BofA SECURITIES

US Rates Watch

Rates relative value update with PCA

14 December 2022

Rates Research
United States

Ralph Axel
Rates Strategist
BofAS
+1 646 855 6226
ralph.axel@bofa.com

Anna (Caiyi) Zhang
Rates Strategist
BofAS
+1 917 826 5142
caiyi.zhang@bofa.com

US Rates Research
BofAS
+1 646 855 8846

Bruno Braizinha, CFA
Rates Strategist
BofAS
bruno.braizinha@bofa.com

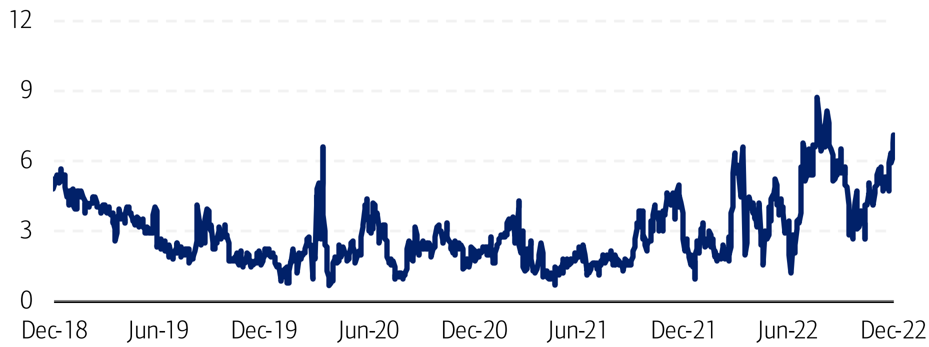
See Team Page for List of Analysts

Using PCA to identify RV opportunities

In this note we give an update on relative value developments in the rates space using principal component analysis on rates, vols, breakevens, and swap spreads.

The root-mean-square error (RMSE in basis points) across the US rates curve shown in Exhibit 1 is a measure of the average deviation of rates across the maturity spectrum from what would be implied by the PCA framework. We view this measure as a proxy for overall liquidity (higher measure = larger deviation from framework = lower liquidity). In March 2020 the RMSE spiked, but then found a new high in summer 2022. The current level is the second highest of its range versus the past few years. We think it is due in part to thinning year-end liquidity but also a function of the major pivot in rates markets starting in mid-October. Before the big rates rally, this metric was relatively low. This supports the Fed's view that illiquidity naturally rises with high market and economic volatility.

Exhibit 1: 3-factor RMSE across US rates (bp) indicates low level of liquidity
US rates this year have a high level of idiosyncratic movements vs history



Source: BofA Global Research

BofA GLOBAL RESEARCH

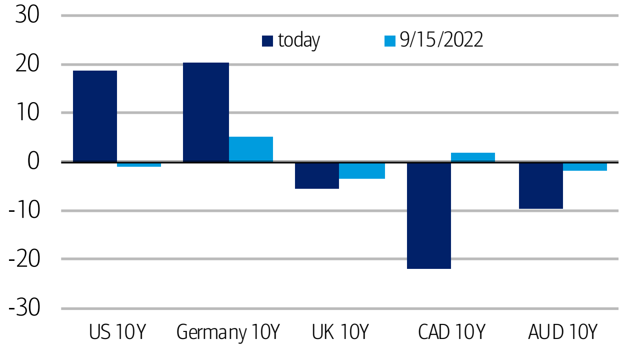
Global 10y rates: pivot timing differentials

To compare across rates markets, we ran a 3-factor PCA back to 2012 with 10y rates in US, Germany, UK, Canada, and Australia. Global rates were quite close to fair value back in September before the market began pivoting on central bank expectations (Exhibit 2). The dramatic rally over the past couple months created large dislocations across these countries with US and EUR cheapening relative to CAD and AUD 10y. This corresponds to an earlier pivot by the BoC and RBA versus others which in the PCA framework appears as a richening of CAD and RBA. CAD 10y rates were equal to US 10y at the end of August, and now CAD 10y is 71bp lower than US 10y. We think the rate sensitivity of the Canadian economy likely justifies this move, and our bias would be for US to cheapen further vs CAD if US payrolls remains resilient and US inflation does not keep surprising as strongly to the downside.

Timestamp: 14 December 2022 06:00AM EST

Exhibit 2: Global 10y rates residuals (bp)

EUR & US 10y rates appear relatively cheap vs CAD 10y which led the pivot



Source: BofA Global Research

BofA GLOBAL RESEARCH

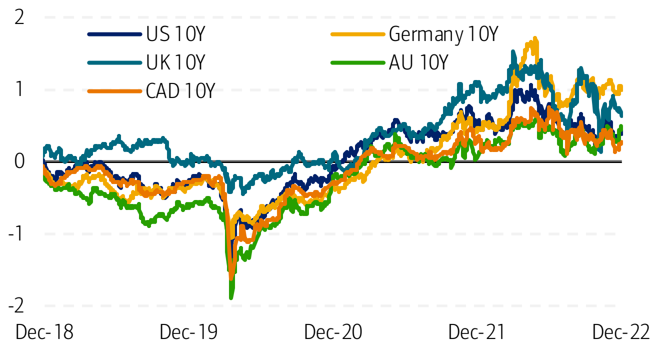
Global breakevens: oil price the main driver

10y breakevens across US, UK, AU, JP, EU, and CAD for at least 6 years appear to be responding to a single overall driver (Exhibit 3). 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.

This suggests that oil has become the primary factor driving global inflation expectations for several years now, rather than monetary policy or anticipation around supply chain reopenings etc. It also implies that any single central bank has very limited impact on its domestic inflation expectation markets. Rather, the expectations channel across countries appears more driven by a global energy factor, outside of central bank reach – although monetary policy should indirectly influence oil prices through how it influences overall aggregate demand. The Fed may be somewhat misinterpreting well-anchored 10y breakevens as evidence markets think they will win the inflation fight. Instead, the anchor seems more likely created by a range-bound oil market, with US reserves demand providing a soft price floor and demand destruction providing a ceiling perhaps somewhere around $130 per barrel.

The second principal component of breakevens accounts for 9% of the variance – which results in a total of 94% covered by 2 factors. We found PC2 correlates well to global financial stress and the Fed's published real rate term premium. Exhibit 4 shows that 10y breakevens in Canada and US look low vs the oil and stress factors while EU appear high. This likely corresponds to the recent downside inflation surprises in North America versus the upside surprises in Europe combined with the higher uncertainty of its energy shock.

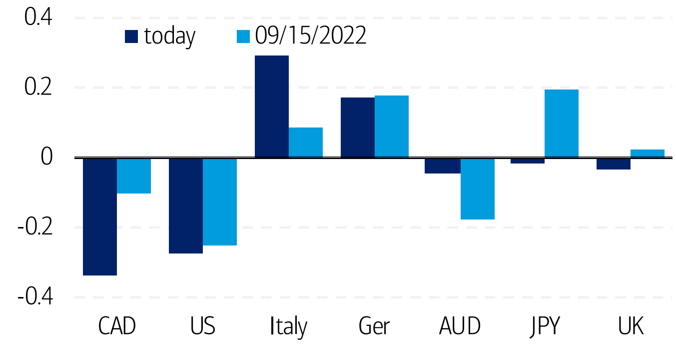
Exhibit 3: Global 10y inflation breakevens since 2018
10y inflation breakevens are very similar across regions



Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

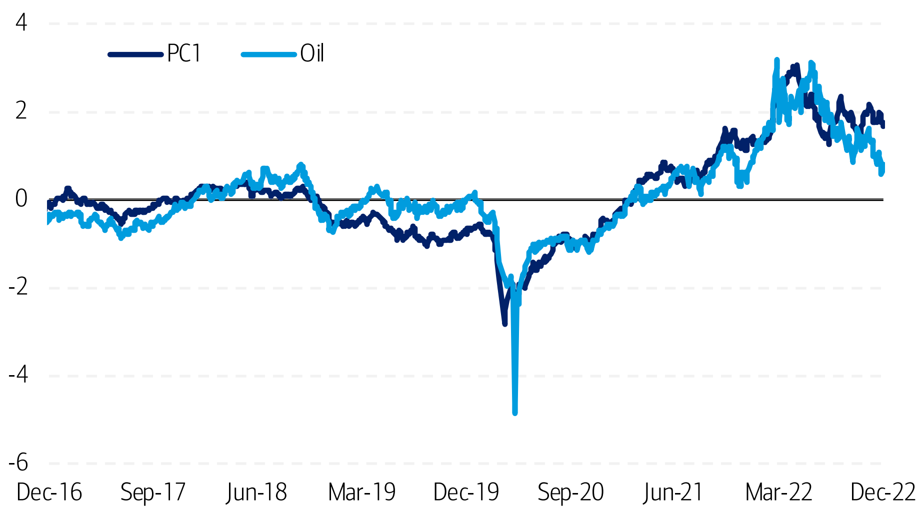
Exhibit 4: Breakeven rich/cheap today vs September
Positive values indicate break is wide vs PCA framework



Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 5: First factor of global BE closely matches 1st crude oil futures
Oil is a primary driver of global inflation expectations



Source: BofA Global Research, Bloomberg

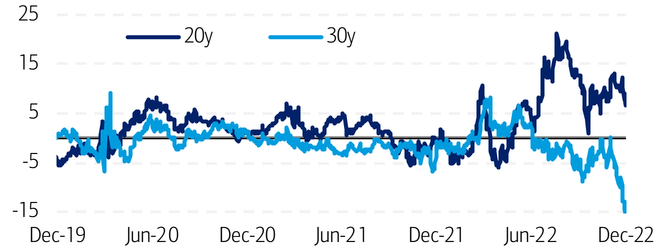
BofA GLOBAL RESEARCH

US rates: 30Y rich on the curve

While the 20y sector has mostly normalized in our framework after looking extremely cheap on the curve, we find that the 30y sector has richened significantly during the recent "pivot rally" starting mid-October (Exhibit 6). While the previously dislocated 20y sector benefitted from increasing likelihood of a Treasury buyback program which we think could emerge next spring, the 30y sector might have richened on flows from the liability-driven investor (LDI) base, including defined benefit plans that achieved their largest funding surplus since 2010 as rates rose, according to the Milliman Pension Funding Index. Some evidence of this flow can be seen in Treasury stripping activity which shows a pickup in the pace of Treasury strips creation (zero-coupon bonds created from existing whole bonds) typically associated with LDI activity. Additional evidence might be in the relatively large increase in Treasury ultralong futures open interest relative to the classic bond futures. As 30y rates richened versus the PCA framework, we also had a large increase in 30y swap spreads (richening of cash versus swaps). The richness in the 10y rate point that we had highlighted in our last report has faded in the PCA framework.

Exhibit 6: 20y and 30y US rate residuals (bp)

20y has richened but still cheap, while 30y has richened



Source: BofA Global Research

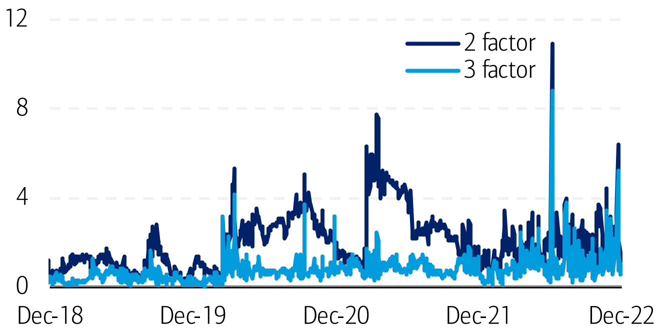
BofA GLOBAL RESEARCH

US volatility: Expect left side vol to continue to come down

In 6m expiries on the vol surface, overall levels have normalized across the grid recently (Exhibit 7), although we continue to see the left side trading above the right side, and gamma above intermediates. We see scope for the left side (1y and 2y tails) to continue to under-perform the right side (we recommended selling 1y1y vol vs 1y10y in our Global Rates Year Ahead) as the market prices the soft Fed pivot with more conviction, which is also likely to help on the process of normalization of the term structure of volatility (1m vs 1y expiries).

Exhibit 7: RMSE across US rates vol curve (bp)

RMSE for vol has gone up during the past month



Source: BofA Global Research

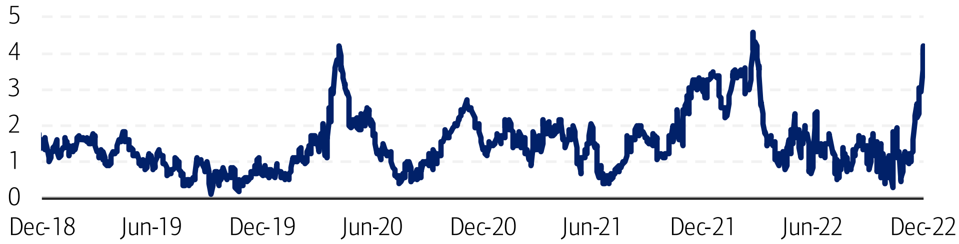
BofA GLOBAL RESEARCH

CAD rates: Overall dislocation increased in December

The overall dislocation across the CAD rates curve was low for most of 2022 but picked up notably over the past few weeks as the dislocations in the US also rose. This suggests that part of the dislocations observed in the CAD rates curve is more global and corresponds to both year end and high market volatility. On the CAD curve we find the 5y-10y slope about 13bp too steep vs the PCA framework. This curve segment was at fair value 3 weeks ago.

Exhibit 8: RMSE across CAD rates curve (bp)

Dislocations in CAD rates overall has increased in December



Source: BofA Global Research

BofA GLOBAL RESEARCH

US swap spreads: 2y-5y slope dislocation mostly reversed

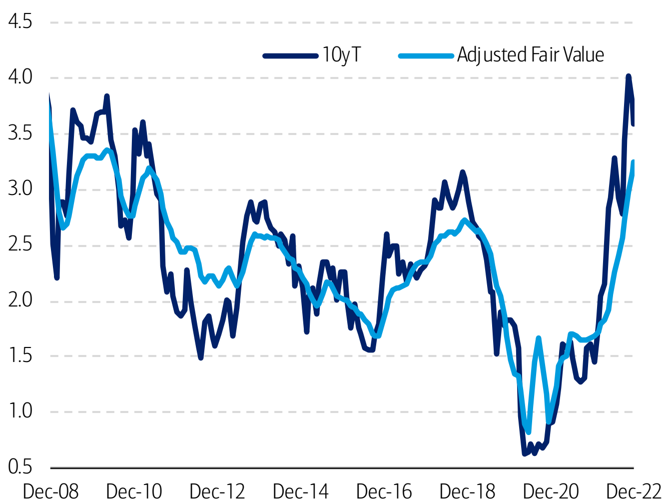
We had highlighted the 2y-5y spread slope dislocation versus PCA and this slope returned to fair value a number of times since late October. We find the slope again has becomes too inverted, but is less than 5bp away from the framework, which compares to a 15bp dislocation in June driven both by rich 2y spreads and cheap 5y spreads. 30y spreads have been highly directional with rates over the last 6 months, tightening with higher rates and widening with lower rates. The framework shows 30y spreads richening about 8bp in the recent widening move to just a bit above fair value.

Fair value from PCA Macro Framework

Our PCA Macro Framework suggests a 10yT fair value of c.3.25% (see Exhibit 9 and Where is the 10yT fair value?). Current levels around 3.5% are well in the context of the standard deviation of the residuals of this framework (c.35bp – see Exhibit 10). This framework suggests: (1) that the easy part of the rally is behind us, with 25bp worth of bullish dynamic left before 10yT mean revert fully to fundamental fair value; and (2) that from here the bullish dynamic may need to be supported by a more significant deterioration of macro fundamentals, and less of the mixed data context we have seen recently.

Exhibit 9: 10yT PCA Macro Framework

10yT fair value 3.25% in this framework

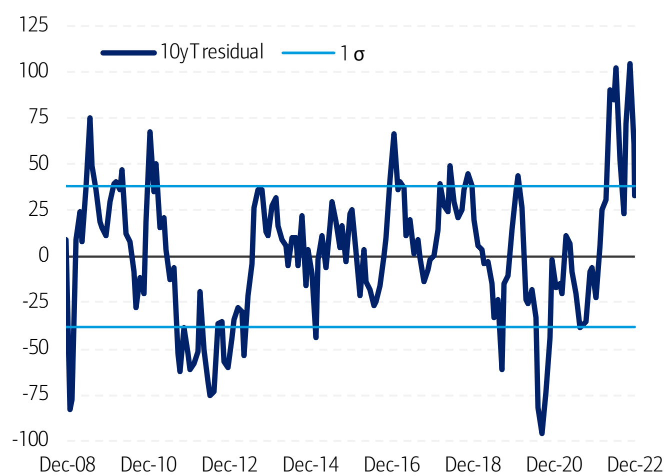


Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 10: Residual of the 10y PCA Macro Framework

10yT is now trading in line with fundamentals, from a c.100bp dislocation in recent months



Source: BofA Global Research

BofA GLOBAL RESEARCH

Analyst Certification

I, Ralph Axel, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

Disclosures

Important Disclosures

BofA Global Research personnel (including the analyst(s) responsible for this report) receive compensation based upon, among other factors, the overall profitability of Bank of America Corporation, including profits derived from investment banking. The analyst(s) responsible for this report may also receive compensation based upon, among other factors, the overall profitability of the Bank's sales and trading businesses relating to the class of securities or financial instruments for which such analyst is responsible.
BofA Securities fixed income analysts regularly interact with sales and trading desk personnel in connection with their research, including to ascertain pricing and liquidity in the fixed income markets.

Other Important Disclosures

Prices are indicative and for information purposes only. Except as otherwise stated in the report, for any recommendation in relation to an equity security, the price referenced is the publicly traded price of the security as of close of business on the day prior to the date of the report or, if the report is published during intraday trading, the price referenced is indicative of the traded price as of the date and time of the report and in relation to a debt security (including equity preferred and CDS), prices are indicative as of the date and time of the report and are from various sources including BofA Securities trading desks.
The date and time of completion of the production of any recommendation in this report shall be the date and time of dissemination of this report as recorded in the report timestamp.

This report may refer to fixed income securities or other financial instruments that may not be offered or sold in one or more states or jurisdictions, or to certain categories of investors, including retail investors. Readers of this report are advised that any discussion, recommendation or other mention of such instruments is not a solicitation or offer to transact in such instruments. Investors should contact their BofA Securities representative or Merrill Global Wealth Management financial advisor for information relating to such instruments.
Rule 144A securities may be offered or sold only to persons in the U.S. who are Qualified Institutional Buyers within the meaning of Rule 144A under the Securities Act of 1933, as amended.
SECURITIES OR OTHER FINANCIAL INSTRUMENTS DISCUSSED HEREIN MAY BE RATED BELOW INVESTMENT GRADE AND SHOULD THEREFORE ONLY BE CONSIDERED FOR INCLUSION IN ACCOUNTS QUALIFIED FOR SPECULATIVE INVESTMENT.
Recipients who are not institutional investors or market professionals should seek the advice of their independent financial advisor before considering information in this report in connection with any investment decision, or for a necessary explanation of its contents.
The securities or other financial instruments discussed in this report may be traded over-the-counter. Retail sales and/or distribution of this report may be made only in states where these instruments are exempt from registration or have been qualified for sale.
Officers of BofAS or one or more of its affiliates (other than research analysts) may have a financial interest in securities of the issuer(s) or in related investments.
This report, and the securities or other financial instruments discussed herein, may not be eligible for distribution or sale in all countries or to certain categories of investors, including retail investors.
Refer to BofA Global Research policies relating to conflicts of interest.
"BofA Securities" includes BofA Securities, Inc. ("BofAS") and its affiliates. Investors should contact their BofA Securities representative or Merrill Global Wealth Management financial advisor if they have questions concerning this report or concerning the appropriateness of any investment idea described herein for such investor. "BofA Securities" is a global brand for BofA Global Research.
Information relating to Non-US affiliates of BofA Securities and Distribution of Affiliate Research Reports:
BofAS and/or Merrill Lynch, Pierce, Fenner & Smith Incorporated ("MLPF&S") may in the future distribute, information of the following non-US affiliates in the US (short name: legal name, regulator): Merrill Lynch (South Africa): Merrill Lynch South Africa (Pty) Ltd., regulated by The Financial Service Board; MLI (UK): Merrill Lynch International, regulated by the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA); BofASE (France): BofA Securities Europe SA is authorized by the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and regulated by the ACPR and the Autorité des Marchés Financiers (AMF). BofA Securities Europe SA ("BofASE") with registered address at 51, rue La Boétie, 75008 Paris is registered under n° 842 602 690 RCS Paris. In accordance with the provisions of French Code Monétaire et Financier (Monetary and Financial Code), BofASE is an établissement de crédit et d'investissement (credit and investment institution) that is authorised and supervised by the European Central Bank and the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and regulated by the ACPR and the Autorité des Marchés Financiers. BofASE's share capital can be found at www.bofaml.com/BofASEdisclaimer; BofA Europe (Milan): Bank of America Europe Designated Activity Company, Milan Branch, regulated by the Bank of Italy, the European Central Bank (ECB) and the Central Bank of Ireland (CBI); BofA Europe (Frankfurt): Bank of America Europe Designated Activity Company, Frankfurt Branch regulated by BaFin, the ECB and the CBI; BofA Europe (Madrid): Bank of America Europe Designated Activity Company, Sucursal en España, regulated by the Bank of Spain, the ECB and the CBI; Merrill Lynch (Australia): Merrill Lynch Equities (Australia) Limited, regulated by the Australian Securities and Investments Commission; Merrill Lynch (Hong Kong): Merrill Lynch (Asia Pacific) Limited, regulated by the Hong Kong Securities and Futures Commission (HKSFC); Merrill Lynch (Singapore): Merrill Lynch (Singapore) Pte Ltd, regulated by the Monetary Authority of Singapore (MAS); Merrill Lynch (Canada): Merrill Lynch Canada Inc, regulated by the Investment Industry Regulatory Organization of Canada; Merrill Lynch (Mexico): Merrill Lynch Mexico, SA de CV, Casa de Bolsa, regulated by the Comisión Nacional Bancaria y de Valores; Merrill Lynch (Argentina): Merrill Lynch Argentina SA, regulated by Comisión Nacional de Valores; BofAS Japan: BofA Securities Japan Co., Ltd., regulated by the Financial Services Agency; Merrill Lynch (Seoul): Merrill Lynch International, LLC Seoul Branch, regulated by the Financial Supervisory Service; Merrill Lynch (Taiwan): Merrill Lynch Securities (Taiwan) Ltd., regulated by the Securities and Futures Bureau; BofAS India: BofA Securities India Limited, regulated by the Securities and Exchange Board of India (SEBI); Merrill Lynch (Indonesia): PT Merrill Lynch Sekuritas Indonesia, regulated by Otoritas Jasa Keuangan (OJK); Merrill Lynch (Israel): Merrill Lynch Israel Limited, regulated by Israel Securities Authority; Merrill Lynch (Russia): OOO Merrill Lynch Securities, Moscow, regulated by the Central Bank of the Russian Federation; Merrill Lynch (DIFC): Merrill Lynch International (DIFC Branch), regulated by the Dubai Financial Services Authority (DFSA); Merrill Lynch (Brazil): Merrill Lynch S.A. Corretora de Títulos e Valores Mobiliários, regulated by Comissão de Valores Mobiliários; Merrill Lynch KSA Company: Merrill Lynch Kingdom of Saudi Arabia Company, regulated by the Capital Market Authority.
This information: has been approved for publication and is distributed in the United Kingdom (UK) to professional clients and eligible counterparties (as each is defined in the rules of the FCA and the PRA) by MLI (UK), which is authorized by the PRA and regulated by the FCA and the PRA - details about the extent of our regulation by the FCA and PRA are available from us on request; has been approved for publication and is distributed in the European Economic Area (EEA) by BofASE (France), which is authorized by the ACPR and regulated by the ACPR and the AMF; has been considered and distributed in Japan by BofAS Japan, a registered securities dealer under the Financial Instruments and Exchange Act in Japan, or its permitted affiliates; is issued and distributed in Hong Kong by Merrill Lynch (Hong Kong) which is regulated by HKSFC; is issued and distributed in Taiwan by Merrill Lynch (Taiwan); is issued and distributed in India by BofAS India; and is issued and distributed in Singapore to institutional investors and/or accredited investors (each as defined under the Financial Advisers Regulations) by Merrill Lynch (Singapore) (Company Registration No 198602883D). Merrill Lynch (Singapore) is regulated by MAS. Merrill Lynch Equities (Australia) Limited (ABN 65 006 276 795), AFS License 235132 (MLEA) distributes this information in Australia only to 'Wholesale' clients as defined by s.761G of the Corporations Act 2001. With the exception of Bank of America N.A., Australia Branch, neither MLEA nor any of its affiliates involved in preparing this information is an Authorised Deposit-Taking Institution under the Banking Act 1959 nor regulated by the Australian Prudential Regulation Authority. No approval is required for publication or distribution of this information in Brazil and its local distribution is by Merrill Lynch (Brazil) in accordance with applicable regulations. Merrill Lynch (DIFC) is authorized and regulated by the DFSA. Information prepared and issued by Merrill Lynch (DIFC) is done so in accordance with the requirements of the DFSA conduct of business rules. BofA Europe (Frankfurt) distributes this information in Germany and is regulated by BaFin, the ECB and the CBI. BofA Securities entities, including BofA Europe and BofASE (France), may outsource/delegate the marketing and/or provision of certain research services or aspects of research services to other branches or members of the BofA Securities group. You may be contacted by a different BofA Securities entity acting for and on behalf of your service provider where permitted by applicable law. This does not change your service provider. Please refer to the Electronic Communications Disclaimers for further information.
This information has been prepared and issued by BofAS and/or one or more of its non-US affiliates. The author(s) of this information may not be licensed to carry on regulated activities in your jurisdiction and, if not licensed, do not hold themselves out as being able to do so. BofAS and/or MLPF&S is the distributor of this information in the US and accepts full responsibility for

information distributed to BofAS and/or MLPF&S clients in the US by its non-US affiliates. Any US person receiving this information and wishing to effect any transaction in any security discussed herein should do so through BofAS and/or MLPF&S and not such foreign affiliates. Hong Kong recipients of this information should contact Merrill Lynch (Asia Pacific) Limited in respect of any matters relating to dealing in securities or provision of specific advice on securities or any other matters arising from, or in connection with, this information. Singapore recipients of this information should contact Merrill Lynch (Singapore) Pte Ltd in respect of any matters arising from, or in connection with, this information. For clients that are not accredited investors, expert investors or institutional investors Merrill Lynch (Singapore) Pte Ltd accepts full responsibility for the contents of this information distributed to such clients in Singapore.

General Investment Related Disclosures:

Taiwan Readers: Neither the information nor any opinion expressed herein constitutes an offer or a solicitation of an offer to transact in any securities or other financial instrument. No part of this report may be used or reproduced or quoted in any manner whatsoever in Taiwan by the press or any other person without the express written consent of BofA Securities.

This document provides general information only, and has been prepared for, and is intended for general distribution to, BofA Securities clients. Neither the information nor any opinion expressed constitutes an offer or an invitation to make an offer, to buy or sell any securities or other financial instrument or any derivative related to such securities or instruments (e.g., options, futures, warrants, and contracts for differences). This document is not intended to provide personal investment advice and it does not take into account the specific investment objectives, financial situation and the particular needs of, and is not directed to, any specific person(s). This document and its content do not constitute, and should not be considered to constitute, investment advice for purposes of ERISA, the US tax code, the Investment Advisers Act or otherwise. Investors should seek financial advice regarding the appropriateness of investing in financial instruments and implementing investment strategies discussed or recommended in this document and should understand that statements regarding future prospects may not be realized. Any decision to purchase or subscribe for securities in any offering must be based solely on existing public information on such security or the information in the prospectus or other offering document issued in connection with such offering, and not on this document.

Securities and other financial instruments referred to herein, or recommended, offered or sold by BofA Securities, are not insured by the Federal Deposit Insurance Corporation and are not deposits or other obligations of any insured depository institution (including, Bank of America, N.A.). Investments in general and, derivatives, in particular, involve numerous risks, including, among others, market risk, counterparty default risk and liquidity risk. No security, financial instrument or derivative is suitable for all investors. Digital assets are extremely speculative, volatile and are largely unregulated. In some cases, securities and other financial instruments may be difficult to value or sell and reliable information about the value or risks related to the security or financial instrument may be difficult to obtain. Investors should note that income from such securities and other financial instruments, if any, may fluctuate and that price or value of such securities and instruments may rise or fall and, in some cases, investors may lose their entire principal investment. Past performance is not necessarily a guide to future performance. Levels and basis for taxation may change.

BofA Securities is aware that the implementation of the ideas expressed in this report may depend upon an investor's ability to "short" securities or other financial instruments and that such action may be limited by regulations prohibiting or restricting "shortselling" in many jurisdictions. Investors are urged to seek advice regarding the applicability of such regulations prior to executing any short idea contained in this report.

This report may contain a trading idea or recommendation which highlights a specific identified near-term catalyst or event impacting a security, issuer, industry sector or the market generally that presents a transaction opportunity, but does not have any impact on the analyst's particular "Overweight" or "Underweight" rating (which is based on a three month trade horizon). Trading ideas and recommendations may differ directionally from the analyst's rating on a security or issuer because they reflect the impact of a near-term catalyst or event.

Foreign currency rates of exchange may adversely affect the value, price or income of any security or financial instrument mentioned in this report. Investors in such securities and instruments effectively assume currency risk.

BofAS or one of its affiliates is a regular issuer of traded financial instruments linked to securities that may have been recommended in this report. BofAS or one of its affiliates may, at any time, hold a trading position (long or short) in the securities and financial instruments discussed in this report.

BofA Securities, through business units other than BofA Global Research, may have issued and may in the future issue trading ideas or recommendations that are inconsistent with, and reach different conclusions from, the information presented herein. Such ideas or recommendations may reflect different time frames, assumptions, views and analytical methods of the persons who prepared them, and BofA Securities is under no obligation to ensure that such other trading ideas or recommendations are brought to the attention of any recipient of this information.

In the event that the recipient received this information pursuant to a contract between the recipient and BofAS for the provision of research services for a separate fee, and in connection therewith BofAS may be deemed to be acting as an investment adviser, such status relates, if at all, solely to the person with whom BofAS has contracted directly and does not extend beyond the delivery of this report (unless otherwise agreed specifically in writing by BofAS). If such recipient uses the services of BofAS in connection with the sale or purchase of a security referred to herein, BofAS may act as principal for its own account or as agent for another person. BofAS is and continues to act solely as a broker-dealer in connection with the execution of any transactions, including transactions in any securities referred to herein.

Copyright and General Information:

Materials prepared by BofA Global Research personnel are based on public information. Facts and views presented in this material have not been reviewed by, and may not reflect information known to, professionals in other business areas of BofA Securities, including investment banking personnel. BofA Securities has established information barriers between BofA Global Research and certain business groups. As a result, BofA Securities does not disclose certain client relationships with, or compensation received from, such issuers. To the extent this material discusses any legal proceeding or issues, it has not been prepared as nor is it intended to express any legal conclusion, opinion or advice. Investors should consult their own legal advisers as to issues of law relating to the subject matter of this material. BofA Global Research personnel's knowledge of legal proceedings in which any BofA Securities entity and/or its directors, officers and employees may be plaintiffs, defendants, co-defendants or co-plaintiffs with or involving issuers mentioned in this material is based on public information. Facts and views presented in this material that relate to any such proceedings have not been reviewed by, discussed with, and may not reflect information known to, professionals in other business areas of BofA Securities in connection with the legal proceedings or matters relevant to such proceedings.

This information has been prepared independently of any issuer of securities mentioned herein and not in connection with any proposed offering of securities or as agent of any issuer of any securities. None of BofAS any of its affiliates or their research analysts has any authority whatsoever to make any representation or warranty on behalf of the issuer(s). BofA Global Research policy prohibits research personnel from disclosing a recommendation, investment rating, or investment thesis for review by an issuer prior to the publication of a research report containing such rating, recommendation or investment thesis.

Any information relating to the tax status of financial instruments discussed herein is not intended to provide tax advice or to be used by anyone to provide tax advice. Investors are urged to seek tax advice based on their particular circumstances from an independent tax professional.

The information herein (other than disclosure information relating to BofA Securities and its affiliates) was obtained from various sources and we do not guarantee its accuracy. This information may contain links to third-party websites. BofA Securities is not responsible for the content of any third-party website or any linked content contained in a third-party website. Content contained on such third-party websites is not part of this information and is not incorporated by reference. The inclusion of a link does not imply any endorsement by or any affiliation with BofA Securities. Access to any third-party website is at your own risk, and you should always review the terms and privacy policies at third-party websites before submitting any personal information to them. BofA Securities is not responsible for such terms and privacy policies and expressly disclaims any liability for them.

All opinions, projections and estimates constitute the judgment of the author as of the date of publication and are subject to change without notice. Prices also are subject to change without notice. BofA Securities is under no obligation to update this information and BofA Securities ability to publish information on the subject issuer(s) in the future is subject to applicable quiet periods. You should therefore assume that BofA Securities will not update any fact, circumstance or opinion contained herein.

Certain outstanding reports or investment opinions relating to securities, financial instruments and/or issuers may no longer be current. Always refer to the most recent research report relating to an issuer prior to making an investment decision.

In some cases, an issuer may be classified as Restricted or may be Under Review or Extended Review. In each case, investors should consider any investment opinion relating to such issuer (or its security and/or financial instruments) to be suspended or withdrawn and should not rely on the analyses and investment opinion(s) pertaining to such issuer (or its securities and/or financial instruments) nor should the analyses or opinion(s) be considered a solicitation of any kind. Sales persons and financial advisors affiliated with BofAS or any of its affiliates may not solicit purchases of securities or financial instruments that are Restricted or Under Review and may only solicit securities under Extended Review in accordance with firm policies.

Neither BofA Securities nor any officer or employee of BofA Securities accepts any liability whatsoever for any direct, indirect or consequential damages or losses arising from any use of this information.

Research Analysts

US

Mark Cabana, CFA
Rates Strategist
BofAS
+1 646 855 9591
mark.cabana@bofa.com

Ralph Axel
Rates Strategist
BofAS
+1 646 855 6226
ralph.axel@bofa.com

Bruno Braizinha, CFA
Rates Strategist
BofAS
+1 646 855 8949
bruno.braizinha@bofa.com

Katie Craig
Rates Strategist
BofAS
+1 646 855 6625
katie.craig@bofa.com

Meghan Swiber, CFA
Rates Strategist
BofAS
+1 646 855 9877
meghan.swiber@bofa.com

Anna (Caiyi) Zhang
Rates Strategist
BofAS
+1 917 826 5142
caiyi.zhang@bofa.com