

# US Rates Watch

## CP monitor: supply stable, bank funding needs high

### Supply: CP supply stable, CD issues continue to climb

**Supply:** Financials CP outstanding level has gradually come back from the March bank stress. Over the month through mid-September, non-financials CP issuance declined further, while asset-backed CP supply saw modest pickup. Tier-2 CP supply seems to have bottomed near the end of August and level in September shows a slight pickup since then. Overall, total CP outstanding has been steady and is at \$1.2tn as of Wednesday, Sept 13<sup>th</sup>. In addition, bank CD issuance has continued to climb over recent weeks, especially in large domestic commercial banks. We continue to believe the growth in financial CP & CDs represents banks competing for liquidity (see our report, [Banks fighting to keep liquidity](#)).

### Demand: MMFs the largest CP holders in Q2 '23

**Demand:** MMFs have surpassed other financial business to be the largest CP buyers at the end of Q2 2023; on the other hand, amount held by other financial business dipped in Q2. In addition, prime MMF have maintained a higher WAM to support CP issuance at longer tenors. Prime MMF WAMs are now 25-30 days vs start of year levels at 10-15 days.

### Rates: trading in-line with other front-end levels

**Rates:** Overall fin & non-fin CP rates trade in-line with other money market rates. We see risks that continued aggressive bank CD issuance & funding competition could cheapen rates further (Exhibit 7, Exhibit 10).

### Maturity distro & issuance: Sept mat. extension dropped

**Maturity distribution:** Total CP maturity extension modestly dropped in September. Asset-backed CP and non-asset backed tier-1 are now at similar maturity extension c.60-62 days. CP maturing in the next 3 months remain primarily in financials (Exhibit 16). Country-wise, the amount of CP maturing is mostly seen in Canada, France & US (Exhibit 18). Canada was the largest issuer in August with \$62bn total CP.

**Bottom line:** Financials continue to source funding from CP & CD markets, supporting their growth & threatening cheaper levels over time. MMFs have surpassed "other financial business" to be the largest CP holders at the end of Q2 '23. Maturity extension modestly dropped in September.

27 September 2023

Rates Research  
United States

**US Rates Research**  
BofAS  
+1 646 855 8846

**Mark Cabana, CFA**  
Rates Strategist  
BofAS  
[mark.cabana@bofa.com](mailto:mark.cabana@bofa.com)

**Anna (Caiyi) Zhang**  
Rates Strategist  
BofAS  
[cai.yi.zhang@bofa.com](mailto:cai.yi.zhang@bofa.com)

**Katie Craig**  
Rates Strategist  
BofAS  
[katie.craig@bofa.com](mailto:katie.craig@bofa.com)

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

ABCP = asset backed commercial paper

CD = certificate of deposit

CP = commercial paper

MMF = money market mutual funds

O/S = outstanding

WAM = weighted-average maturity

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 9.**

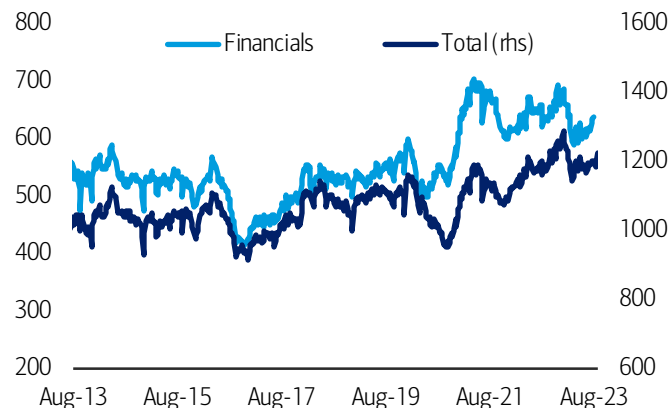
12605690

Timestamp: 27 September 2023 11:16AM EDT

# Commercial paper outstanding

## Exhibit 1: Financial CP vs total CP outstanding (\$bn)

Financials O/S has seen gradual recovery since March bank stress

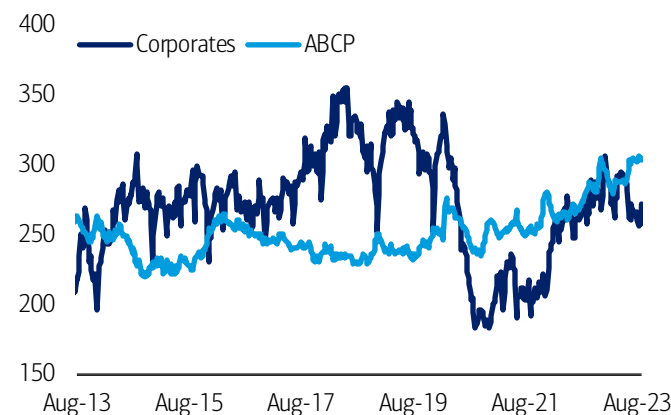


Source: BofA Global Research, Haver

BofA GLOBAL RESEARCH

## Exhibit 2: Nonfin CP vs ABCP outstanding (\$bn)

Over the month thru mid-September, nonfin CP issuance saw further decline, ABCP supply modestly picked up

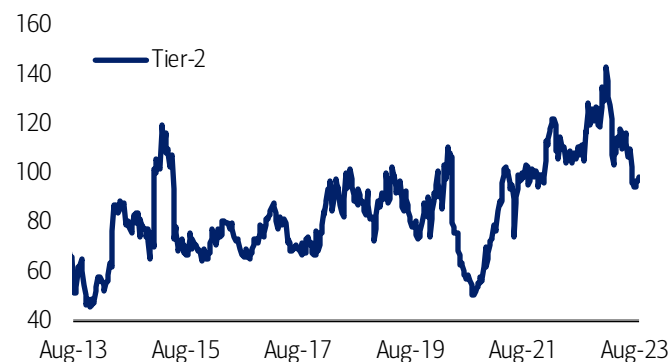


Source: BofA Global Research, Haver

BofA GLOBAL RESEARCH

## Exhibit 3: Tier-2 CP outstanding (NSA, \$bn)

Tier-2 CP slightly increased since September



Source: BofA Global Research, Haver

BofA GLOBAL RESEARCH

## Exhibit 4: CP outstanding as of 09/20/2023 (NSA, \$bn)

MoM total O/S increased by \$20bn

	O/S	ΔMoM	Z-score since 2020	ΔYoY	Z-score since 2001
Financials	644	6	0.16	8	0.07
ABCP	304	2	0.14	25	0.42
Corporates	272	12	0.83	-3	-0.13
Total (rhs)	1221	20	0.60	31	0.27

Source: BofA Global Research, Haver

BofA GLOBAL RESEARCH

## Exhibit 5: Domestic vs foreign issuers in Fin & Corp CP (NSA, \$bn)

Further breakdown shows YoY decline in foreign fin CP is almost 2-sigma below average

	O/S	ΔMoM	Z-score since 2020	ΔYoY	Z-score since 2001
Fin - domestic	267	-4	-0.31	40	0.99
Fin - foreign	377	10	0.52	-32	-1.61
Corp - domestic	207	21	1.70	-9	-0.22
Corp - foreign	64	-10	-1.34	5	0.46

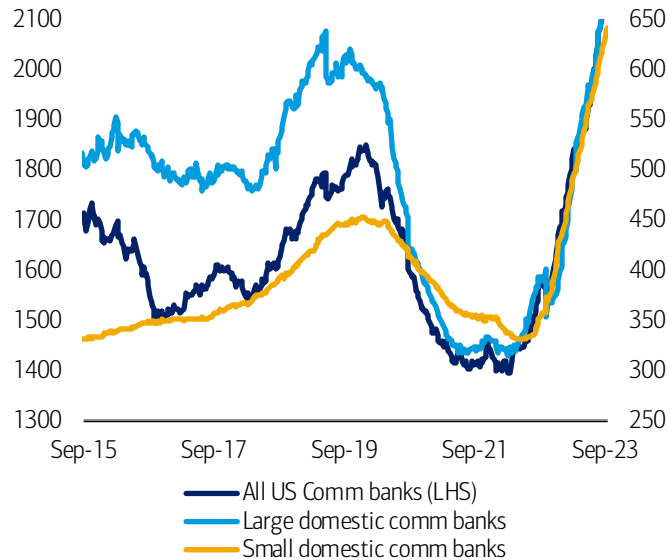
Source: BofA Global Research, Haver

BofA GLOBAL RESEARCH

## CD activity

### Exhibit 6: US Commercial bank large time deposits as a proxy for CD activity (\$bn)

CD activity saw significant increase since last year

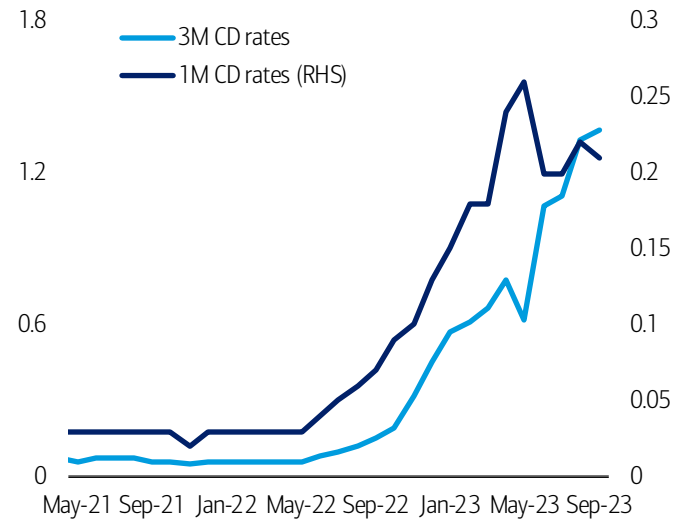


Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

### Exhibit 7: 1M & 3M CD rates (monthly, %)

CD rates has cheapened with aggressive bank CD issuance & funding competition since 2H '22



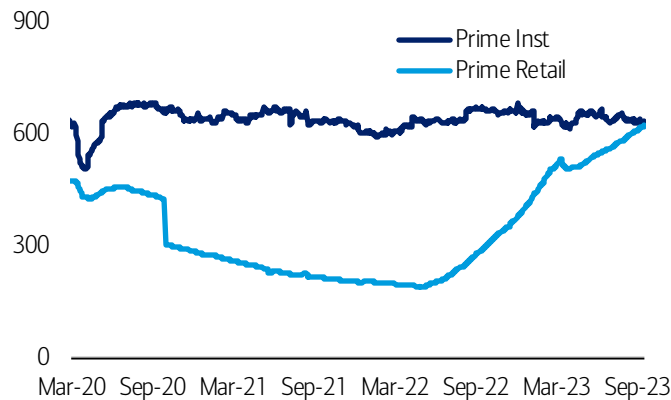
Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

## MMF AUM & WAM

### Exhibit 8: MMF AUM (\$bn)

Retail funds continued to attract inflows due to low deposit alternatives

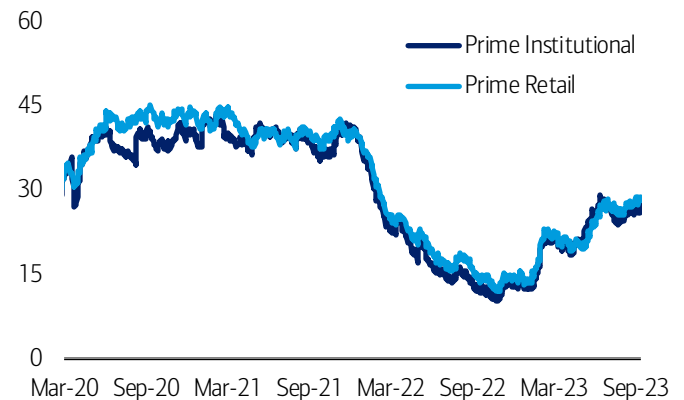


Source: BofA Global Research, Crane Data

BofA GLOBAL RESEARCH

### Exhibit 9: MMF WAM (days)

Prime institutional & retail funds have both been extending WAM



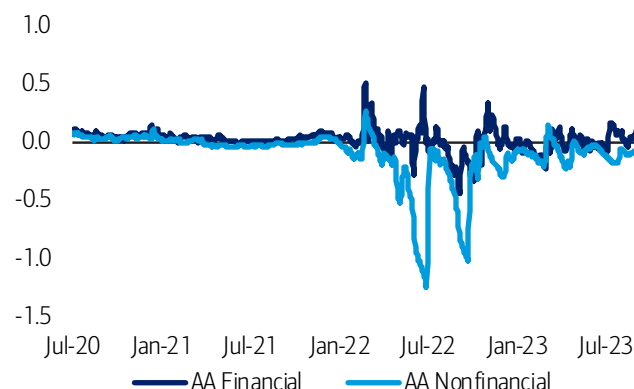
Source: BofA Global Research, Crane Data

BofA GLOBAL RESEARCH

## CP rates & spreads to OIS

### Exhibit 10: 3m AA fin & AA non-fin CP spreads to OIS (5D MA, %)

Fin & non-fin CP rates trade in-line with other money market rates



Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

### Exhibit 11: 1-month CP rates levels %, spreads to OIS (5d MA, bp), and z-scores

Z-scores of 1m CP spreads to OIS reflect relatively stable valuations

	Levels as of 09/25/2023	5D MA spreads	Z-score of spreads (5d MA) since 2020
AA Fin	5.43	9.1	0.1
AA Nonfin	5.29	-4.9	-0.2
A2 P2 Nonfin	5.51	17.1	-0.3
AA Asset backed	5.38	4.1	-0.1

Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

### Exhibit 12: 3-month CP rates levels %, spreads to OIS (5d MA, bp), and z-scores

Z-scores of 3m CP spreads to OIS reflect relatively stable valuations

	Levels as of 09/25/2023	5D MA spreads	Z-score of spreads (5d MA) since 2020
AA Fin	5.41	0	-0.3
AA Nonfin	5.34	-7	-0.1
A2 P2 Nonfin	5.6	19	-0.3
AA Asset backed	5.48	7	-0.3

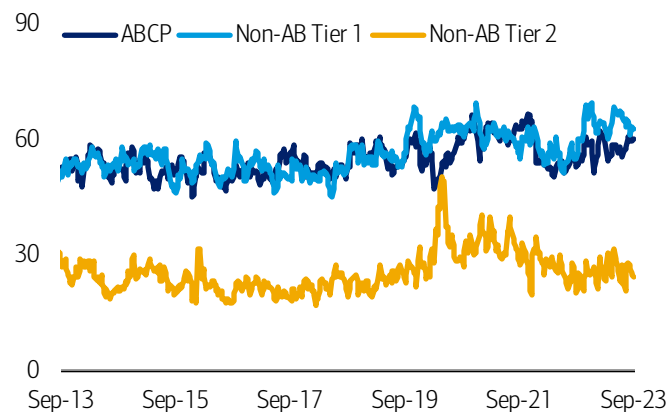
Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

## CP maturity distribution

### Exhibit 13: Avg maturity distribution of CP O/S by category (days)

Maturity extension most pronounced for non-asset backed tier 1 issuers

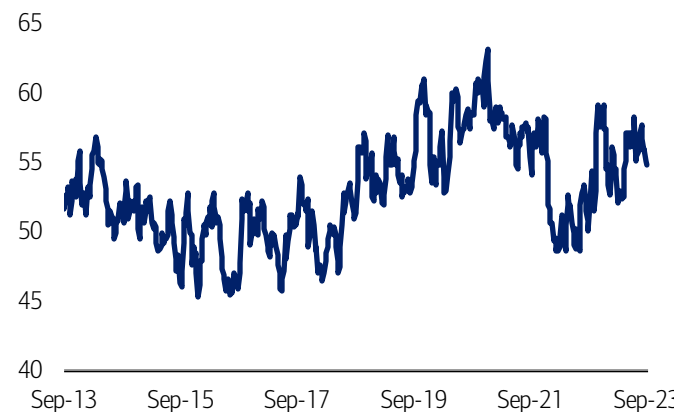


Source: BofA Global Research, Federal Reserve

BofA GLOBAL RESEARCH

### Exhibit 14: Avg maturity distribution of total CP outstanding (days)

Maturity extension for total CP dropped in September

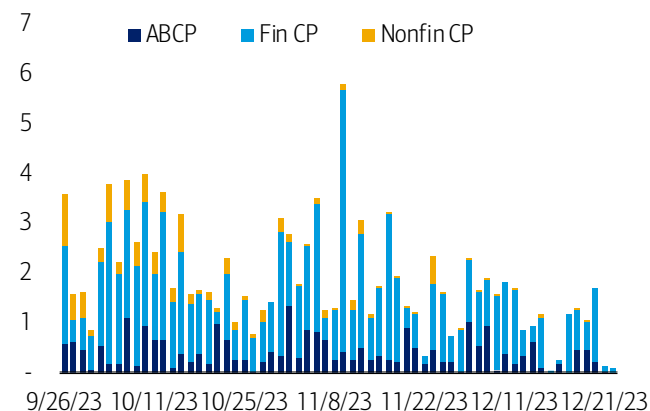


Source: BofA Global Research, Federal Reserve

BofA GLOBAL RESEARCH

**Exhibit 15: CP maturing in the next 3 months (\$bn)**

CP maturing in the next 3m largely concentrated in financial CP

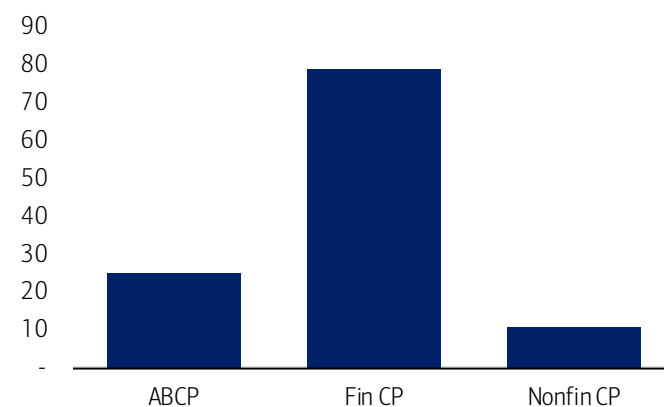


Source: BofA Global Research, Crane

BofA GLOBAL RESEARCH

**Exhibit 16: Total CP maturing in the next 3 months by category (\$bn, as of 09/25/2023)**

CP maturing in the next 3m largely concentrated in financial CP

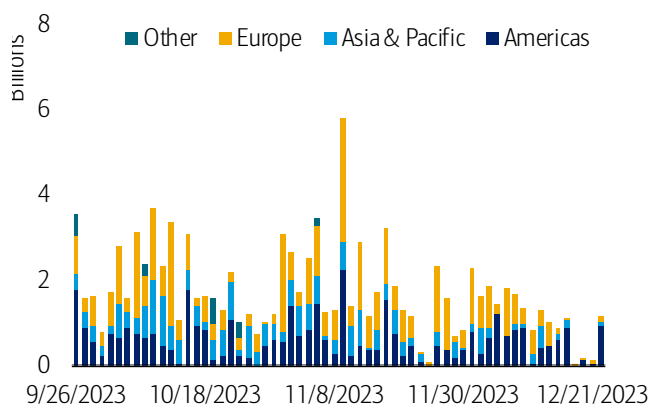


Source: BofA Global Research, Crane

BofA GLOBAL RESEARCH

**Exhibit 17: CP maturing by region (\$bn)**

Amount of CP maturing mostly seen in Americas &amp; Europe

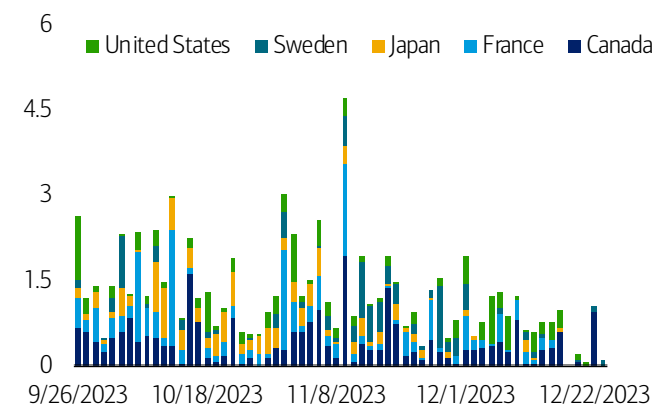


Source: BofA Global Research, Crane Data

BofA GLOBAL RESEARCH

**Exhibit 18: Top 5 CP maturing by country (\$bn)**

Country-wise amount of CP maturing mostly seen in Canada, France &amp; US



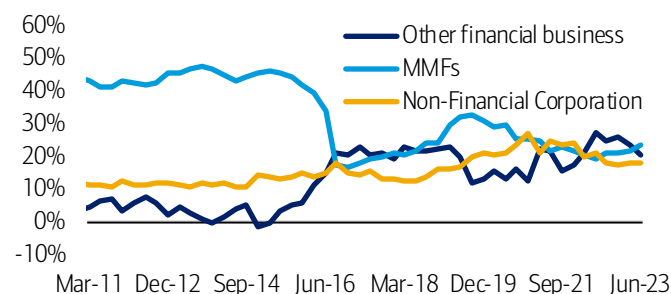
Source: BofA Global Research, Crane Data

BofA GLOBAL RESEARCH

## CP holders

### Exhibit 19: Top 3 holders CP holdings over time

CP demand from other financial business declined in Q2 '23



Source: BofA Global Research, Federal Reserve

BofA GLOBAL RESEARCH

### Exhibit 20: CP holders as of end Q2 2023 (% total)

The largest CP buyers in Q2 '23 is money market mutual funds

	\$bn	% Total
MMFs	263	23.3%
Other Financial Business	234	20.8%
NonFinancial Corporation	206	18.2%
Foreign Institutions	172	15.2%
Other	-875	-77.5%
State & Local Govt	87	7.7%
Mutual Funds	40	3.5%
Total	1130	100%

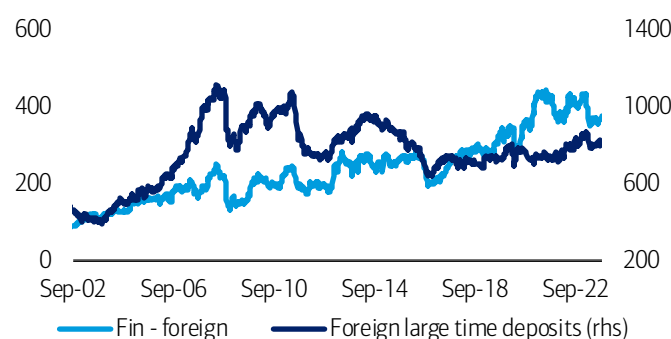
Source: BofA Global Research, Federal Reserve

BofA GLOBAL RESEARCH

## Foreign CP

### Exhibit 21: Foreign fin CP outstanding & large time deposits (NSA, \$bn)

Foreign fin CP & large time deposits have stabilized recently



Source: BofA Global Research, Haver

BofA GLOBAL RESEARCH

## CP issuers

### Exhibit 22: Total CP top 5 issuers by country (as of 08/31/2023)

Canada was the largest issuer in terms of total CP

	\$bn	% Total
Canada	62	22%
France	47	17%
United States	40	14%
Japan	24	8.4%
Sweden	20	7.2%

Source: BofA Global Research, Crane

BofA GLOBAL RESEARCH

### Exhibit 23: ABCP top 5 issuers by country

France has the largest issuance in ABCP

	\$bn	% Total
France	19	33%
Canada	13	22%
United States	12	21%
Japan	6	11%
United Kingdom	6	10%

Source: BofA Global Research, Crane

BofA GLOBAL RESEARCH

### Exhibit 24: Fin CP top 5 issuers by country

Canada leads the largest issuance in financial CP

	\$bn	% Total
Canada	44	24%
Sweden	20	11%
United States	18	10%
Australia	15	8%
France	15	8%

Source: BofA Global Research, Crane

BofA GLOBAL RESEARCH

### Exhibit 25: Nonfin CP top 5 issuers by country

France leads the largest issuance in non-financial CP

	\$bn	% Total
France	13	33%
United States	9	23%
Canada	5	13%
Netherlands	4	11%
Japan	3	7%

Source: BofA Global Research, Crane

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

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

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

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

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

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

This information: has been approved for publication and is distributed in the United Kingdom (UK) to professional clients and eligible counterparties (as each is defined in the rules of the FCA and the PRA) by MLI (UK), which is authorized by the PRA and regulated by the FCA and the PRA - details about the extent of our regulation by the FCA and PRA are available from us on request; has been approved for publication and is distributed in the European Economic Area (EEA) by BoFASE (France), which is authorized by the ACPR and regulated by the ACPR and the AMF; has been considered and distributed in Japan by BoFA Japan, a registered securities dealer under the Financial Instruments and Exchange Act in Japan, or its permitted affiliates; is issued and distributed in Hong Kong by Merrill Lynch (Hong Kong) which is regulated by HKSF; is issued and distributed in Taiwan by Merrill Lynch (Taiwan); is issued and distributed in India by BoFA India; and is issued and distributed in Singapore to institutional investors and/or accredited investors (each as defined under the Financial Advisers Regulations) by Merrill Lynch (Singapore) (Company Registration No 198602883D). Merrill Lynch (Singapore) is regulated by MAS. Merrill Lynch Equities (Australia) Limited (ABN 65 006 276 795), AFS License 235132 (MLEA) distributes this information in Australia only to "Wholesale" clients as defined by s.761G of the Corporations Act 2001. With the exception of Bank of America N.A., Australia Branch, neither MLEA nor any of its affiliates involved in preparing this information is an Authorised Deposit-Taking Institution under the Banking Act 1959 nor regulated by the Australian Prudential Regulation Authority. No approval is required for publication or distribution of this information in Brazil and its local distribution is by Merrill Lynch (Brazil) in accordance with applicable regulations. Merrill Lynch (DIFC) is authorized and regulated by the DFSA. Information prepared and issued by Merrill Lynch (DIFC) is done so in accordance with the requirements of the DFSA conduct of business rules. BoFA Europe (Frankfurt) distributes this information in Germany and is regulated by BaFin, the ECB and the CBI. BoFA Securities entities, including BoFA Europe and BoFASE (France), may outsource/delegate the marketing and/or provision of certain research services or aspects of research services to other branches or members of the BoFA Securities group. You may be contacted by a different BoFA Securities entity acting for and on behalf of your service provider where permitted by applicable law. This does not change your service provider. Please refer to the [Electronic Communications Disclaimers](#) for further information.

This information has been prepared and issued by BoFA and/or one or more of its non-US affiliates. The author(s) of this information may not be licensed to carry on regulated activities in your



jurisdiction and, if not licensed, do not hold themselves out as being able to do so. 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

---

**Mark Cabana, CFA**

Rates Strategist

BofA

[mark.cabana@bofa.com](mailto:mark.cabana@bofa.com)

**Bruno Braizinha, CFA**

Rates Strategist

BofA

[bruno.braizinha@bofa.com](mailto:bruno.braizinha@bofa.com)

**Ralph Axel**

Rates Strategist

BofA

[ralph.axel@bofa.com](mailto:ralph.axel@bofa.com)

**Meghan Swiber, CFA**

Rates Strategist

BofA

[meghan.swiber@bofa.com](mailto:meghan.swiber@bofa.com)

**Katie Craig**

Rates Strategist

BofA

[katie.craig@bofa.com](mailto:katie.craig@bofa.com)

**Anna (Caiyi) Zhang**

Rates Strategist

BofA

[caiyi.zhang@bofa.com](mailto:caiyi.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.