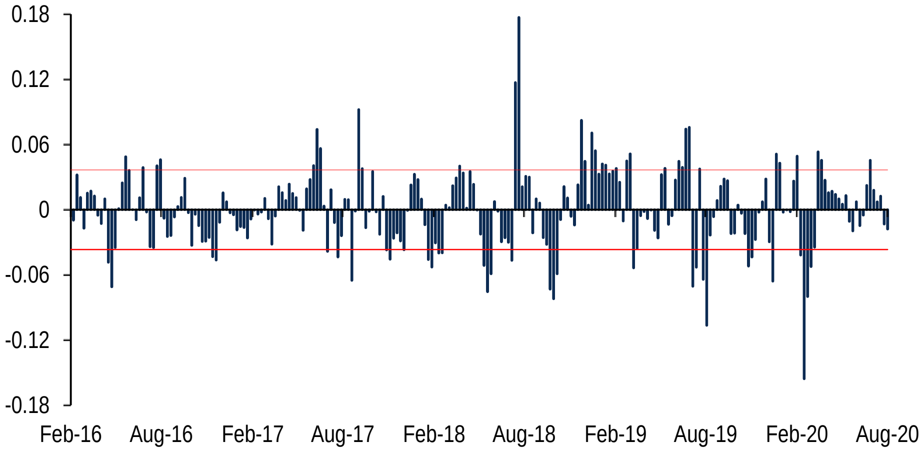


Source: BofA Global Research

In the results above we were able to identify clear trends in CTA positioning in rates space, both in terms of duration exposure (long/short) and in terms curve bias (steepener flattener), and find some correlation in trends between 10yT betas obtained in our analysis with both 10yT futures CFTC positioning for non-reportable and a momentum signal.

What we are interested, however, is in the types of flows this data may suggest, and those may be extracted by the analysis of weekly shifts in betas do duration exposure (first order) and curve (second order). The results for the former show a long bias since February and few meaningful changes in beta since then (the last was on the week of July 10 with a further meaningful buildup of longs). More recently (in early August) we have seen slow shift in sentiment with lightening up on long.

Chart 13: Changes in2s10s Treasury curve bias



Source: BofA Global Research

On the curve, the last big change in CTA bias was in late March, from a bull steepening bias that leveraged expectations for Fed easing, to the slight flattening bias that has persisted since. More recently, since early August, we have seen some trimming of the flattening bias from a peak in July 24.

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