

UK Watch

Bank of England Review: another hike

One more hike and one fewer cut

In response to more hawkish than expected forecasts from the Bank of England (BoE) today we change our call. We now expect a 25bp Bank Rate hike in June to 4.75% terminal, compared to our call of no more hikes previously and 4.5% terminal. We expect one 25bp rate cut in 2024, in 3Q, compared to two previously (in 1Q and 3Q). This raises our end-2024 Bank Rate forecast to 4.5% from 4.0%.

We have low conviction on the timing and level of terminal. The BoE's guidance today could be consistent with no more hikes in our view, and / or could also be consistent with skipping the June meeting and hiking in August. The BoE left all their options open.

Big picture, however, in our view the UK has probably the biggest persistent inflation problem among developed market economies (e.g. [Global Economic Weekly: Inflating worries 17 February 2023](#)). So we had argued it was a close call whether the BoE would stop at 4.5% or hike further. We also expected fewer rate cuts than the market and thought the risks were skewed to even less. The BoE will, in our view, cut slower than other developed market central banks.

In-line decision, hawkish forecasts, unchanged guidance

BoE rate setters today voted 7-2 to hike Bank Rate 25bp to 4.5%. That was in-line with consensus and our expectations. Dhingra and Tenreyro dissented as expected, preferring to keep rates on hold. There is an open question in our view whether Tenreyro will vote for a rate cut in her final policy meeting in June given she has voted against hikes since Bank Rate reached 3.0%.

The BoE's forecasts were surprising hawkish today. They raised their 1-year, 2-year and 3-year ahead mean inflation forecasts 2.3ppt, 0.5ppt and 0.9ppt respectively. The BoE expects CPI inflation still double its 2% target in a year's time. These were larger upward revisions than we were expecting. Assuming Bank Rate follows the market path from a week ago, which peaked above 4.75%, the BoE expects inflation of 2% in 3-years time and 1.9% in 2-years time. Their mean forecasts broadly validate the market curve.

The BoE's guidance was unchanged. They continue to suggest they need upside data surprises in order to hike further, saying "If there were to be evidence of more persistent pressures, then further tightening in monetary policy would be required.". That said, our proprietary BoE Mood indicator, a hawkishness score for the minutes, rose to its most hawkish since June last year. Although that is hard to interpret because the BoE shortened the minutes significantly this month creating a structural break in our Mood indicator.

(Continued on next page.)

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.

>> Employed by a non-US affiliate of BofAS and is not registered/qualified as a research analyst under the FINRA rules.

Refer to "Other Important Disclosures" for information on certain BofA Securities entities that take responsibility for the information herein in particular jurisdictions.

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 5 to 7.

12558178

Timestamp: 11 May 2023 11:38AM EDT

11 May 2023

Macro
United Kingdom

Robert Wood
UK Economist
MLI (UK)
+44 20 7996 7415
robert.d.wood@bofa.com

Agne Stengeryte
Rates Strategist
MLI (UK)
+44 75 41694477
agne.stengeryte@bofa.com

Mark Capleton
Rates Strategist
MLI (UK)
mark.capleton@bofa.com

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

Kate Pavlovich >>
Data Science Rsch Analyst
MLI (UK)
+44 20 7996 7726
kate.pavlovich@bofa.com

The tension: guidance vs. forecasts

There is a tension between the BoE's forecasts seeming to validate the market curve and guidance that suggests the BoE will pause unless it sees upside surprises. This in our view makes the BoE outlook hard to read. This tension is hard to resolve because several rate setters speak infrequently, so we find it hard to judge how they individually interpret the data. And the BoE does not offer insight into its thinking on monetary strategy i.e. whether the appropriate policy is more hikes and more cuts, or fewer hikes but holding at terminal for longer.

In our view the tension is explained by the gap between the BoE's mode and mean forecasts. The BoE's view on the most likely single outcome is that inflation will undershoot the target markedly if interest rates follow the market curve. But they see large upside risks to that central case, so their mean forecast is for inflation close to target. Policy should respond to the mean – taking account of the balance of risks. But equally that means the BoE has to continually see hawkish data relative to its central case in order to conclude the upside risks are materialising and therefore justify further hikes. BoE rate setters may also have different strategies in mind.

One can easily disagree about the BoE's medium-term forecasts. Differences in opinion on persistence can drive large differences in medium term forecasts. But in the short-term the BoE's forecasts do not look to us obviously dovish. We see upside and downside risks to their inflation and wage calls for the next few months. This means we tend to see the BoE as close to pausing, given its guidance. That is why we expected 4.5% terminal before today, and continue to think a hike in June is a close call.

That said, raising inflation forecasts as much as the BoE did today would not be what we would expect from a central bank about to pause hikes. It would be an odd signal to raise inflation 50bp at the policy relevant horizon as a signal of an imminent pause.

BoE speakers may resolve some of this tension in coming weeks, but we think that is more hope than expectation. In the absence of any further information we assume one more 25bp hike in June, with low conviction. The BoE could skip June and hike in August, for instance, returning to a quarterly hiking schedule. Or it could pause here and hold at terminal for longer. Really, all options are left open. Our interpretation is consistent with a market that priced the terminal rate little changed after the Bank of England press conference, when Bailey emphasised the guidance, retracing an initial spike on the forecast change headlines (more detail in rates section below).

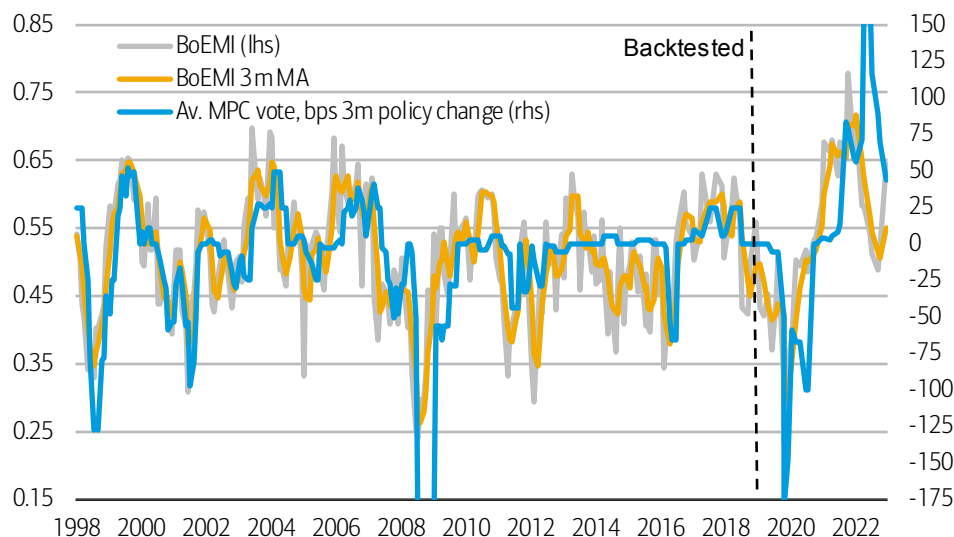
BoE expects very soft landing

The big picture from the BoE's forecasts, in our view, is that they now expect a very soft landing. No recession, annualised growth close to potential from mid-2023, unemployment peaking at 4.5% and inflation falls 900bp from its peak to a low point 20bp below the 2% target. This can add up of course. The BoE thinks the inflation neutral unemployment rate is in the low 4s, so 4.5% would imply some small degree of slack. The BoE argues that its models suggest almost all of the acceleration in wage growth is a response to spot inflation, so wage growth will drop back sharply as headline inflation drops.

The economic scenario hangs together, but we would argue it is optimistic. The UK has experienced the greatest acceleration in wage growth and the strongest evidence, in our view, of inflation expectations deanchoring modestly to the upside. We think the UK has an inflation persistence problem. We have therefore been arguing the risks of fewer rate cuts than the two we expect in 2024. With the BoE also potentially pausing at a lower terminal than the market to hold there for longer, we take the opportunity to remove a cut from 2024. We now expect one cut only, in 3Q 2024. In sum we raise our end-2024 Bank Rate forecast to 4.5% from 4.0%.

Exhibit 1: BofA Bank of England Mood Indicator

Much more hawkish BoE



BofA Global Research, Bank of England. BoEMI is scaled from 0 to 1, and reflects the proportion of 'hawkish' sentences in the minutes of the BoE's monetary policy meeting. A score of 0.5, for instance, means half of the sentences were hawkish. The indicator identified as BoEMI is intended to be an indicative metric only and may not be used for reference purposes or as a measure of performance for any financial instrument or contract, or otherwise relied upon by third parties for any other purpose, without the prior written consent of BofA Global Research. This economic indicator was not created to act as a benchmark. This performance is back-tested and does not represent the actual performance of any account or fund. Back-tested performance depicts the theoretical (not actual) performance of a particular strategy over the time period indicated. No representation is being made that any actual portfolio is likely to have achieved returns similar to those shown herein.

BofA GLOBAL RESEARCH

The analysis of Bank of England Mood Indicator (BoEMI) in this report is back-tested and does not represent the actual performance of any account or fund. Back-tested performance depicts the hypothetical back-tested performance of a particular strategy over the time period indicated. In future periods, market and economic conditions will differ and the same strategy will not necessarily produce the same results. No representation is being made that any actual portfolio is likely to have achieved returns similar to those shown herein. In fact, there are frequently sharp differences between back-tested returns and the actual results realized in the actual management of a portfolio. Back-tested performance results are created by applying an investment strategy or methodology to historical data and attempts to give an indication as to how a strategy might have performed during a certain period in the past if the product had been in existence during such time. Back-tested results have inherent limitations including the fact that they are calculated with the full benefit of hindsight, which allows the security selection methodology to be adjusted to maximize the returns. Further, the results shown do not reflect actual trading or the impact that material economic and market factors might have had on a portfolio manager's decision-making under actual circumstances. Back-tested returns do not reflect advisory fees, trading costs, or other fees or expenses.

Rates: firmer forward real rates required

The UK rates market initially read the BoE's new forecasts as suggesting more rate hikes, increasing the cumulative rate hike pricing to over 45bp after the May meeting. But this hawkish interpretation was revised softer during the press conference.

At the time of writing, the market is pricing 42bp of additional Bank rate hikes after today's meeting, more than our call for additional 25bp in June, but not enough to enter an opposing position, we think.

The UK is likely facing the most severe persistent inflation problem among developed market economies, and this means (in our view) that the BoE is likely to cut later and

slower than other central banks. We therefore see market pricing of Bank rate cuts after the September MPC meeting as more inconsistent with our latest views.

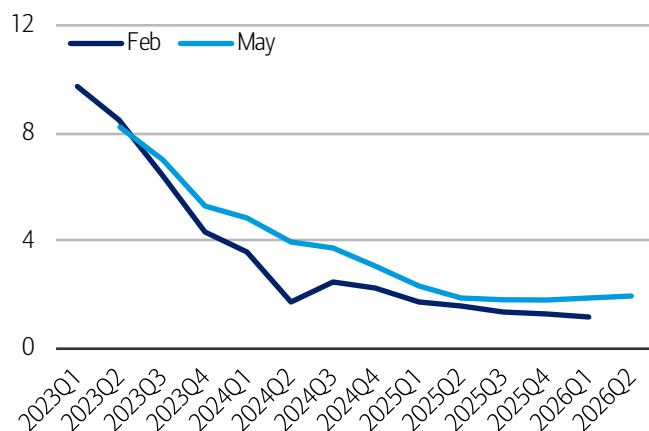
Further out, the 2s10s curves flattened on the back of midday announcement, unwinding some of the move during the press conference. Flattening pressures resumed later in the session. Our expectation for an additional Bank rate hike in June and a delay to BoE cuts towards year-end is in line with the price action.

The problem with seeking out inflation persistence trade opportunities is that a material inflation overshoot is already priced into the RPI curve. We therefore see the better plays being in the real yield curve - an inflation overshoot is priced, but not the required tightness in (real) policy rates to tackle it, we would argue. Cash-for-cash shortening trades between shorter-dated linkers would be our preferred way of expressing this theme.

The BoE seems to have shifted somewhat towards acceptance of this inflation persistence threat, judging by the dramatic change in its inflation since the February MPR, as shown in Exhibit 2 and Exhibit 3.

Exhibit 2: BoE forecast inflation paths in February and now, %

Inflation persistence seen as a bigger problem now than 3 months ago.

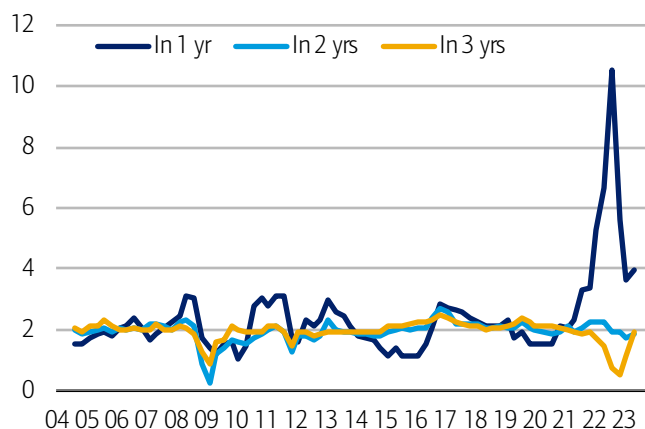


Source: Bank of England

BofA GLOBAL RESEARCH

Exhibit 3: BoE forecasts to different horizons, %

Expected target undershoot at three year horizon has disappeared.



Source: Bank of England

BofA GLOBAL RESEARCH

GBP – BoE unlikely to be of much help near term

We think the BoE is unlikely to offer much help to GBP in the near term, particularly vs. EUR, given the market is pricing a higher terminal rate for the BoE vs. our baseline, but a lower one for the ECB. This is not to say monetary policy cannot help GBP later in the year—our economists expect fewer rate cuts from the BoE than from the ECB next year, whereas markets are pricing a more symmetric stance. Ultimately, this will depend on how sticky inflation proves and why: inflation persistence on idiosyncratic issues around the supply side of the UK labour market (as our economists have highlighted) won't probably help GBP much. But inflation persistence on an improved outlook—much as in recent months—could help GBP, risk-sentiment permitting. We would flag we now find the investor EURGBP positioning neutral vs. long at the start of the year, with this change driven primarily by Hedge Funds.

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.

Individuals identified as economists do not function as research analysts under U.S. law and reports prepared by them are not research reports under applicable U.S. rules and regulations.

Macroeconomic analysis is considered investment research for purposes of distribution in the U.K. under the rules of the Financial Conduct Authority.

Refer to [BofA Global Research policies relating to conflicts of interest](#).

"BofA Securities" includes BofA Securities, Inc. ("BofA") 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:

BofA 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; BofA 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; BofA 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 BofA 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 BofA 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 BofA 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. BofA 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.