

Liquid Insight

ECB balance sheet update

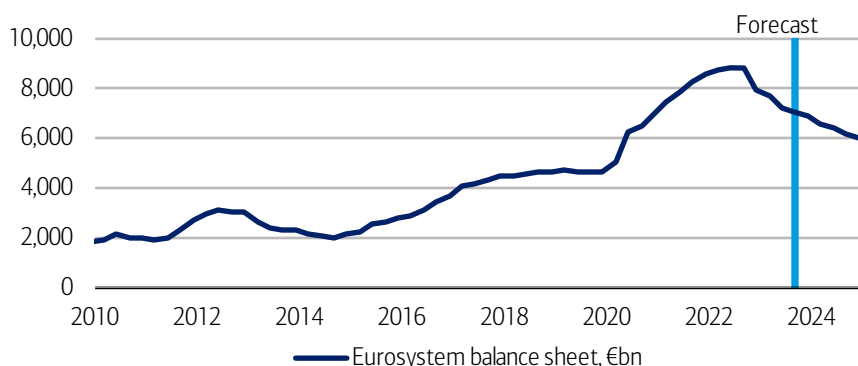
Key takeaways

- We expect the Eurosystem balance sheet to fall to €6.9trn at the end of 2023 and €6.0trn at the end of 2024
- We incorporate passive QT assumptions on PEPP in 2H2024 and remuneration changes on certain deposits
- Excess liquidity could be higher than previously expected in 2024 and is a risk to our Mar24 Euribor-€str view

By Ronald Man

Chart of the day: Eurosystem balance sheet

We forecast Eurosystem balance sheet to fall to €6trn by end-2024



Source: BofA Global Research

BofA GLOBAL RESEARCH

Shifting components

We forecast the Eurosystem's balance sheet to fall from €8.5trn at the end of 2022 to €6.9trn at end-2023 and €6.0trn at end-2024. Our forecast is based on the assumption of continued full passive quantitative tightening (QT) in the asset purchase programme (APP) portfolio and a start of partial passive QT in the pandemic emergency purchase programme (PEPP) portfolio from 2H 2024.

We also assume remuneration changes to government and non-euro area resident deposits at the Eurosystem, given the European Central Bank's (ECB) recent focus on minimising the interest it pays on its liabilities. This is likely to cause a shift among the central bank's liability components, with these deposits flowing into reserves, and consequently slow the decline in excess liquidity. While we continue to expect bank demand for reserves and term funding to sustain, upside risks to the excess liquidity profile is a risk to our Euro interbank offered rate (Euribor) vs euro-short term rate (€str) widener view.

Trading ideas and investment strategies discussed herein may give rise to significant risk and are not suitable for all investors. Investors should have experience in relevant markets and the financial resources to absorb any losses arising from applying these ideas or strategies.

BofA Securities does and seeks to do business with issuers covered in its research reports. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision.

Refer to important disclosures on page 6 to 8. Analyst Certification on page 5. 12587596

Timestamp: 03 August 2023 12:30AM EDT

03 August 2023

Rates and Currencies Research
Global

Global Rates & Currencies Research
MLI (UK)

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

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

See Team Page for List of Analysts

Liquid Insight

Recent Publications

- 2-Aug-23 [Bank of England preview: persistence vs more hikes](#)
- 1-Aug-23 [High bar for near-term FX vol spikes](#)
- 31-Jul-23 [RBA preview: one more hike, just in case](#)
- 27-Jul-23 [BoJ preview: Are we there yet?](#)
- 26-Jul-23 [ECB Preview: 25bp with little guidance](#)
- 25-Jul-23 [July FOMC: hike & seek](#)
- 24-Jul-23 [USD: Looking beyond the FOMC](#)
- 20-Jul-23 [Caution on disinflation for G10 FX](#)
- 19-Jul-23 [US liquidity drain: RRP drop defers scarcity](#)
- 18-Jul-23 [Some overshoots greater than others](#)

BofA GLOBAL RESEARCH

Assumptions

QT

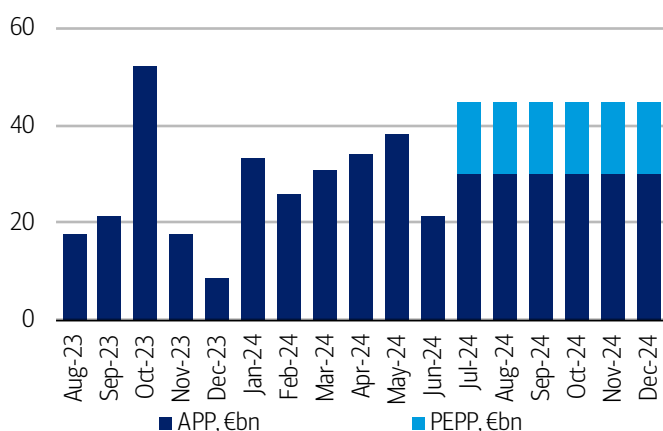
- **APP:** The ECB fully stopped reinvestments in the APP portfolio since July 2023. We use the redemption profile provided by the ECB where available, which implies on average a c. €30bn reduction in APP holdings per month. We expect this to continue in the foreseeable future.
- **PEPP:** Our economists believe it is more likely than not that passive QT in the PEPP portfolio will begin in mid-2024 (see the report [European Rates Viewpoint, 1 August 2023](#)). As with APP, we assume QT in the PEPP portfolio is progressive at 50%, which would equate to c. €15bn per month in 2H 2024 (Exhibit 1).
- **Risks are two-way.** A stronger desire to reduce losses on its balance sheet or stronger-than-expected growth and inflation outlook may bring forward even more the start of QT in the PEPP portfolio, or starting QT in the PEPP portfolio by full non-reinvestment. The risk of active QT remains low as we believe the ECB's focus on losses means it will not want to crystallise losses in its QE portfolios. Conversely, potential use of the Transmission Protection Mechanism (TPI) may temporarily increase the Eurosystem's balance sheet. A weaker-than-expected growth or inflation outlook may also cause the ECB to not bring forward the start of QT in its PEPP portfolio as we assumed in this report.

Targeted longer-term refinancing operations (TLTROs)

- We assume banks will repay 5% of outstanding TLTROs in each quarterly window above and beyond maturing TLTROs, comparable to past behaviour (Exhibit 2).
- One risk is the ECB introducing a new TLTRO programme or operations in the future.
- Another risk is punitive tiering by the ECB, which could be an option for the central bank to reduce the cost of its liabilities. This could prompt some banks to repay TLTRO borrowings voluntarily early. But the ECB would risk large distortions in the front-end rates market.

Exhibit 1: QT assumptions

We assume passive QT in PEPP begins 2H 2024

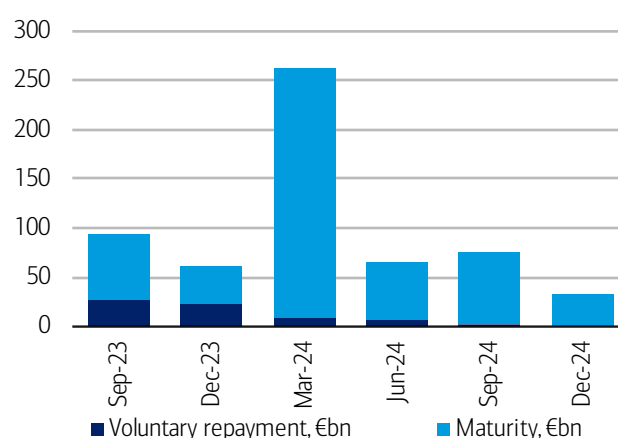


Source: BofA Global Research, ECB

BofA GLOBAL RESEARCH

Exhibit 2: TLTRO repayment expectations

The next big repayment will be in March 2024



Source: BofA Global Research, ECB

BofA GLOBAL RESEARCH

Government and non-euro resident deposits

- We believe the likelihood of the ECB setting a 0% remuneration rate, from €str minus 20bp currently, on government and non-euro area resident deposits at the central bank after its operational framework review is now very high. The operational framework is due to be concluded by the end of this year, and we assume implementation of a 0% remuneration rate will be on 1 January 2024 (Exhibit 3).
- Our assumption follows the recent change by the ECB on its remuneration on minimum reserves ([Euro Area Watch, 27 July 2023](#)). We assume government and non-euro area resident will bring down their deposits at the central bank to levels pre-June 2014, i.e. before the ECB set a negative deposit facility rate and when the remuneration rate on most government deposits was 0%. This implies government and non-euro area resident deposits will fall to c. €100bn and €50bn, respectively (Exhibit 4).
- The decline in government and non-euro area resident deposits will be reflected in an increase in reserves, which will slow the decline in excess liquidity from QT and TLTRO roll offs.
- Risks are skewed to a smaller drawdown than we assume. Governments may want to hold more absolute cash than they did at the central bank than in 2014. Some non-euro area residents may not have as large as scope to draw down their deposits at the Eurosystem to 2014 levels as before.

Currency growth

- We assume coins and banknotes will grow at 0.5% per month. This is in line with the average rate between 2017 and 2022. Excess liquidity in the euro area banking system would mechanically decrease but the Eurosystem's balance sheet size would not be impacted. One risk to our excess liquidity expectations is changes in currency growth: stronger currency growth would imply a sharper reduction in excess liquidity, and vice versa.

Exhibit 3: Remuneration on deposits at Eurosystem

We expect 0% on government and non-euro area resident deposits in 2024

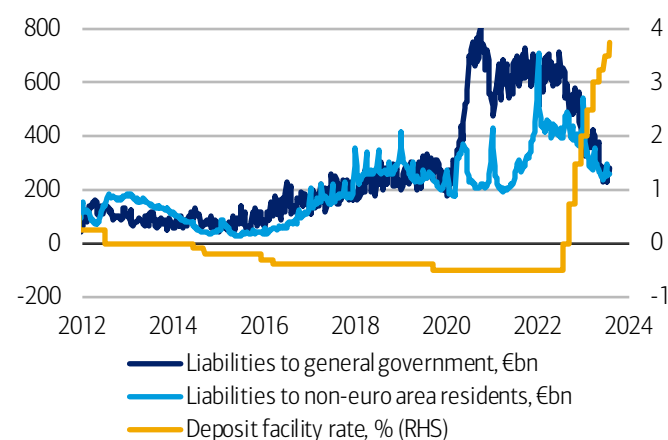
Category		Current remuneration rate	Assumptions	Latest size, €bn
Current account	Minimum reserve	Depo rate	0% from 20 Sep 23 as announced by ECB	165
	Other cash	0%	0%	9
Deposit facility		Depo rate	Depo rate	3,577
Government deposits		€str-20bp	0% from 1 Jan 24	282
Liabilities to non-euro area residents		Majority likely at €str-20bp	0% from 1 Jan 24	256

Source: BofA Global Research, ECB

BofA GLOBAL RESEARCH

Exhibit 4: Deposits at Eurosystem and the depo rate

A 0% remuneration rate could bring levels back to pre-negative rate levels



Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Market implications

Our assumptions imply the Eurosystem's balance sheet will fall from €8.0tn at the end of 2022 to €6.9tn at the end of 2023, and €6.0tn at the end of 2024. As a % of GDP, this implies the Eurosystem's balance will fall from 59% at end-2022 to 50% at end-2023, and to 41% at end-2024.

Excess liquidity is projected to fall from €3.8tn at the end of 2022 to €3.3tn at the end of 2023, and €2.7tn at the end of 2024. Our end-2024 projections increased because we now assume government and non-euro area residents will reduce their cash balance at the central bank to c. €150bn collectively from 1 January 2024. This is a risk to our [Mar24 3M Euribor futures vs €str widener recommendation](#) (current: 10bp, target: 25bp, stop: 8bp). That said, the risks to the combined €150bn government and non-euro area resident deposit balance assumption itself are skewed to the upside, which means risks to our latest excess liquidity projections are biased to the downside.

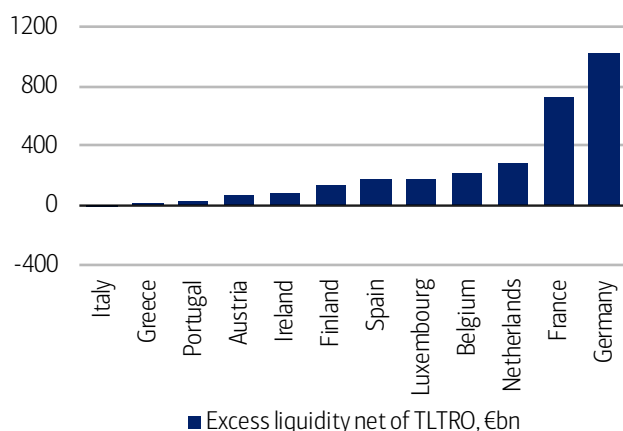
We still expect bank demand for high quality liquid assets (HQLA) to sustain as QT continues and TLTROs roll off. At the end of June 2023, banks in Italy at the aggregate level still have a c. €15bn gap between their TLTRO borrowings and excess liquidity balance (Exhibit 5). Competition for reserves is likely to sustain, especially for term deposits. Therefore term premium in bank's unsecured wholesale borrowing market is still expected to increase beyond what the market is pricing in.

For €str, we continue to expect its spread against the deposit facility rate to tighten as excess liquidity declines. We expect the €str-depo spread to be 0bp by end-2024.

For repo, we had expected general collateral (GC) rates to cheapen as the cash-rich collateral-scarce environment unwinds. Yet the recent magnitude of cheapening has been stronger than what we had expected. Germany and France one-day GC vs €str spreads has been consistently positive for most of July. The positive spread itself suggests that the recent repo cheapening may be driven more by more collateral availability than cash scarcity. We now expect Germany one-day GC vs €str to be 2bp by end-2023. For Germany one-day SC vs GC, we assume long positioning may scale back slightly from multiyear highs, as measured by our [FX & Rates Sentiment Survey](#) (Exhibit 6). We expect the SC vs GC spread to be -15bp by end-2023.

Exhibit 5: Excess liquidity net of TLTRO by country

Banks in Italy face an aggregate gap of € -15bn in June 2023

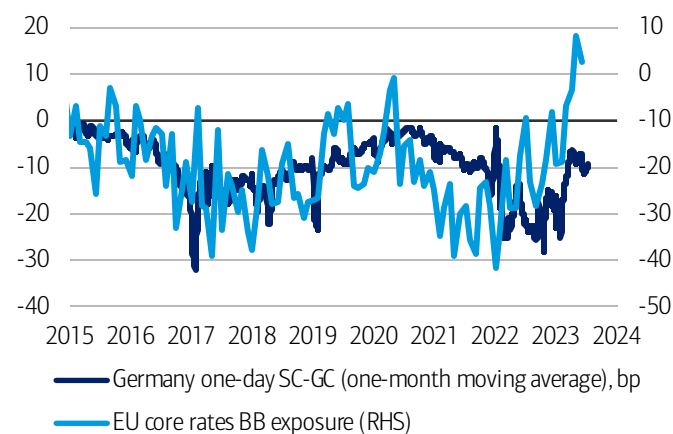


Source: BofA Global Research, ECB

BofA GLOBAL RESEARCH

Exhibit 6: Germany one-day SC vs GC and positioning

Less long positioning could widen SC-GC spreads.



Source: BofA Global Research FX & Rates Sentiment Survey, Bloomberg, CME Group

BofA GLOBAL RESEARCH

Notable Rates and FX Research

- **Global Rates, FX & EM Year Ahead 2023** – [Year Ahead 2023: Pivot ≠ Peak](#), 20 Nov 2022
- [Don't underestimate central bank commitment to 2% inflation](#) **Global FX Weekly**, 28 July 2023
- [Goldilocks and the 3 banks](#) **Global Rates Weekly**, 28 July 2023
- [Ahead of major central bank meetings](#), **Liquid Cross Border Flows**, 24 July 2023

Rates, FX & EM trades for 2023

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: Don't underestimate central bank commitment to 2% inflation 28 July 2023](#)

[Global Rates Weekly: Goldilocks and the 3 banks 28 July 2023](#)

Analyst Certification

I, Ronald Man, 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 BofA 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.bofam.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 (HKSF); 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 (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 HKSF; 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:

Copyright 2023 Bank of America Corporation. All rights reserved. iQDatabase® is a registered service mark of Bank of America Corporation. This information is prepared for the use of BofA Securities clients and may not be redistributed, retransmitted or disclosed, in whole or in part, or in any form or manner, without the express written consent of BofA Securities. BofA Global Research information is distributed simultaneously to internal and client websites and other portals by BofA Securities and is not publicly-available material. Any unauthorized use or disclosure is prohibited. Receipt and review of this information constitutes your agreement not to redistribute, retransmit, or disclose to others the contents, opinions, conclusion, or information contained herein (including any investment recommendations, estimates or price targets) without first obtaining express permission from an authorized officer of BofA Securities.

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 or 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

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

Trading ideas and investment strategies discussed herein may give rise to significant risk and are not suitable for all investors. Investors should have experience in relevant markets and the financial resources to absorb any losses arising from applying these ideas or strategies.

