Liquid Insight

Fed UST WAM shift: a slow aspiration

11 March 2024

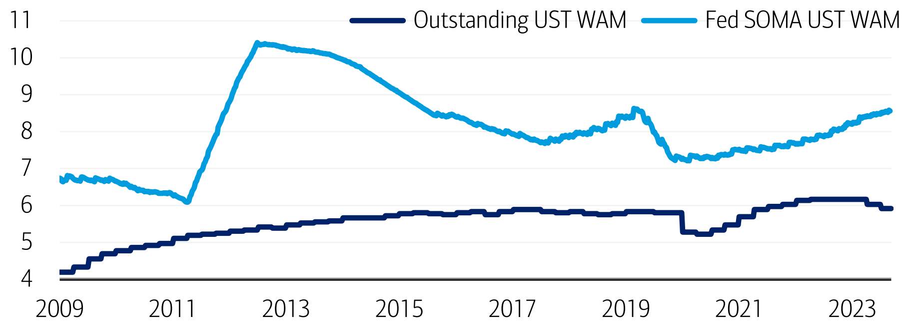
Rates and Currencies Research
Global

Key takeaways

- Fed comments have driven interest in a potential shortening of the SOMA UST WAM
- Recent declines in 2Y rates & 2Y spread widening following Fed SOMA WAM comments are likely overdone
- Fed may want a more nimble portfolio with minimal market impact; rollover shortening or MBS to bills most likely

By M. Cabana, R. Axel, J. Curro, M. Swiber, K. Craig

Exhibit 1: Fed SOMA UST WAM & overall UST WAM outstanding (years)
Fed UST WAM is much longer than the UST market



Source: Federal Reserve, US Treasury

BofA GLOBAL RESEARCH

Fed UST WAM in focus, but unlikely near term

Clients have focused on the composition of the Fed balance sheet in past 2 weeks. This was spurred by recent Fed Governor Waller comments that he would like to see "a shift in Treasury holdings toward a larger share of shorter-dated Treasury securities". Chair Powell also mentioned a similar theme in his Senate Congressional testimony last week, though noted this was a longer-term aspiration. The Fed's System Open Market Account (SOMA) potfolio WAM is 8.6Y vs UST WAM of 5.9Y (including Fed holdings) (Exhibit 1).

Comments on Fed UST WAM have spurred declines in front end US rates & a widening of short-dated swap spreads. We think these moves are overdone because (1) any Fed SOMA UST WAM shift will be slow (2) market impact is likely largest only if Fed purchases in the secondary market. Our best guess is that Fed UST WAM shortening is likely more of a story for 2025, not 2024. We elaborate in greater detail below.

Global Rates & Currencies Research
MLI (UK)

Mark Cabana, CFA
Rates Strategist
BofAS
+1 646 743 7013
mark.cabana@bofa.com

Ralph Axel
Rates Strategist
BofAS
+1 646 743 7011
ralph.axel@bofa.com

Jeana Curro
MBS Strategist
BofAS
jeana.curro@bofa.com

Meghan Swiber, CFA
Rates Strategist
BofAS
+1 646 743 7020
meghan.swiber@bofa.com

Katie Craig
Rates Strategist
BofAS
+1 646 743 7016
katie.craig@bofa.com

Adarsh Sinha
FX Strategist
Merrill Lynch (Hong Kong)
+852 3508 7155
adarsh.sinha@bofa.com

Janice Xue
Emerging Asia FI/FX Strategist
Merrill Lynch (Hong Kong)
+852 3508 8587
janice.xue@bofa.com

See Team Page for List of Analysts

Liquid Insight
Recent Publications

BofA GLOBAL RESEARCH

12669087

Timestamp: 11 March 2024 12:30AM EDT

Fed balance sheet debate coming but WAM to wait

The Fed will start an in-depth discussion of their balance sheet policy at the March FOMC (Mar 19-20). The Fed's first balance sheet priority is determining when & how to slow QT. A secondary consideration will be the discussion of their UST WAM, which will likely be delayed until May or later. Indeed, Chair Powell said at his Senate testimony last week that "I don't think we will deal with [UST WAM discussion] at this meeting".

The Fed needs to prioritize how & when to slow QT given the reduction of excess liquidity in the system. The Fed's best proxy for excess liquidity in the system is the balance of the overnight reverse repo (ON RRP) facility. Fed ON RRP is <$450b and could potentially see a sizeable drop around the April tax date (Exhibit 2). We suspect the Fed will want to identify & agree on key thresholds for slowing QT before shifting focus to any changes in UST WAM. Slowing QT is Fed priority 1, SOMA UST WAM is priority 2.

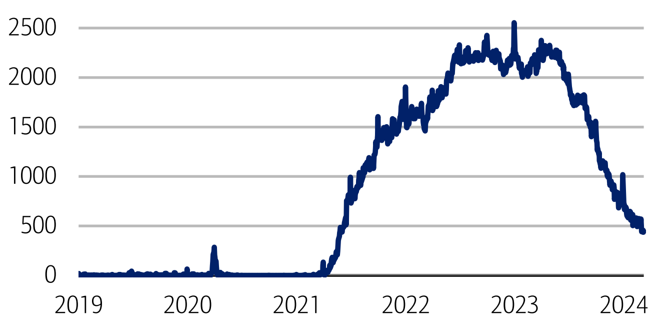
Fed history: shorter WAM gain may not outweigh cost

The Fed debated shorting their UST WAM in May 2019. These discussions reflected caution on shortening maturities too aggressively. Fed staff work flagged risks that a short WAM portfolio of <3Y could put "significant upward pressure" on term premiums. These minutes also suggest the potential benefits of shifting to a shorter maturity UST WAM might not be worth the potential costs. The Fed largely held off making any final decisions on Fed UST WAM considerations at this time.

Despite not reaching any final decisions on Fed UST WAM in May '19, the Fed did take 2 notable balance sheet actions in subsequent months: (1) July '19: Fed stopped QT & rolled over maturing MBS into USTs proportional to USTs outstanding (2) Sept '19: repo spiked & Fed started buying bills to permanently add liquidity into the system. The actions in July & Sept '19 suggest was in no rush to shorten their UST WAM.

Exhibit 2: Fed ON RRP facility use ($bn)

Fed ON RRP balances have fallen quickly reflecting reduced excess liquidity

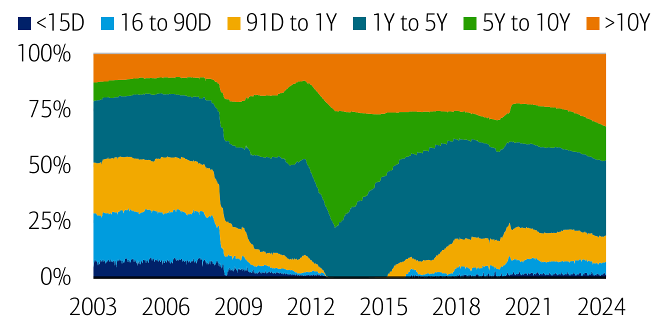


Source: Federal Reserve

BofA GLOBAL RESEARCH

Exhibit 3: Fed SOMA UST maturity distribution (%)

Fed UST <1Y maturities are 19% today vs 52% pre GFC



Source: Federal Reserve

BofA GLOBAL RESEARCH

Fed SOMA UST WAM considerations today

Fed's UST WAM today is like May '19: today = 8.6Y, May '19 = 8.4Y. The gap to UST WAM outstanding (including Fed holdings) is similarly wide (Exhibit 1). The % of USTs maturing in <1Y today is also like '19: today = 19%, May '19 = 17% (Exhibit 3). Pre-GFC Fed UST WAM was 3.3Y and % of USTs maturing <1Y was 52%.

A Fed portfolio that converges to pre-GFC would be a substantial shift but likely only to take place over time. In this shift the Fed would likely see its MBS holdings fall to zero over time and see a slow shortening of its UST WAM. Chair Powell reiterated this desire last week saying the Fed would prefer not to own MBS and any move to shortening WAM is "not something that would happen quickly." We agree as the Fed currently holds $2.3tr of Agency MBS with a current runoff rate of just $14-16bn/mo.

We see 3 ways the Fed could shorten the SOMA UST WAM: (1) adjust rollover process (2) reinvest MBS repayments into bills (3) "anti-twist", i.e. sell long-dated USTs or MBS & buy shorter-dated USTs. A mix of options is possible & we think those involving option 2 are most likely; option 3 would have the largest market impact & is least likely.

Adjust rollover process: currently the Fed "rolls over" any maturing UST securities above their monthly $60b QT redemption cap. The Fed's rollover process allocates maturing USTs in relation to USTs being issued that month. The process has generally seen sizeable reinvestments into 10 & 30Y USTs, which has helped lengthen Fed SOMA WAM since QT started. For detail on Fed rollovers see UST auction primer.

The Fed could speed up their WAM shortening by adjusting their current rollover process to focus on bills and / or 2 & 3Y tenors. The Fed did not adjust their rollover process in '19, implying a high bar for change today. For reference, an unchanged $60b/m UST QT redemption cap the Fed will rollover $64b in '24 & $55b in '25; these are relatively small quantities that would likely have only a modest impact on Fed SOMA UST WAM.

Fed rollovers are an "add on" at USTs auctions which will limit the market impact of this strategy. When the Fed rolls over maturing USTs at auction this mechanically increases the size of total UST issues but does not impact the amount the private sector must absorb. A shift in Fed rollover strategy to shorter tenors would mechanically lower total UST WAM the Fed's "add on" would increase the size of these shorter tenor bonds; any rollover shift would likely be done in close consultation with the US Treasury.

The overall impact of a shift in Fed rollovers is likely minimal to the private sector and it does not reduce the WAM of its holdings.

Reinvest MBS repayments into bills: our best guess is the Fed will implement a shorter UST WAM portfolio once QT ends, primarily relying on MBS reinvestment into bills. This reinvestment process would occur slowly given the current pace of Fed MBS repayments. Over the past six months, its MBS have only prepaid at an average pace of $15b/m ($19bn since the start of QT) and our MBS strategists estimate future paydowns would only exceed $20b/m on average if 10Y UST was <3.5% (Exhibit 4). This implies that any Fed MBS to bill reinvestment would likely total only $200b annualized in '24 for our 10Y base case (end '24 10Y = 4.25%). The reinvestment could approach $250b annualized if 10Y were <3.5%. The process will likely be slow.

Exhibit 4: Fed average monthly MBS repayment in '24
Fed monthly MBS repayments are unlikely to exceed $20b/m if 10Y <3.5%

10Y UST Scenario	5%	4.50%	4.25%	4%	3.50%	3%
Fed MBS Paydown ($b/m)	15.1	15.9	16.4	17.2	19.4	22.3

Source: BofA Global Research

BofA GLOBAL RESEARCH

Any Fed MBS to bill reallocation would likely be done in the secondary market, as was the case in 2019. Fed secondary buying of bills would seek to reduce the available float for the private sector. Fed MBS reinvestments into bills would help modestly richen front end USTs if Treasury did not offset this expected demand with higher supply.

"Anti-twist": the Fed could theoretically sell longer-dated securities (USTs or MBS) to shorten WAM. The Fed could also sell the long end and buy shorter-dated USTs to shorten WAM. This process would essentially represent an "anti-twist". For reference, in Sept 2011 the Fed announced it would sell $400bn of short maturity SOMA holdings and invest that in long maturity Treasuries. It ultimately did about $700bn of this trade through the end of 2012 which changed its portfolio to 50% above and below the 5-year maturity to 22%/78% above and below the 5y point. The net change in spreads and rates across the period of Operation Twist was small.

An "anti-twist" would act to steepen the UST curve and drive a meaningful flattening of the UST spread curve. It would also likely weigh on risk sentiment. We doubt the Fed would want to risk meaningfully tighter financial conditions in such an "anti-twist".

Bottom line: the Fed will soon discuss their balance sheet policies, but we expect no near-term change in Fed SOMA UST WAM. Any new & deliberate shift in Fed SOMA UST WAM is unlikely in '24. The least market moving means by which the Fed could shorten WAM is through their rollover process & the most disruptive would be through an "anti-twist". We suspect that the Fed is not looking to move markets with a shorter WAM but instead wants a nimbler portfolio over time. If that's the case, the widening in 2y spreads since Fed SOMA WAM shortening discussion began is likely overdone.

Notable Rates and FX Research

- **Global Macro Year Ahead 2024 -** Hope for the best, prepare for the worst, 19 Nov 2023
- **Global Rates Year Ahead 2024 –** Cloudy with a chance of landing, 19 Nov 2023
- **G10 FX Year Ahead -** The year of the landing, 20 Nov 2023
- Ahead of a busy week, **Liquid Cross Border Flows**, 4 Mar 2024

Rates, FX & EM trades for 2024

For a complete list of our open trade recommendations, as well as our trade recommendations closed over the past 12 months, see the reports below:

Global FX Weekly: The June target 08 March 2024

Global Rates Weekly: Double WAMmy 08 March 2024

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 no 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 Canadian Investment Regulatory Organization; 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 (Israel): Merrill Lynch Israel Limited, regulated by Israel Securities Authority; 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.

Futures and options are not appropriate for all investors. Such financial instruments may expire worthless. Before investing in futures or options, clients must receive the appropriate risk disclosure documents. Investment strategies explained in this report may not be appropriate at all times. Costs of such strategies do not include commission or margin expenses.

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.

Research Analysts

US

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

Paul Ciana, CMT
Technical Strategist
BofAS
+1 646 855 6007
paul.ciana@bofa.com

John Shin
FX Strategist
BofAS
+1 646 855 9342
joong.s.shin@bofa.com

Vadim Iaralov
FX Strategist
BofAS
+1 646 855 8732
vadim.iaralov@bofa.com

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

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

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

Europe

Ralf Preusser, CFA
Rates Strategist
MLI (UK)
+44 20 7995 7331
ralf.preusser@bofa.com

Ruben Segura-Cayuela
Europe Economist
BofA Europe (Madrid)
+34 91 514 3053
ruben.segura-cayuela@bofa.com

Mark Capleton
Rates Strategist
MLI (UK)
+44 20 7995 6118
mark.capleton@bofa.com

Athanasios Vamvakidis
FX Strategist
MLI (UK)
+44 020 7995 0279
athanasios.vamvakidis@bofa.com

Sphia Salim
Rates Strategist
MLI (UK)
+44 20 7996 2227
sphia.salim@bofa.com

Kamal Sharma
FX Strategist
MLI (UK)
+44 20 7996 4855
ksharma32@bofa.com

Ronald Man
Rates Strategist
MLI (UK)
+44 20 7995 1143
ronald.man@bofa.com

Michalis Rousakis
FX Strategist
MLI (UK)
+44 20 7995 0336
michalis.rousakis@bofa.com

Pac Rim

Adarsh Sinha
FX Strategist
Merrill Lynch (Hong Kong)
+852 3508 7155
adarsh.sinha@bofa.com

Janice Xue
Rates Strategist
Merrill Lynch (Hong Kong)
+852 3508 8587
janice.xue@bofa.com

Shusuke Yamada, CFA
FX/Rates Strategist
BofAS Japan
+81 3 6225 8515
shusuke.yamada@bofa.com