

US Rates Watch

MMF portfolio update: MMFs absorb bank deposit outflows

MMF portfolio update: MMFs absorb deposit outflows

AUM: Money market funds have seen \$200bn in inflows MTD, according to Crane Data (Exhibit 1). Government MMFs drew large inflows of \$224bn following contagion fears around uninsured bank deposits. At the same time, prime funds saw \$24bn in outflows as investors likely wanted to park cash in safer funds and limit exposure to banks.

Most of these MMF inflows were into institutional MMF. Institutional MMF AUM grew roughly \$140bn MTD vs \$60bn into retail funds. The recent institutional MMF inflows are likely to be from uninsured bank depositors (Exhibit 2). The flow into government institutional funds is a reversal of the theme we saw in '22 and earlier this year. Prime retail had drawn the majority of inflows with Fed hikes & low bank deposit betas.

Overall, we expect MMF AUM to continue to increase as yields stay high and remain attractive relative to bank deposit rates.

Simple yield: The average 7-day simple yield on government MMFs has risen 5.5bps MTD vs 0.8bps for prime MMFs over the same period (Exhibit 3). Since the start of '23, yields have risen 42 and 27bps for gov't and prime funds, respectively. We expect yields to keep rising along with Fed hikes.

WAM & WAL: MMFs reversed some of the extension we saw in WAM and WALs YTD as uncertainty around the Fed's path grew following recent bank stress. Prime MMFs have reduced WAM 2.7 days MTD but are still 4.5 days longer YTD (Exhibit 4). Gov't funds have only declined 0.9 days MTD but are still 1.9 days shorter on the year. Prime WALs have shortened 6.1 days MTD & 3.4 days YTD. Gov't fund WAL is shorter by 4.4 days MTD, 4.9 days YTD (Exhibit 5).

Uncertainty around the Fed's hiking path continues to keep MMFs short. Fed reaction to the recent bank stress will likely determine whether MMFs want to extend out with the expectations of rate cuts or remain short if future hikes are still expected.

We still expect front-end paper to cheapen in late 2023 after the debt limit resolution due to significant net issuance in T-bills, which should encourage MMF WAM extension.

ON RRP take-up: MMF take-up at the Fed's ON RRP rose in February (Exhibit 7). Take-up likely rose due to cuts in FHLB debt and UST bills + large MMF inflows (Exhibit 6).

The recent bank stress initially led to lower ON RRP take-up. Lower ON RRP use occurred despite MMF inflows as MMFs likely shifted their holdings into FHLB debt. As FHLB issuance slows and MMFs continue to see inflows, ON RRP use will likely increase, in our view.

22 March 2023

Rates Research
United States

Katie Craig
Rates Strategist
BofAS
katie.craig@bofa.com

Mark Cabana, CFA
Rates Strategist
BofAS
mark.cabana@bofa.com

US Rates Research
BofAS
+1 646 855 8846

[See Team Page for List of Analysts](#)

AUM: Assets under management

MMF: Money market fund

YTD: Year to date

WAMs: Weighted average maturity

WAL: Weighted average life

ON RRP: Overnight reverse repo facility

QT: Quantitative tightening

FHLB: Federal home loan banks

CD: Certificate of deposit

CP: Commercial paper

TD: Time deposit

UST: US Treasuries

Inst'l: institutional

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 7 to 8.

12532778

Timestamp: 22 March 2023 10:19PM EDT

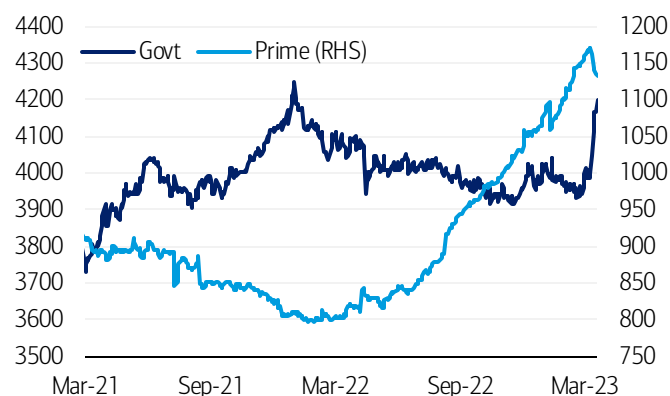
Holdings: According to data from iMoneyNet, prime fund inflows shifted holdings back into UST repo and non-negotiable TD (Exhibit 8, Exhibit 10). Gov't funds, which were flat AUM over February, shifted holdings from Treasury and agency debt back into Treasury repo (Exhibit 9, Exhibit 11).

The decline in UST debt was predominantly out of Treasury bills and notes vs FRNs (Exhibit 12, Exhibit 13). The decline in agency debt was likely driven by a reduction of FHLB issuance in Feb (Exhibit 6). March MMF holdings have likely shifted back into agency debt given the recent uptick in issuance (Exhibit 14).

Prime funds increased Japanese exposure in CD and non-negotiable TDs but reduced exposure to Japanese banks via lower financial CP (Exhibit 15).

Exhibit 1: MMF AUM (\$bn)

Govt funds saw large inflows, prime funds saw outflows

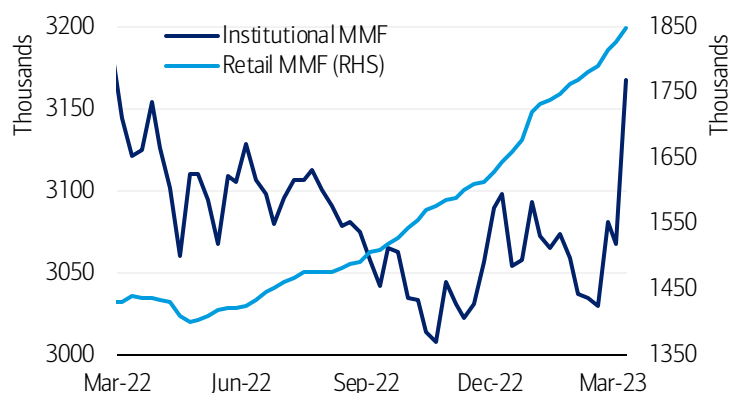


Source: BoFA Global Research, Crane Data

BoFA GLOBAL RESEARCH

Exhibit 2: Institutional MMF AUM vs Retail MMF AUM (\$tn)

Bank deposit outflows are flooding into institutional MMFs

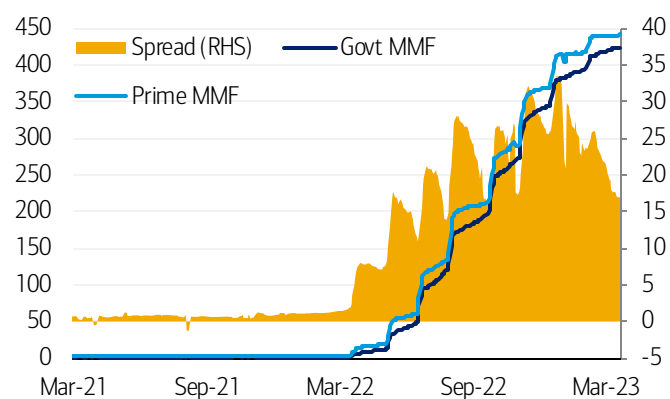


Source: Bloomberg, ICI

BoFA GLOBAL RESEARCH

Exhibit 3: Domestic MMF 7 day simple yield (bps)

MMF yields continue to rise with Fed hikes

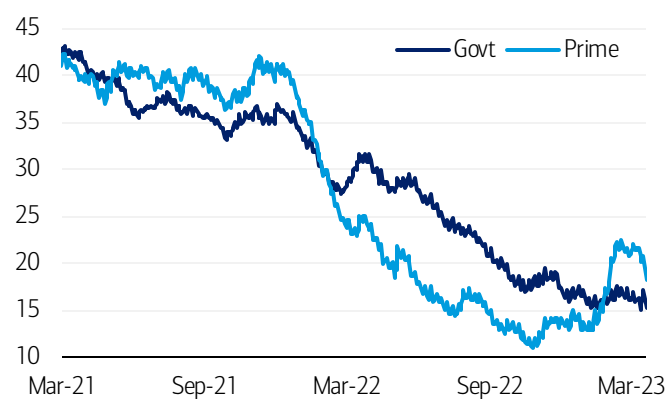


Source: BoFA Global Research, iMoneyNet

BoFA GLOBAL RESEARCH

Exhibit 4: MMF WAM (Days)

MMF WAMs have reversed some of their recent extension

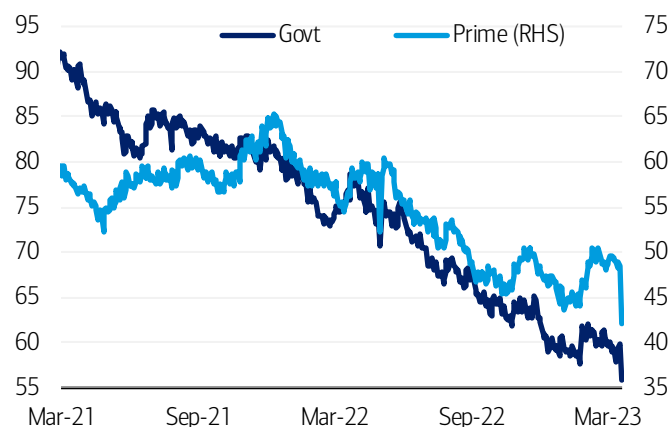


Source: BoFA Global Research, iMoneyNet

BoFA GLOBAL RESEARCH

Exhibit 5: MMF WAL (Days)

Prime fund WALs dropped dramatically after bank stress

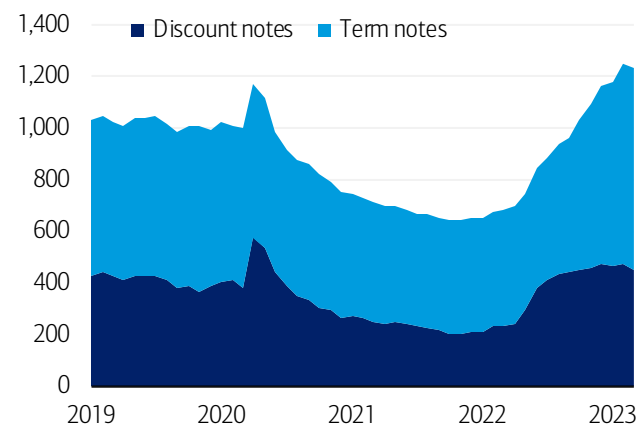


Source: BofA Global Research, iMoneyNet

BofA GLOBAL RESEARCH

Exhibit 6: FHLB debt issuance (\$bn)

FHLB debt issuance declined for the first time in months in Feb



Source: BofA Global Research, FHLB Office of Finance

BofA GLOBAL RESEARCH

Exhibit 7: Top 10 MMFs' ON RRP use (\$bn)

MMF ON RRP increased likely due to bill cuts at the end of Feb

Fund	Feb Assets	Feb ON RRP	Jan ON RRP	Dec ON RRP	Nov ON RRP
Goldman Sachs FS Govt	233	138	136	142	147
Fidelity Govt Money Market	247	136	139	136	111
Fidelity Govt Cash Reserves	212	119	125	126	101
Vanguard Federal Money Mkt Fund	229	118	119	128	121
Fidelity Series Govt Money Market	145	93	2	1	1
Dreyfus Govt Cash Mgmt	134	84	87	82	50
JPMorgan US Govt MM	191	84	88	118	112
BlackRock Lq T-Fund	88	60	41	50	49
BlackRock Lq FedFund	117	58	42	59	53
Vanguard Cash Reserves Federal MM	98	54	49	51	45

Source: BofA Global Research, Crane Data

BofA GLOBAL RESEARCH

Exhibit 8: Domestic MMF holdings, prime funds (\$bn)

Prime funds placed inflows into UST repo and non-negotiable TD

	Prime			Prime Institutional			Prime Retail		
	Feb-23	MoM	YoY	Feb-23	MoM	YoY	Feb-23	MoM	YoY
Cash	11.5	1	10	4.4	(0)	3	7.1	1	7
Treasury Debt	6.2	(2)	2	3.0	(0)	1	3.2	(1)	2
Treasury Repo	184.9	31	176	38.5	2	37	146.4	29	139
Govt Agency Debt	1.4	0	1	0.6	0	1	0.8	0	1
Govt Agency Repo	55.6	8	46	8.5	0	6	47.1	7	40
Other Repo	49.8	0	3	28.4	(1)	(2)	21.4	1	5
CD	157.0	(2)	63	64.0	(1)	10	93.0	(1)	53
Financial Co CP	137.2	(8)	36	53.8	(4)	6	83.4	(4)	30
ABCP	46.7	1	17	16.7	(0)	1	30.0	1	16
Other CP	18.5	2	3	5.9	1	(0)	12.6	1	4
Non-Negotiable TD	103.8	10	8	45.0	1	(15)	58.8	9	23
VRDN	5.8	0	(3)	1.9	0	(2)	4.0	0	(1)
Other	7.9	0	(1)	0.0	0	0	0.0	(47)	0
Total	791	41	362	277	(2)	44	514	43	317

Source: BofA Global Research, iMoneyNet

BofA GLOBAL RESEARCH

Exhibit 9: Domestic MMF holdings, government funds (\$bn)

Gov't MMF holdings shifted out of UST and Agency debt and into UST repo

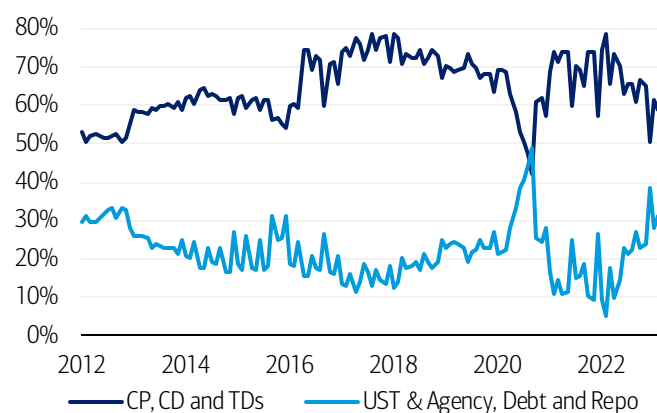
	Government			Government Institutional			Government Retail		
	Feb-23	MoM	YoY	Feb-23	MoM	YoY	Feb-23	MoM	YoY
Cash	55.0	1	15	43.5	2	14	11.5	(1)	1
Treasury Debt	945.0	(39)	(736)	729.5	(28)	(364)	215.5	(11)	(372)
Treasury Repo	2091.2	58	349	949.7	25	12	1141.5	33	338
Gov't Agency Debt	510.0	(20)	151	245.9	(6)	30	264.2	(14)	121
Gov't Agency Repo	349.3	(1)	25	257.8	(4)	23	91.5	3	1
Other Repo	3.8	1	4	3.8	1	4	0.0	0	0
Investment Co Funding Agrmnt	8.2	0	4	3.3	0	(0)	4.9	(0)	5
VRDN	0.5	(0)	(5)	0.0	0	(4)	0.5	(0)	(1)
Other Instrument	0.3	(1)	(1)	0.2	(0)	(0)	0.1	(0)	(0)
Total	3963	(0)	(194)	2234	(9)	(286)	1730	8	92

Source: BofA Global Research, iMoneyNet

BoFA GLOBAL RESEARCH

Exhibit 10: Prime MMF holdings as % of total

Prime fund holding of UST repo increased while CP, CD, and TD declined

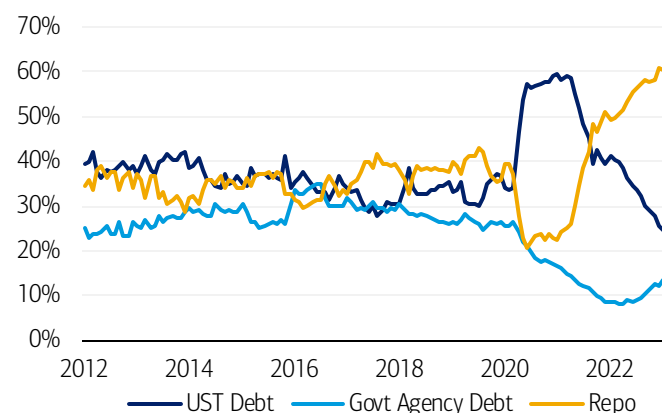


Source: BofA Global Research, iMoneyNet

BoFA GLOBAL RESEARCH

Exhibit 11: Govt MMF holdings as % total

Gov't holdings of repo dominates while growth in agency debt has slowed

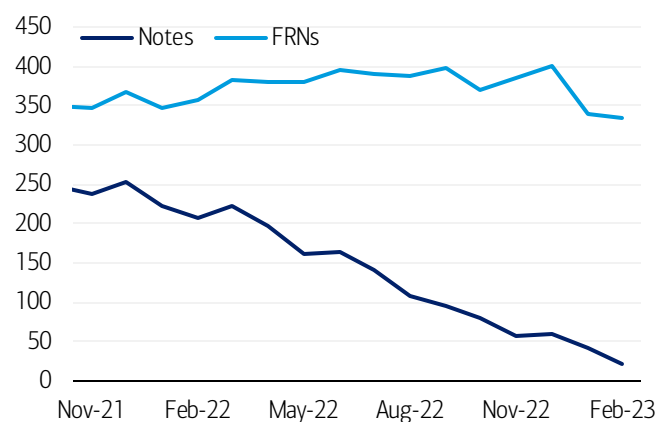


Source: BofA Global Research, iMoneyNet

BoFA GLOBAL RESEARCH

Exhibit 12: MMF holdings of Treasury notes and FRNs

MMF holdings declined for notes and FRNs



Source: BofA Global Research, Crane Data

BoFA GLOBAL RESEARCH

Exhibit 13: Bills outstanding versus total MMF holdings (\$bn)

MMF holdings as % of outstanding declined to new lows in Dec

	Bills Outstanding	MMF Holdings	MMF as % Total
Oct-21	3851	1237	32%
Nov-21	3785	1199	32%
Dec-21	3768	1184	31%
Jan-22	3959	1274	32%
Feb-22	4053	1261	31%
Mar-22	3927	1144	29%
Apr-22	3826	1093	29%
May-22	3671	984	27%
Jun-22	3523	896	25%
Jul-22	3514	892	25%
Aug-22	3724	846	23%
Sep-22	3644	761	21%
Oct-22	3665	765	21%
Nov-22	3811	706	19%
Dec-22	3696	598	16%
Jan-23	3937	662	17%
Feb-23	4056	644	16%

Source: BofA Global Research, Crane Data

BoFA GLOBAL RESEARCH

Exhibit 14: Money market flows and FHLB debt (\$bn)

MMFs absorbed most of the FHLB debt issuance via inflows and reduction of ON RRP take-up

FHLBs	13-Mar	14-Mar	15-Mar	16-Mar	17-Mar	20-Mar	21-Mar
Total	156.48	66.28	8.03	18.88	8.44	12.1	3.36
Money Markets	13-Mar	14-Mar	15-Mar	16-Mar	17-Mar	20-Mar	21-Mar
ON RRP Total	2,126.68	2,042.58	2,055.82	2,066.32	2,106.17	2,098.39	2,194.63
ON RRP Change (d/d)	-62	-84.1	13.24	10.5	39.85	-7.78	96.24
MMF Flows	37	47.83	11.63	37.28	-5.13	26.97	47.66
MMF Inflow - RRP Change	99	131.93	-1.61	26.78	-44.97	34.74	-48.58
FHLB - MM Flow (Net)	57.48	-65.65	9.64	-7.9	53.41	-22.64	51.94

Source: BofA Global Research, FRBNY, Bloomberg, Crane Data

BofA GLOBAL RESEARCH

Exhibit 15: Prime MMF holdings, by country of issuer (\$bn)

Prime MMF shifted out of financial CP from Japanese banks but into non negotiable TD from Japan banks

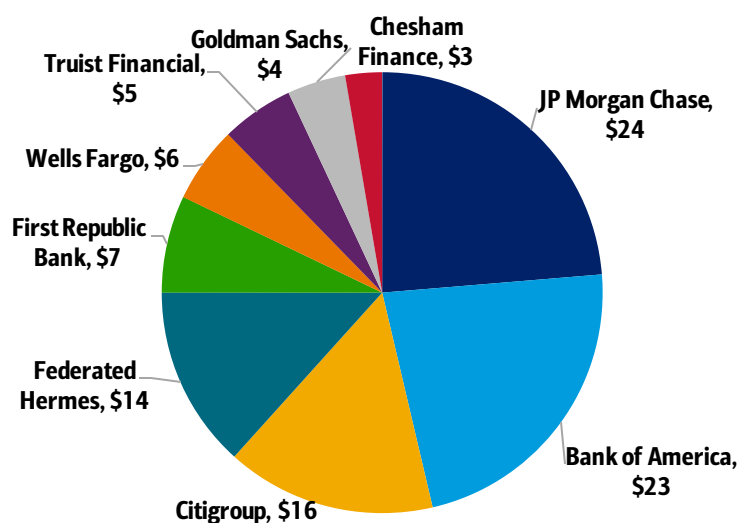
	CD			Financial Co CP			Non-Negotiable TD		
	Feb-23	MoM Δ	YoY Δ	Feb-23	MoM Δ	YoY Δ	Feb-23	MoM Δ	YoY Δ
US	17.1	(2)	12	8.5	0	5	5.5	2	5
Canada	28.2	(2)	6	35.9	(1)	9	7.7	0	0
Euro Bloc	35.1	1	18	25.5	(3)	2	38.2	(3)	(2)
Germany	9.5	(1)	3	9.7	(1)	3	7.2	2	(3)
France	19.8	1	12	6.0	(1)	(2)	5.4	(2)	(2)
Other	5.7	1	3	9.7	(2)	1	25.6	(3)	3
Europe (non-Euro Bloc)	21.4	(1)	6	31.1	0	10	24.5	0	(8)
UK	10.2	(1)	2	7.0	(2)	0	4.1	(0)	2
Sweden	10.8	1	4	16.5	2	9	20.1	1	(4)
Other	0.5	(0)	(1)	7.6	1	(0)	0.3	(0)	(6)
Australia	0.4	0	(1)	21.0	(0)	7	7.8	0	3
China	0.8	1	(1)	0.1	0	0	2.0	1	0
Japan	50.6	2	22	7.7	(4)	0	10.9	7	4
Total	157.0	(2)	94	137.2	(8)	36	103.8	10	8

Source: BofA Global Research, iMoneyNet

BofA GLOBAL RESEARCH

Exhibit 16: Top 10 MMF bank exposure (\$bn)

MMFs had large exposure to First Republic in Feb



Source: Office of Financial Research

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. BofA Securities fixed income analysts regularly interact with sales and trading desk personnel in connection with their research, including to ascertain pricing and liquidity in the fixed income markets.

Other Important Disclosures

Prices are indicative and for information purposes only. Except as otherwise stated in the report, for any recommendation in relation to an equity security, the price referenced is the publicly traded price of the security as of close of business on the day prior to the date of the report or, if the report is published during intraday trading, the price referenced is indicative of the traded price as of the date and time of the report and in relation to a debt security (including equity preferred and CDS), prices are indicative as of the date and time of the report and are from various sources including BofA Securities trading desks.

The date and time of completion of the production of any recommendation in this report shall be the date and time of dissemination of this report as recorded in the report timestamp.

This report may refer to fixed income securities or other financial instruments that may not be offered or sold in one or more states or jurisdictions, or to certain categories of investors, including retail investors. Readers of this report are advised that any discussion, recommendation or other mention of such instruments is not a solicitation or offer to transact in such instruments. Investors should contact their BofA Securities representative or Merrill Global Wealth Management financial advisor for information relating to such instruments.

Rule 144A securities may be offered or sold only to persons in the U.S. who are Qualified Institutional Buyers within the meaning of Rule 144A under the Securities Act of 1933, as amended. SECURITIES OR OTHER FINANCIAL INSTRUMENTS DISCUSSED HEREIN MAY BE RATED BELOW INVESTMENT GRADE AND SHOULD THEREFORE ONLY BE CONSIDERED FOR INCLUSION IN ACCOUNTS QUALIFIED FOR SPECULATIVE INVESTMENT.

Recipients who are not institutional investors or market professionals should seek the advice of their independent financial advisor before considering information in this report in connection with any investment decision, or for a necessary explanation of its contents.

The securities or other financial instruments discussed in this report may be traded over-the-counter. Retail sales and/or distribution of this report may be made only in states where these instruments are exempt from registration or have been qualified for sale.

Officers of BofAS or one or more of its affiliates (other than research analysts) may have a financial interest in securities of the issuer(s) or in related investments.

This report, and the securities or other financial instruments discussed herein, may not be eligible for distribution or sale in all countries or to certain categories of investors, including retail investors.

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

"BofA Securities" includes BofA Securities, Inc. ("BofAS") and its affiliates. Investors should contact their BofA Securities representative or Merrill Global Wealth Management financial advisor if they have questions concerning this report or concerning the appropriateness of any investment idea described herein for such investor. "BofA Securities" is a global brand for BofA Global Research.

Information relating to Non-US affiliates of BofA Securities and Distribution of Affiliate Research Reports:

BofAS and/or Merrill Lynch, Pierce, Fenner & Smith Incorporated ("MLPF&S") may in the future distribute, information of the following non-US affiliates in the US (short name: legal name, regulator): Merrill Lynch (South Africa): Merrill Lynch South Africa (Pty) Ltd., regulated by The Financial Service Board; MLI (UK): Merrill Lynch International, regulated by the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA); BofASE (France): BofA Securities Europe SA is authorized by the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and regulated by the ACPR and the Autorité des Marchés Financiers (AMF). BofA Securities Europe SA ("BofASE") with registered address at 51, rue La Boétie, 75008 Paris is registered under no 842 602 690 RCS Paris. In accordance with the provisions of French Code Monétaire et Financier (Monetary and Financial Code), BofASE is an établissement de crédit et d'investissement (credit and investment institution) that is authorised and supervised by the European Central Bank and the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and regulated by the ACPR and the Autorité des Marchés Financiers. BofASE's share capital can be found at www.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 (HKSCF); Merrill Lynch (Singapore): Merrill Lynch (Singapore) Pte Ltd, regulated by the Monetary Authority of Singapore (MAS); Merrill Lynch (Canada): Merrill Lynch Canada Inc, regulated by the Investment Industry Regulatory Organization of Canada; Merrill Lynch (Mexico): Merrill Lynch Mexico, SA de CV, Casa de Bolsa, regulated by the Comisión Nacional Bancaria y de Valores; Merrill Lynch (Argentina): Merrill Lynch Argentina SA, regulated by Comisión Nacional de Valores; BofAS Japan: BofA Securities Japan Co., Ltd., regulated by the Financial Services Agency; Merrill Lynch (Seoul): Merrill Lynch International, LLC Seoul Branch, regulated by the Financial Supervisory Service; Merrill Lynch (Taiwan): Merrill Lynch Securities (Taiwan) Ltd., regulated by the Securities and Futures Bureau; BofAS India: BofA Securities India Limited, regulated by the Securities and Exchange Board of India (SEBI); Merrill Lynch (Israel): Merrill Lynch Israel Limited, regulated by Israel Securities Authority; Merrill Lynch (DIFC): Merrill Lynch International (DIFC Branch), regulated by the Dubai Financial Services Authority (DFSA); Merrill Lynch (Brazil): Merrill Lynch S.A. Corretora de Títulos e Valores Mobiliários, regulated by Comissão de Valores Mobiliários; Merrill Lynch KSA Company: Merrill Lynch Kingdom of Saudi Arabia Company, regulated by the Capital Market Authority.

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

This report may contain a trading idea or recommendation which highlights a specific identified near-term catalyst or event impacting a security, issuer, industry sector or the market generally that presents a transaction opportunity, but does not have any impact on the analyst's particular "Overweight" or "Underweight" rating (which is based on a three month trade horizon). Trading ideas and recommendations may differ directionally from the analyst's rating on a security or issuer because they reflect the impact of a near-term catalyst or event.

Foreign currency rates of exchange may adversely affect the value, price or income of any security or financial instrument mentioned in this report. Investors in such securities and instruments effectively assume currency risk.

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

BofA Securities, through business units other than BofA Global Research, may have issued and may in the future issue trading ideas or recommendations that are inconsistent with, and reach different conclusions from, the information presented herein. Such ideas or recommendations may reflect different time frames, assumptions, views and analytical methods of the persons who prepared them, and BofA Securities is under no obligation to ensure that such other trading ideas or recommendations are brought to the attention of any recipient of this information.

In the event that the recipient received this information pursuant to a contract between the recipient and BofAS for the provision of research services for a separate fee, and in connection therewith BofAS may be deemed to be acting as an investment adviser, such status relates, if at all, solely to the person with whom BofAS has contracted directly and does not extend beyond the delivery of this report (unless otherwise agreed specifically in writing by BofAS). If such recipient uses the services of BofAS in connection with the sale or purchase of a security referred to herein, BofAS may act as principal for its own account or as agent for another person. BofAS is and continues to act solely as a broker-dealer in connection with the execution of any transactions, including transactions in any securities referred to herein.

Copyright and General Information:

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

Materials prepared by BofA Global Research personnel are based on public information. Facts and views presented in this material have not been reviewed by, and may not reflect information known to, professionals in other business areas of BofA Securities, including investment banking personnel. BofA Securities has established information barriers between BofA Global Research and certain business groups. As a result, BofA Securities does not disclose certain client relationships with, or compensation received from, such issuers. To the extent this material discusses any legal proceeding or issues, it has not been prepared as nor is it intended to express any legal conclusion, opinion or advice. Investors should consult their own legal advisers as to issues of law relating to the subject matter of this material. BofA Global Research personnel's knowledge of legal proceedings in which any BofA Securities entity and/or its directors, officers and employees may be plaintiffs, defendants, co-defendants or co-plaintiffs with or involving issuers mentioned in this material is based on public information. Facts and views presented in this material that relate to any such proceedings have not been reviewed by, discussed with, and may not reflect information known to, professionals in other business areas of BofA Securities in connection with the legal proceedings or matters relevant to such proceedings.

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

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

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

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

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

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

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

Research Analysts

Ralph Axel

Rates Strategist
BofAS
ralph.axel@bofa.com

Bruno Braizinha, CFA

Rates Strategist
BofAS
bruno.braizinha@bofa.com

Mark Cabana, CFA

Rates Strategist
BofAS
mark.cabana@bofa.com

Katie Craig

Rates Strategist
BofAS
katie.craig@bofa.com

Meghan Swiber, CFA

Rates Strategist
BofAS
meghan.swiber@bofa.com

Anna (Caiyi) Zhang

Rates Strategist
BofAS
cai yi.zhang@bofa.com

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

