

European Rates Watch

Dutch Pension Fund indexation & market impact

Pension indexations in Jan-23 supported 10s30s flattening

In Q4 last year, Dutch Pension Funds announced large indexations of pensions for Jan23. This mattered for the EUR curve as it drove funds to receive rates and buy bonds in the long end. As outlined early December (see <u>liquid insight 8-Dec-22</u>), the link between the two comes from the fact that indexation increases the notional of all liabilities, and thereby mechanically lowers the interest rate hedge. In the context of the transition to a new Defined Contribution (DC) system, and with consensus geared towards lower rates in coming years, it was natural to assume funds would try to counteract this reduction in their interest rate hedge. To offset the impact of Jan-23 indexation on their rate hedge ratios, we estimated that the top 5 funds would need to receive €50mln/01 in rates.

We are monitoring indexation news again...

Since March, Dutch pension funds' activity in swaps appears to have been limited, with 10s30s steepening more than implied by 2s10s and vol in Mar-May (Exhibit 1). Quarterend related receiving may now be ongoing, but eyes are on potential indexation news that could generate larger receiving needs. Last year, a number of funds had indexed in July or October already. Some can index pensions more than once a year and quickly made use of the temporary reduction in the threshold for indexation (min policy funding ratio of 105% instead of 110%, from 1-Jul-22 - Exhibit 4). The next key indexation date is Jan-24, but we cannot rule out intermediary indexation again. Dutch inflation is still running high (5.8% in May) and Minister Schouten announced last week that the period of lower indexation threshold would be extended from mid to end of 2023, with funds no longer required to give a bridging plan by Sep 1st for DC transition to benefit from this.

... but acknowledge 5 reasons why impact could be smaller

The impact of the next indexation rounds on the EUR 10s30s swaps curve is likely to be smaller than what was observed in Dec-22 to Feb-23. There are five reasons for that: (1) inflation is lower, (2) funding ratios are lower, (3) interest rate hedge ratios are higher, (4) more of the duration increase could be done in bonds, and (5) more of the receiving could happen in the belly of the curve rather than the long end, to prepare for the impact of the transition to DC. Exhibit 5 shows the amount of receiving that may be required under different indexation scenarios to maintain stable interest rate hedges.

Three takeaways on curve, swap spreads and swaptions

Given the above, we believe that the dynamic of the 10s30s swaps curve can remain driven by the 10y, with scope for bear flattening near term, and then bull steepening (Exhibit 9). In bonds, the bull steepening could be more limited as demand for long-dated bonds stays strong in the rally. This also supports a richening of Buxl vs Bunds on ASW. PFs could turn to buying OTM receivers in long tails, richening these vols, as a trade-off between having to hedge against lower long-end rates ahead of the transition to DC, and avoiding a long-end swaps position that may be redundant post transition.

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 7. Analyst Certification on page 5.

Timestamp: 30 June 2023 01:35AM EDT

30 June 2023

Rates Research Europe

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

PF: Pension Funds

ASW: asset swap

OTM: out of the money

DC: defined contribution

The March rally, which was followed by rangebound rates and uncertainty around the pension reform (with the law only just passed in May) may have contributed to limited receiving activity from Dutch Pensions since March. The 10s30s and 30s50s curves look c.6-7bp too steep relative to what their relationship vs 2s10s and vol would imply.

Exhibit 1: 10s30s and fair value based on relationship vs vol & 2s10s Fair value for 10s30s curve is around -53bp, ie. 6bp flatter than market level.



Exhibit 2: Residual of 10s30s and 30s50s vs 2s10s & implied vol Pension flows could have contributed to the excessive 15bp (and 10bp) in 10s30s and 30s50s flattening resp. late 2022. Now curves too steep.



Source: BofA Global Research.

BofA GLOBAL RESEARCH

More on 5 reasons why indexation impact could be smaller

The impact of the next indexation rounds on the EUR 10s30s swaps curve is likely to be smaller than what was observed in 4Q22-1Q23. Here are more details on the 5 reasons:

- 1. Inflation over Jul-22 to Jul-23 (most common reference period) is likely to be much lower than the 12.4% registered over Jul-21 to Jul-22. Also, funds had more catch-up to do last year following years of close to 0% indexation (Exhibit 3).
- 2. Funding ratios have declined due to the Jan-23 indexation (Exhibit 4), reducing somewhat the room for additional large indexation, especially as funds look to keep buffers for the transition to DC. In Exhibit 5, we examine different indexation scenarios and estimate the receiving needs they would create if funds wanted to maintain their interest rate hedge ratios at 1Q23 levels. With 2% indexation, receiving needs could be limited to €15mln/01, while full indexation based on latest inflation print would imply over €40mln/01 of receiving needs.

Exhibit 3: Average Dutch pension indexation for active PF members Average indexation hovered around 0% for more than a decade

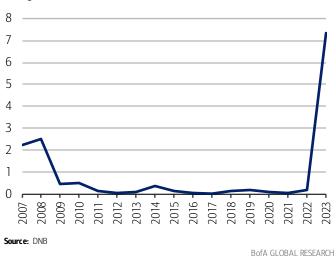
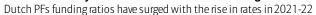
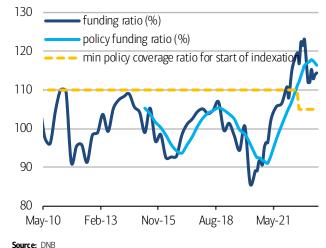


Exhibit 4: Industry Wide Dutch Pension Funds' funding ratios





BofA GLOBAL RESEARCH

3. In 4Q22-1Q23, most funds didn't just offset the impact of indexation on their interest rate hedge ratios, they went beyond and increased their hedges (Exhibit 6). One could interpret this as a general trend that can extend, given the risks posed by lower rates in coming years. But it could also mean, on the other hand, that they are able to tolerate some decline in the hedge ratios due to indexation.

Exhibit 5: Amount of receiving in mln/01 needed for Dutch PFs to offset impact of indexation on rate hedge ratios (BofA estimates)

We look at 3 indexation scenarios; consider top 5 & top 10 Dutch PF groups

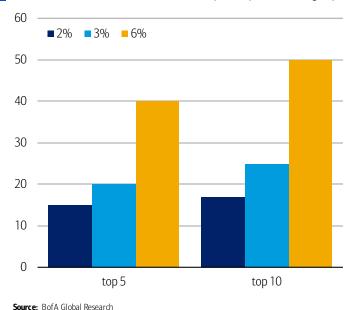
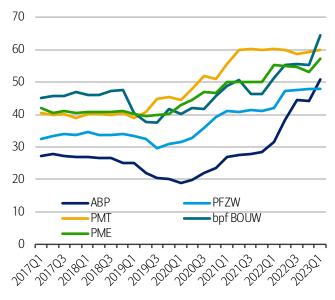


Exhibit 6: Actual hedging of interest risk, for top 5 largest Dutch PFs Funds have increased their hedge ratios again in 1Q23



Source: DNB, BofA Global Research

BofA GLOBAL RESEARCH

More of the duration buying could be done in bonds rather than swaps, as risks around margin requirements are in focus, given the negative valuations on interest rate derivative positions (Exhibit 7). We have already seen increased PF interest in Euro government bond syndications this year relative to prior ones (Exhibit 8).

BofA GLOBAL RESEARCH

More receiving could be done in shorter maturities, rather than in the 30y+ as funds prepare for the pension reform leading to less receiving needs at long maturities.

Exhibit 7: Market value of Dutch PF interest rates derivatives positions Value of IR derivatives positions in deeply negative territory post rates selloff

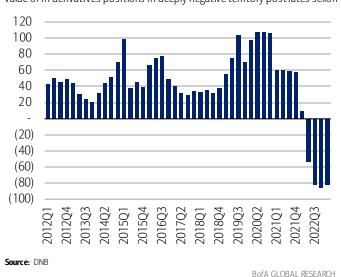
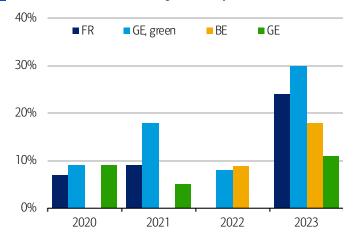


Exhibit 8: Allocation to pension funds (*) at 30y syndications

Pension funds' have absorbed a larger share of syndications in 2023.



Source: debt agencies, BofA Global Research. (*) for German green and conventional syndications, allocation percentages are for Pensions & insurers together.

BofA GLOBAL RESEARCH

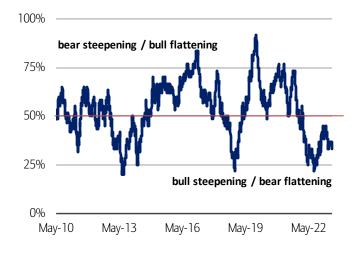


Three takeaways on curve, swap spreads and swaptions

Taking on board the five factors below, we would highlight 3 market implications:

- 1. The dynamic of the 10s30s swaps curve can remain driven by the 10y (Exhibit 9), with scope for bear flattening near term (especially as 10s30s look too steep vs 2s10s and vol), and then bull steepening when the rally asserts itself.
- 2. In bonds, the bull steepening could be more limited as demand for long-dated bonds remains strong in the rally. We find it particularly interesting that the German Finanzagentur's Q3 funding update includes a net reduction in bond and bill supply, but an increase in 30y issuance (see European Rates Watch). We believe it is likely to be a reflection of the higher investor demand in that sector. This points to potential for a richening of Buxl vs Bunds on ASW. The relationship between the two has been very stable in Q2, possibly on limited swaps flows, however we see scope for Buxl to trade on a structurally richer level vs Bunds ASW, as was the case pre 2022 (Exhibit 10). Besides long end bond demand by PFs, we could see: (a) greater demand from insurers as well, (b) reduced paying flows in the 10y when the rally asserts itself, and (3) more swapped financial corporate issuance, putting greater tightening pressure on 10y spreads.
- 3. As funds consider the trade-off between adding swap hedges against lower longend rates ahead of the transition to DC (to protect funding ratios), and the risk of having to close them post transition under unfavorable conditions (reduced liquidity, same-way market), they could turn to buying OTM receivers in long tails, richening vol in 30y tails vs 10y tails. As the curve dynamic would point otherwise (with 10y rates being more volatile), a more immediate vol expression of this potential PF demand could be a calendar spread: short 6m-1y expiries vs 2-3y ones in 30y tails.

Exhibit 9: % of 10s30s moves driven by the back-end over 3m Since 2022, moves in the 10s30s curve has been mostly led by the 10y.

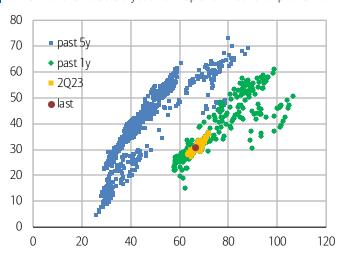


Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 10: Buxl vs Bund Euribor asset swaps

The relationship between the two has been very linear in 2Q23, with scope for Buxl to richen structurally back to the pre 2022 relationship vs Bunds



Source: Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Options Risk Statement

Potential Risk at Expiry & Options Limited Duration Risk
Unlike owning or shorting a stock, employing any listed options strategy is by
definition governed by a finite duration. The most severe risks associated with
general options trading are total loss of capital invested and
delivery/assignment risk... all of which can occur in a short period.



Investor suitability

The use of standardized options and other related derivatives instruments are considered unsuitable for many investors. Investors considering such strategies are encouraged to become familiar with the "Characteristics and Risks of Standardized Options" (an OCC authored white paper on options risks). U.S. investors should consult with a FINRA Registered Options Principal.

For detailed information regarding the risks involved with investing in listed options: http://www.theocc.com/about/publications/character-risks.jsp

Analyst Certification

I, Sphia Salim, 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

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 Prudential 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 (Australia): Merrill Lynch (Hong Kong): Merrill (H (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): Merrill Lynch (Canada): Merrill Lynch (Mexico): Merrill Lynch (Mexico): Merrill Lynch (Mexico) (Mexico): Merrill Lynch (Mexico): Mexico (Mexico): Mexico (Mexico): Mexico (Mexico): Mexico (Me 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): Merrill Lynch (Israel): Merrill Lynch (Israel) (Imited, 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 in Germany and is regulated by BaFin, the ECB and the CBI. BofA Securit

This information has been prepared and issued by BofAS and/or one or more of its non-US affiliates. The author(s) of this information may not be licensed to carry on regulated activities in your jurisdiction and, if not licensed, do not hold themselves out as being able to do so. BofAS and/or MLPF&S is the distributor of this information in the US and accepts full responsibility for information distributed to BofAS and/or MLPF&S clients in the US by its non-US affiliates. Any US person receiving this information and wishing to effect any transaction in any security



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

General Investment Related Disclosures:

Taiwan Readers: Neither the information nor any opinion expressed herein constitutes an offer or a solicitation of an offer to transact in any securities or other financial instrument. No part of this report may be used or reproduced or quoted in any manner whatsoever in Taiwan by the press or any other person without the express written consent of BofA Securities. This document provides general information only, and has been prepared for, and is intended for general distribution to, BofA Securities clients. Neither the information nor any opinion expressed constitutes an offer or an invitation to make an offer, to buy or sell any securities or other financial instrument or any derivative related to such securities or instruments (e.g., options, futures, warrants, and contracts for differences). This document is not intended to provide personal investment advice and it does not take into account the specific investment objectives, financial situation and the particular needs of, and is not directed to, any specific person(s). This document and its content do not constitute, and should not be considered to constitute, investment advice for purposes of ERISA, the US tax code, the Investment Advisers Act or otherwise. Investors should seek financial advice regarding the appropriateness of investing in financial instruments and implementing investment strategies discussed or recommended in this document and should understand that statements regarding future prospects may not be realized. Any decision to purchase or subscribe for securities in any offering must be based solely on existing public information on such security or the information in the prospectus or other offering document issued in connection with such offering, and not on this document.

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

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

This report may contain a trading idea or recommendation which highlights a specific identified near-term catalyst or event impacting a security, issuer, industry sector or the market generally that presents a transaction opportunity, but does not have any impact on the analyst's particular "Overweight" or "Underweight" rating (which is based on a three month trade horizon). Trading ideas and recommendations may differ directionally from the analyst's rating on a security or issuer because they reflect the impact of a near-term catalyst or event. Foreign currency rates of exchange may adversely affect the value, price or income of any security or financial instrument mentioned in this report. Investors in such securities and instruments effectively assume currency risk.

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

BofA Securities, through business units other than BofA Global Research, may have issued and may in the future issue trading ideas or recommendations that are inconsistent with, and reach different conclusions from, the information presented herein. Such ideas or recommendations may reflect different time frames, assumptions, views and analytical methods of the persons who prepared them, and BofA Securities is under no obligation to ensure that such other trading ideas or recommendations are brought to the attention of any recipient of this information. In the event that the recipient received this information pursuant to a contract between the recipient and BofAS for the provision of research services for a separate fee, and in connection therewith BofAS may be deemed to be acting as an investment adviser, such status relates, if at all, solely to the person with whom BofAS has contracted directly and does not extend beyond the delivery of this report (unless otherwise agreed specifically in writing by BofAS). If such recipient uses the services of BofAS in connection with the sale or purchase of a security referred to herein, BofAS may act as principal for its own account or as agent for another person. BofAS is and continues to act solely as a broker-dealer in connection with the execution of any transactions, including transactions in any securities referred to herein.

Copyright and General Information:

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 inform

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

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

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

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

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

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

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

