

## Japan Watch

## December CPI: Lull to continue; adjusting our forecasts

**December CPI: Limited price changes on a sequential basis**

The December Tokyo CPI report showed Japan-style core inflation (ex. fresh food) slowing slightly to +2.1% YoY (+2.3% in November) and the Bank of Japan (BoJ) core measure (ex. fresh food and energy) falling to +3.5% (+3.6%), in line with the consensus (Exhibit 4). Both measures remained above 2% on a MoM annualized basis (Exhibit 5), but YoY growth slowed again due to unfavorable base effects.

As per the last few months, food prices were the main factor behind the slowdown in inflation. The CPI for non-perishable food and dining services were both flat MoM but slowed to +6.0% and +4.3% YoY, (+6.4% and +5.0% in November), in a pullback from the sharp rise in 2H CY22 (Exhibit 7). Together, these components depressed YoY BoJ core inflation by 0.13ppt. Similarly, the CPI for hotel charges depressed YoY BoJ core inflation by another 0.03ppts, again due largely to unfavorable base effects.

Elsewhere, the energy CPI slowed further to -18.8% YoY (from -16.7% in November), but durables and semi-durables (apparel, etc.) were broadly flat. Overall, price changes in December were very limited on a sequential basis, as we expected.

**Inflation to be sustained despite near-term lull**

Prices are likely to remain static for a wide range of items in the near-term, in line with our expectation. The upshot is that YoY CPI inflation will likely slow sharply, due to the tough comparison base established by last year's price hikes.

The most recent Teikoku Databank survey also confirms that price hikes by food manufactures will likely remain minimal for the remainder of the fiscal year (Exhibit 9). Outside of food, some corporates have already announced price hikes for some non-food items at the start of the new fiscal year in April. But this is consistent with our view that we are unlikely to get major movements in the CPI at least until then (Exhibit 10).

Having said this, while imported cost pressures are easing, many corporates have yet to fully reflect the increase in costs—particularly labor costs—onto prices. Moreover, we expect labor costs to continue rising, reflecting tailwinds from the FY24 Shunto negotiations. We therefore expect annualized inflation to remain above 2%.

In the near-term, we'll be focusing on the extent of price hikes at the start of the new fiscal year, starting in April 2024.

**Forecast update: Cut Japan-style core on falling energy prices; ex-energy core largely unchanged**

Finally, we take the opportunity to update our inflation forecasts based on recent data, our strategists' latest commodity price estimates, and forex forecasts.

The BoJ core CPI excluding energy is broadly in line with our previous forecasts, and we make only minor tweaks to reflect changes to our USD/JPY assumptions (Exhibit 1; see [Stars aligning for sustained 2% inflation](#), 29 September 2023). We continue to think the BoJ and consensus are under-estimating domestic inflationary pressures, and expect the BoJ core CPI to remain above 2% through 2024-2025 (we forecast average annual inflation of +2.5% in CY24 and +2.0% in CY25). (continued overleaf).

09 January 2024

Economics  
Japan

**Takayasu Kudo**  
Japan and Asia Economist  
BofAS Japan  
+81 3 6225 8592  
[takayasu.kudo@bofa.com](mailto:takayasu.kudo@bofa.com)

**Izumi Devalier**  
Japan and Asia Economist  
BofAS Japan  
+81 3 6225 6257  
[izumi.devalier@bofa.com](mailto:izumi.devalier@bofa.com)

**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.**

12643211

Timestamp: 08 January 2024 11:54PM EST

However, we sharply reduce our energy CPI forecasts to reflect the extension of government subsidies (Exhibit 11; policies extended from end-December 2023 to end-April 2024) and cuts to our strategy team's USD/JPY and commodity price forecasts (see [World at a Glance: Kickoff for the new year](#), 4 January 2024 for our FX forecasts and [Global Energy Weekly, 7 January 2024](#) for commodity price forecasts). As a result, we lower our CY24 average Japan-style core CPI forecast (including energy) to +2.5% YoY, from +3.2% previously.

Our Japan-style core CPI estimate is below the BoJ's most recent forecast (as of October 2023). But given that the BoJ policy board likely did not factor in the government's subsequent decision to extend energy subsidies, we think the BoJ will also revise down its FY24 Japan-style core CPI projections in its next Outlook Report, due at the 23 January monetary policy meeting (MPM).

We also see considerable risk of a further extension to energy subsidies beyond the end-April deadline that our new inflation forecasts assume, implying that risks to our Japan-style core CPI forecasts from May are skewed to the downside.

### Exhibit 1: BofA / BoJ / market consensus CPI forecasts

We continue to think the BoJ and consensus are under-estimating domestic inflationary pressures

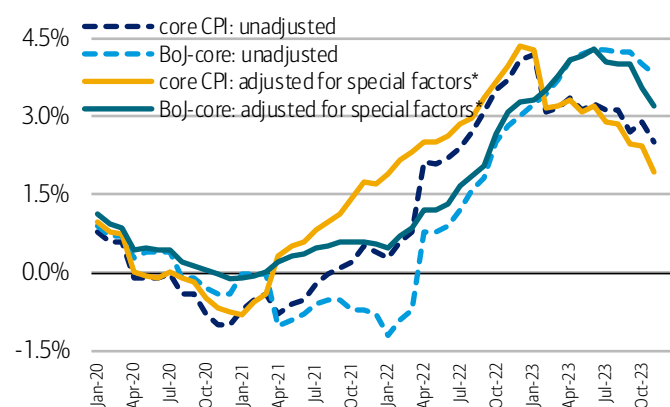
	Japan-style core CPI*				BoJ-style core CPI**			
	BoJ forecasts	BBG consensus	BofA forecasts		BoJ forecasts	BBG consensus	BofA forecasts	
	(31 Oct)	(14 Dec)	New (9 Jan)	Old (29 Sep)	(31 Oct)	(14 Dec)	New (9 Jan)	Old (29 Sep)
Calendar Year								
2023	-	3.1	3.1	3.1	-	4.0	3.9	3.9
2024	-	2.2	2.5	3.2	-	2.1	2.5	2.6
2025	-	1.6	1.9	1.8	-	1.6	2.0	2.1
Fiscal Year								
2023	2.8	2.9	2.8	3.0	3.8	3.9	3.9	3.9
2024	2.8	2.2	2.4	2.8	1.9	2.0	2.2	2.3
2025	1.7	1.6	1.8	1.7	1.9	1.8	1.9	2.0

Source: BofA Global Research, BoJ \*excluding fresh food \*\*excluding fresh food and energy

BofA GLOBAL RESEARCH

### Exhibit 2: Japan's core inflation measures (yoy%, nationwide CPI)

CPI yoy growth has peaked out

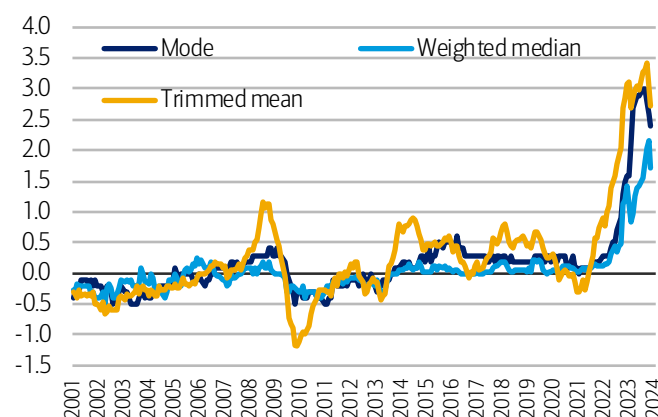


Source: BofA Global Research, Ministry of Internal Affairs and Communications MIAC \*hotel fees and mobile phone service charges

BofA GLOBAL RESEARCH

### Exhibit 3: BoJ's measures of underlying inflation (%)

All the three indicators finally reached 2%

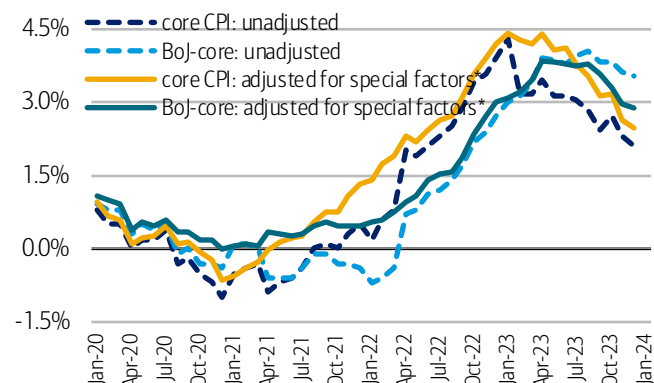


Source: BofA グローバルリサーチ、日本銀行

BofA GLOBAL RESEARCH

**Exhibit 4: Japan's core inflation measures (yoy%, Tokyo CPI)**

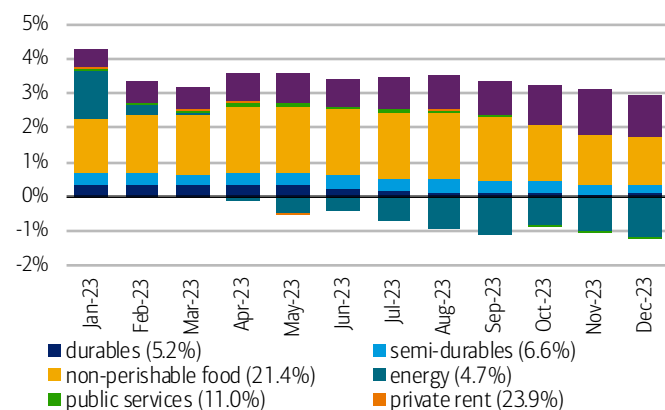
CPI yoy growth has peaked out



Source: BofA Global Research, MIAC \*hotel fees and mobile phone service charges  
BofA GLOBAL RESEARCH

**Exhibit 6: Tokyo CPI: contributions to core CPI (ppt to YoY%)**

Main driver of inflation shifting from imported goods to services



Source: BofA Global Research, MIAC

BofA GLOBAL RESEARCH

**Exhibit 8: Tokyo CPI (December 2023)**

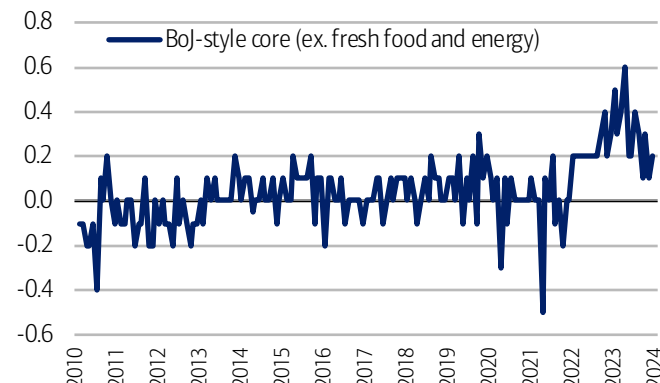
Japan's "supercore" services inflation remained firm at +6.1% YoY

	CPI weights	yoy%
Headline	100.0%	2.4%
Fresh food	3.9%	9.6%
Japan-style core CPI (ex fresh food)	96.2%	2.1%
Energy	4.7%	-18.8%
BoJ-style core CPI (ex fresh food & energy)	91.5%	3.5%
non-perishable food	21.4%	6.0%
US-style core CPI (ex food ex alcohol & energy)	71.1%	2.7%
durable goods	5.2%	1.5%
semi-durable goods	6.6%	4.3%
Services	56.6%	2.2%
Public services	11.0%	-0.8%
Private services	45.6%	2.9%
private rent	3.9%	0.1%
imputed rent	20.0%	0.1%
Private services ex rent	21.7%	6.1%
dining out	5.2%	4.3%
other services	16.5%	6.7%
mobile phone services	2.1%	11.1%
hotel charges	1.0%	58.9%
other services	13.5%	2.9%

Source: MIAC BofA GLOBAL RESEARCH

**Exhibit 5: Tokyo BoJ-core CPI: month-over-month growth % (SA)**

Core inflation measures remain above 2% on a MoM annualized basis

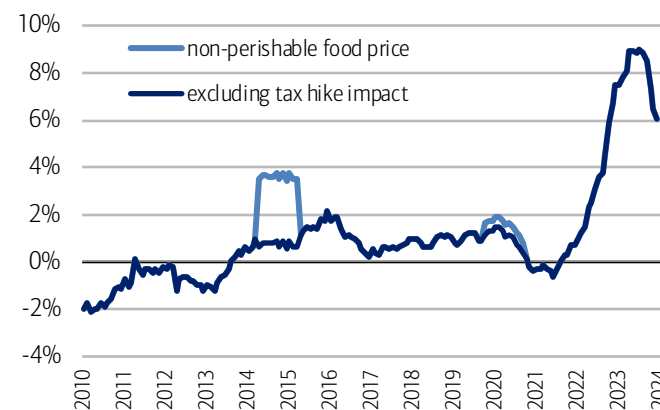


Source: BofA Global Research, MIAC

BofA GLOBAL RESEARCH

**Exhibit 7: Tokyo CPI: Trend in non-perishable food price (yoy%)**

Non-perishable food price has peaked out

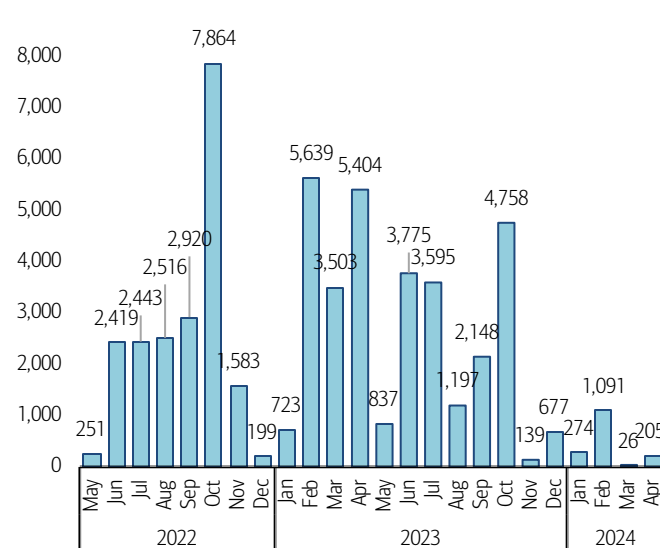


Source: BofA Global Research, MIAC

BofA GLOBAL RESEARCH

**Exhibit 9: Planned food price revisions (# of items by month)**

Planned price revisions by food manufacturers point to few price hikes



Source: Teikoku Databank

BofA GLOBAL RESEARCH

**Exhibit 10: Major non-food price hikes announced**

Near-term focus is on the extent of price hikes at the start of the new fiscal year, starting in April 2024.

Company	Effective from	Product/service	Main price increase (%)
Non-life insurance companies	2024/01	Car insurance premium	about 2.5%~3%
Huis Ten Bosch	2024/01	Park ticket (one-day pass)	4~6%
Tokyo-Monorail	2024/03	Passenger fare	ave. 10.8%
Sagawa Express	2024/04	Delivery fees	ave. 7%
Toyohashi Railroad	2024/Spring	Passenger fare	11~21%
Meitetsu	2024/Spring	Passenger fare	ave. 10%
Kanagawa pref./ Chiba pref./ Okinawa pref. etc.	2024/04 onwards	Water bill	ave. 5~25%
Japan Post	2024/10	Postage	9~10%

Source: BofA Global Research, media reports

BofA GLOBAL RESEARCH

**Exhibit 11: CPI impact of the government's energy-cost relief measures**

The government extended the energy subsidies to end-April 2024

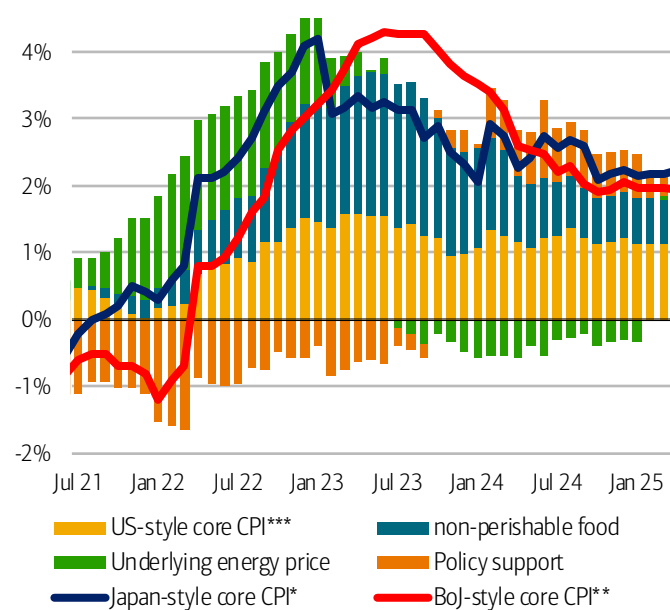
	Period	Detail	CPI impact (nationwide latest)
Extension of gasoline subsidy	Jan '22 - Apr '24	full subsidy for up to ¥35 above ¥168/liter, half subsidy for rise greater than ¥35	-0.1%
Lowering electricity bills	Jan '23-Apr '24 (Feb '23-May '24 in CPI)	¥7/kWh subsidy for households	-0.4%
Lowering city gas bills	Jan '23-Apr '24 (Feb '23-May '24 in CPI)	¥30/m <sup>3</sup> city gas support for households	-0.1%
Total			-0.6%

Source: BofA Global Research, MIAC, media reports

BofA GLOBAL RESEARCH

**Exhibit 12: Factors driving changes in Japan-style core CPI\***

We expect BoJ core CPI to stay above 2% through 2024-25



Source: BofA Global Research, MIAC Note: BofA forecasts based on our FX and commodity team's forecasts \*CPI excluding fresh food \*\*CPI excluding fresh food and energy \*\*\*CPI excluding food and energy

BofA GLOBAL RESEARCH

**Exhibit 13: Japan inflation forecast summary**

2024-2025

	Calendar year				Fiscal year				Quarterly										
	2022	2023	2024	2025	2022	2023	2024	2025	2Q23	3Q23	4Q23	1Q24	2Q24	3Q24	4Q24	1Q25	2Q25	3Q25	4Q25
	(A)	(F)	(F)	(F)	(A)	(F)	(F)	(F)	(A)	(A)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)	(F)
Consumer price index (unadjusted)																			
Headline CPI	2.5	3.3	2.5	1.9	3.3	3.0	2.4	1.8	3.4	3.1	2.9	2.5	2.5	2.6	2.2	2.2	2.1	1.7	1.8
CPI ex fresh food	2.3	3.1	2.5	1.9	3.0	2.8	2.4	1.8	3.2	3.0	2.6	2.6	2.5	2.6	2.2	2.2	2.1	1.7	1.8
CPI ex fresh food & energy	1.1	3.9	2.5	2.0	2.2	3.9	2.2	1.9	4.2	4.3	3.8	3.3	2.5	2.2	2.0	2.0	1.9	1.9	2.0
CPI ex food & energy	0.1	2.6	2.0	1.6	1.1	2.7	1.8	1.7	2.6	2.7	2.8	2.5	2.0	1.8	1.6	1.6	1.6	1.7	1.7

Sources: Cabinet Office, BoJ, MoF, MIA, METI, MLIT, Bloomberg, and BofA Global Research estimates.

BofA GLOBAL RESEARCH

## 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.

### 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.

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.

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.

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. ("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](http://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 Canadian Investment Regulatory Organization; Merrill Lynch (Mexico): Merrill Lynch Mexico, SA de CV, Casa de Bolsa, regulated by the Comisión Nacional Bancaria y de Valores; Merrill Lynch (Argentina): Merrill Lynch Argentina SA, regulated by Comisión Nacional de Valores; BofAS Japan: BofA Securities Japan Co., Ltd., regulated by the Financial Services Agency; Merrill Lynch (Seoul): Merrill Lynch International, LLC Seoul Branch, regulated by the Financial Supervisory Service; Merrill Lynch (Taiwan): Merrill Lynch Securities (Taiwan) Ltd., regulated by the Securities and Futures Bureau; BofAS India: BofA Securities India Limited, regulated by the Securities and Exchange Board of India (SEBI); Merrill Lynch (Israel): Merrill Lynch Israel Limited, regulated by Israel Securities Authority; Merrill Lynch (DIFC): Merrill Lynch International (DIFC Branch), regulated by the Dubai Financial Services Authority (DFSA); Merrill Lynch (Brazil): Merrill Lynch S.A. Corretora de Títulos e Valores Mobiliários, regulated by Comissão de Valores Mobiliários; Merrill Lynch KSA Company: Merrill Lynch Kingdom of Saudi Arabia Company, regulated by the Capital Market Authority.

This information: has been approved for publication and is distributed in the United Kingdom (UK) to professional clients and eligible counterparties (as each is defined in the rules of the FCA and the PRA) by MLI (UK), which is authorized by the PRA and regulated by the FCA and the PRA - details about the extent of our regulation by the FCA and PRA are available from us on request; has been approved for publication and is distributed in the European Economic Area (EEA) by BofASE (France), which is authorized by the ACPR and regulated by the ACPR and the AMF; has been considered and distributed in Japan by BofAS Japan, a registered securities dealer under the Financial Instruments and Exchange Act in Japan, or its permitted affiliates; is issued and distributed in Hong Kong by Merrill Lynch (Hong Kong) which is regulated by 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.

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.

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 2024 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.