

## Global Research Unlocked

## Slowing the shrink; the impact and impetus behind a QT moderation

## Key takeaways

- BofA Global Research analysts join the podcast to discuss emerging risks, opportunities, and growth themes in global markets
- The Fed is likely to slow Quantitative Tightening (QT) this year, which, by itself, could mean slightly lower Treasury yields
- We discuss how QT works and whether we'd expect to see another round of Quantitative Easing

26 February 2024

Macro

United States

**Thomas (T.J.) Thornton**

Head of Research Marketing

BofAS

+1 646 855 2449

thomas.thornton2@bofa.com

**Mark Cabana, CFA**

Rates Strategist

BofAS

**Michael Gapen**

US Economist

BofAS

BofA SECURITIES 

## Global Research Unlocked: Slowing the shrink; the impact and impetus behind a QT moderation



## Rate policy isn't the only big Fed change likely for '24

Since emerging from the COVID pandemic, the Fed has contracted the size of its balance sheet, also known as Quantitative Tightening (QT). They've done this by allowing their Treasury holdings to mature without reinvesting the proceeds. This has placed upward pressure on yields, all else equal. But the Fed is expected to slow this process later this year. Mark Cabana says this is good news for the Treasury market as it means the private sector will have less total supply to absorb. And while some investors are fond of making the connection between the Fed balance sheet and the S&P 500, it's interesting that the S&P is making new highs while the balance sheet has shrunk, albeit from elevated levels. Mike Gapen discusses why that may be happening. *Global Research Unlocked can now be found on public podcast platforms, including Spotify, Apple Podcasts, Google Podcasts, and Amazon Music. These podcasts are first released to clients and then to the platforms.*

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.**

12662746

Timestamp: 26 February 2024 05:00AM EST

# Full Podcast Transcript

**T.J. Thornton, Head of Product Marketing:** Hello and welcome to Global Research Unlocked, where we discuss what's rising from growth industries, rising risks and opportunities in global markets. I'm T.J. Thornton, Head of Product Marketing at BofA Global Research, and we're recording this episode on Monday, February 5, 2024.

*We think are likely why the Fed will be slowing down QT because they don't want to force banks to let go of some of that valuable excess liquidity that they're choosing to hold onto. And they certainly don't want to do that and risk, potentially, putting banks in a situation where they don't have enough liquidity to meet any outflows that they experience or they don't have enough liquidity to avoid large scale securities sales. And that's the key reason why we think they'll be slowing down QT later this year.*

- Mark Cabana

Much of the focus on the Fed has been on when, or by how much they might cut interest rates, but it's not just rate policy that's changing. The Fed is currently reducing the size of its balance sheet by selling bonds or letting them mature, but the Fed's expected to slow this process down later this year. We'll discuss what that might mean for interest rates and just how important excess liquidity is for asset prices and the US economy. Joining us today are Mark Cabana, Head of US Rates Strategy, and Mike Gapen, Head of US Economics. Thanks for joining us today.

**Mark Cabana, Head of US Rates Strategy:** Thanks for having us.

**Michael Gapen, Head of US Economics:** Thanks for having us T.J.

**T.J. Thornton:** Sure, first question's for Mark. Back to this concept of QT or Quantitative Tightening, could you just give us a basic definition of what it is and also what kind of impact you think it's had on rates?

**Mark Cabana:** The Fed has been going through a process of reducing the size of its balance sheet. The market has known this as Quantitative Tightening or QT. When the Fed allows its balance sheet to contract, it's really allowing its securities holdings, primarily its holdings of Treasury securities and agency mortgages, to redeem without reinvestment. The Fed has set a certain amount of redemptions each month that it will tolerate in its Treasury and mortgage portfolio. They've set that target at \$60 billion per month for Treasuries, \$35 billion per month for mortgages, and they allow these securities to roll off without reinvestment. Now, importantly for the market is that, as the Fed allows this process of its securities portfolio to unwind or to reduce over time that does in turn mean that the private sector has to hold more of these securities. In essence, for every dollar that matures off of the Fed's portfolio in their Treasury holdings, that's one more dollar that the private sector needs to hold as well, and that increases the stock of duration risk that the private sector needs to absorb, and in theory, more duration risk to the market should put more upward pressure on yields. Now, before the Fed started QT, and they really started QT or this process of unwinding their balance sheet post-COVID in June of 2022, before they started in this process, we estimated that there could be a 40 basis point impact on the 10-Year Treasury Yield from the expected reduction of their securities portfolio. Now, that's a very imprecise estimate. It uses rough rules of thumb that prior event studies around Fed balance sheet activity have created. And since then we have obviously seen 10-Year Treasury Yields rise by much more than 40 basis points, but we do think that the unwind or the reduction of the Fed's securities portfolio has put upward pressure on Treasury yields and it has caused Treasuries to cheapen, let's say versus SOFR (Secured Overnight Financing Rate) swaps. And if you look at 2 year SOFR swaps or 10 year SOFR swaps, since the Fed started the QT process, you've seen at least 2 year Treasuries cheapened by about 15 basis points and 10 year Treasuries cheapened by about 15 basis points.

**T.J. Thornton:** Mark, the next evolution in QT is a tapering or a slower shrinking of the balance sheet. It's not like they're going back to QE (Quantitative Easing), where they're buying a bunch of bonds and mortgages during COVID and during the financial crisis. But what does this next phase mean for rates and other parts of the market, do you think?

**Mark Cabana:** Sure, the Fed is discussing publicly the idea of slowing down the pace of their securities portfolio runoff or engaging in a slower QT process. Now remember the Fed is reducing its balance sheet by \$60 billion per month in Treasuries, \$35 billion per month in mortgages or up to that amount. And they're going to presumably reduce the maximum monthly reduction in Treasuries as they slow the balance sheet. We don't know the timing. Mike and I think that it will probably happen in the first half of this year. We actually, as a base case now have the timing for a slowdown in the Fed's balance sheet reduction occurring at the May FOMC (Federal Open Market Committee) meeting. We pushed that out from March based upon some guidance that we heard from the Fed at the January FOMC meeting. But we think that's when they will announce a slowdown in QT and they will be doing that because they don't want to withdraw too much excess liquidity from the banking system where they want to be a bit more careful about that withdrawal, as they continue to proceed with QT. What does this mean for rates? It has meant that there would be less supply that the market is expecting it will need to take down as the Fed slows the shrinkage of its balance sheet. Certainly, good news for the Treasury market, in that if the Fed slows QT, it will mean less total supply that the private sector needs to take down and somewhat less duration risk that the private sector needs to hold as the Fed slows QT.

**T.J. Thornton:** Okay, great. I wanted to move a bit into some of the real world impacts of QT. Capital markets, as we were reminded recently, didn't rebound as much as many expected last year. There are a lot of factors behind that, but do you think QT plays a role at least through the provisioning of liquidity?

**Michael Gapen:** Hey, T.J., I do think QT played a role, maybe not so much on the liquidity side of the story, but on the duration side, as Mark mentioned when the Fed is shrinking its balance sheet, it's putting longer dated Treasury mortgage backed securities out into the hands of private holders, and generally that puts upward pressure on interest rates. Now, the Fed started to taper in June of 2022, but it was signaling in advance that this was likely coming. The S&P 500, for example, peaked out at just short of, I think 4800 in late 2021, and it didn't rise above that level again until December of 2023, so it played a part in addition to higher front end rates, communication from the Fed that it would do whatever it takes to slow inflation down, even if that meant inducing a recession, which obviously didn't come, thank goodness. But I do think QT played a role in keeping asset markets subdued over the course of 2022 and slowed the rebound in 2023.

**Mark Cabana:** Yeah, maybe building on Mike's response, when we, at least on the Rates Strategy team think about the impact of QT in the capital markets more broadly, we generally think about it in terms of what is the additional increase in Treasury yields that will be required for the private sector to hold the amount of debt that needs to be issued by the government. And again, if the Fed is allowing its securities to roll off, then there's more duration risk that the private sector needs to hold. Now, that's how we think the clearest connection to capital markets works, but there is a very meaningful cohort in the market that I sometimes describe as "M2 Equity Investors." These are folks who are investing in risk assets and they typically are thinking about the attractiveness of risk assets in relation to what the central bank or the Fed's balance sheet is doing. And if the Fed is believed to be adding liquidity into the system, growing the money supply as a result of the balance sheet growth, then these investors want to be positioned for risk on, and the same is true, if the Fed is shrinking its balance sheet. If the Fed is indeed shrinking its sheet, this section of capital markets will probably be a bit more cautious on risk, and that may indeed have been one of the factors at play that was behind the

struggles that a risk assets had for a period of time as the Fed was signaling QT and also starting its rate hiking process.

**T.J. Thornton:** Got it. And I wanted to follow up on that idea because right, many of us have seen the chart that shows money supply versus say the S&P. Money supply or at least the Fed's balance sheet has been rolling over. It's off the highs. Is that the same as money supply for one? And then how do you explain the fact that despite that rolling over of markets, at least the S&P, the NASDAQ, some of the big US indices are sitting at highs, does that sort of challenge that view?

**Michael Gapen:** I would say that the balance sheet equal to the money supply, no, it's when securities are purchased or sold, it's certainly a component of the money supply: reserves, currency, what we would call base money, but there are other components longer term time deposit CDs and other types of near money that comprise M1 and M2. Not necessarily should we think of say a direct one-to-one relationship. In general, yes, I think the size of the Fed's balance sheet should be correlated or have positive correlation with asset prices and economic growth. Again, when the Fed's buying assets, it's taking longer duration securities out of the market, putting downward pressure on term premium, the reverse happens when it runs its balance sheet off. But as you mentioned, T.J., the balance sheet's been running off for quite a while now, but the economy and asset markets have done pretty well, so I think it kind of points to two things. One, this is really our second cycle using the balance sheet and there's a lot we don't know about its transmission mechanism, how strong it is. As Mark mentioned, we may not be getting a very large movement in long-term Treasury yields for very large purchases or sales in Treasury securities from the Fed's balance sheet, maybe just the relationship isn't quite that strong. The other thing I think it tells you is that the US emerged from the pandemic in a very good state, and the economy overall was resilient to interest rate increases, whether that came from the Federal Reserve, Federal funds rate increases or a shrinking balance sheet.

**T.J. Thornton:** Okay. This one's for both of you. One of the ways that QT is transmitted to the economies through bank reserves at the Fed, but bank reserves haven't fallen as quickly as maybe you'd expect, as the Fed balance sheet has come off or rolled over. Does this negate the impact that QT would've had, just the fact that bank reserves have stayed high and is just a matter of time before reserves start to fall more quickly in line with the Fed balance sheet?

**Mark Cabana:** Now, as the Fed has conducted QT, they have reduced their balance sheet by almost \$1.3 trillion. The securities portfolio has comprised \$1.37 trillion of that reduction. And what we have observed is that on the liability side of the Fed's balance sheet, really all of QT over 100% of QT has been absorbed by a decline in this overnight reverse repo facility. It's the excess cash that money funds are investing with the Fed on a daily basis. And we've seen that reserve balances have actually grown, so the cash that commercial banks want to hold with the Fed has gone up. And we don't think that this is accidental. Money market mutual funds are investing less with the Fed because there's been an increase in debt outstanding. There's been an increase in Treasury bill supply, money market rates are higher and so money funds are choosing not to invest as much cash with the Fed. They're choosing to invest in higher yielding, private sector alternatives, money market alternatives. And we think that reserve balances and commercial banks have gone up because they're demanding more liquidity and they're demanding more liquidity we think because they want to ensure that they've got adequate liquidity, if they see deposit outflows. There was some banking system stress that we all know in 2023 very well. We believe that banks are choosing to hold more liquidity because they're sitting on still large unrealized securities losses. They never want to sell a security, if they can avoid it, and the best way to avoid that is to hold more cash with the Fed. And they're also holding more cash with the Fed because some of the supervisory or regulatory guidance that they have received around how they manage their liquidity has changed. We've really seen that QT has been evolving on the liability side of the Fed balance sheet by lower RRP (Reverse Repurchase Agreement) balances. Reserves have gone up, and we do think that reserves are going up for very

prudent liquidity risk management reasons. Now it's only a matter of time, if the Fed continues QT, before these reserve balances start to fall. Total utilization of the Fed's overnight RRP, at least as of today, is around \$550 billion. If the Fed continues QT for another six months or so, the overnight RRP will almost certainly be at zero. And then once reserve balances start to fall; it will drain some of that really valuable liquidity that banks have been holding onto away from them. And the question is, how willing will banks be to let that excess liquidity go and what risks might go along with that if the Fed were to continue QT? And these questions, we think are likely why the Fed will be slowing down QT because they don't want to force banks to let go of some of that valuable excess liquidity that they're choosing to hold onto. And they certainly don't want to do that and risk, potentially, putting banks in a situation where they don't have enough liquidity to meet any outflows that they experience or they don't have enough liquidity to avoid large scale securities sales. And that's the key reason why we think they'll be slowing down QT later this year.

**T.J. Thornton:** Okay, thank you Mark. Another question, I've mentioned QE a few times perhaps 'cause I remember it very fondly. But we're currently not expecting recession in the US, at least that's not our econ teams forecast, but if we did see one over the next several years, do you think that the Fed would turn to QE again?

**Michael Gapen:** I think that the answer to that of course depends on how deep the recession would be, but certainly, I think I would lean in the direction of saying would the Fed turn to QE again? Yes, I think it very well could. I do think the neutral rate of interest has risen in the US economy coming out of COVID, but perhaps not by all that much to avoid zero lower bound episodes going forward. It's completely conceivable in my mind that say for example, the Fed begins to normalize rates later this year and it puts them on a track to a terminal policy rate, say at about 3%, so you're right, we're not currently expecting a recession in the US. If the Fed is able to get most of the way through its normalization cycle, the funds rate is sitting somewhere about 3% nominal terms, it should be roughly a 100 basis points in real terms, if inflation's running 2%, that's not a lot of room to cut rates. If we look back historically, rate cutting cycles and response to recessions often involve 300 basis points or more of policy rate cuts. In my mind, it's completely conceivable that the Fed could find itself at the zero lower bound again in future downturns, and then debate, do we need to turn back to the balance sheet again? Do we need to buy Treasuries and mortgage backed securities again? Do I think the Fed would turn to QE? Yes, they probably wouldn't want to. Of course they would prefer just to conduct policy with interest rate policy, but they've got a mandate to achieve if they found themselves at the zero lower bound, I think they would turn to QE again.

**T.J. Thornton:** Okay. And another question just on the current state of affairs in the US economy, obviously we are not looking for recession. However, the path of QT of rate cuts will be determined in large part by what happens with inflation, what happens with US growth. What do you think is happening with US growth at the moment? We recently had a strong employment report; December retail sales were very strong as well. Are we seeing any signs that higher rates are having an impact? There's an assumption that they will, but are we seeing that yet or is it inevitably, getting pushed out?

**Michael Gapen:** I think there's two places that we can point to for signs that higher interest rates are having or have had an impact on the economy. I think these would be housing and bank loan growth. Certainly activity in the housing sector has slowed down in response to higher mortgage rates. There's been structural demand for housing coming out of COVID. We're underbuilt relative to our demographics. And for a variety of reasons, the sector has not seen a major contraction like it often has when the Fed's raised rates this fast. But nonetheless, inventories are low. There's been a lock in effect from higher mortgage rates, so there hasn't been a lot of activity yet, but I think it's a sector that I think has clearly responded to higher rates by slowing down. And the second area I mentioned would be bank lending, where growth on a year on year basis, commercial and industrial loans are down in nominal terms and lending to households for the residential real estate market, as well as consumer loan growth, those have both



slowed down to roughly 3-4% in nominal terms over the past year or roughly flat in real terms. It's an open question though, what's happening in the economy. Certainly in the second half of last year, growth and economic activity reaccelerated; the US had a very good second half of 2023. I would say it's too early to conclude that say hiring in the labor market is reaccelerating after the January employment report last week. So certainly a blowout number and I think the labor market is in very solid footing, but distortions in activity around the end of the year from COVID where, for example, we make our holiday purchases earlier than we used to. And since we're still catching up on employment and many face-to-face leisure and hospitality service sectors, we don't have as many of the normal post-holiday layoffs as we used to, so I think the seasonal factors tend to boost January employment. I'm not here to say that report was weak by any means. I just question whether it was as strong as the headline number suggests. We don't expect a recession in 2024, and we think the outlook looks reasonably good. If the Fed's able to begin its normalization cycle later this year, housing could look better, bank loan growth could improve, the industrial side of the economy could gradually recover, and I think recession risk could be lowered even more.

**T.J. Thornton:** Mark and Mike thanks for joining us today.

**Michael Gapen:** Thank you.

**Mark Cabana:** Thanks for having us T.J.

**T.J. Thornton:** It's hard to quantify it exactly, but QT has likely pushed Treasury rates higher, especially at the long end, so tapering of QT should be helpful in bringing rates down at least modestly when it does happen. Between big deficits and QT, there's been a lot of Treasury supply for the market to absorb and the aspect that's tied to QT at least will ease. We expect tapering to start in May, but it has been a moving target and could change again. And for those investors that invest according to whether money supply or M2 is rising or falling, less of a decline in the Fed's balance sheet should mean less liquidity drain, a positive. Also, Mark makes an interesting point, which is that bank reserves will eventually fall if QT continues. This is one reason the Fed is sensitive to letting this process continue for too long. Thanks for joining.

# 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

From time to time research analysts conduct site visits of covered issuers. BoFA Global Research policies prohibit research analysts from accepting payment or reimbursement for travel expenses from the issuer for such visits.

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. 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 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.

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.**

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 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; BoFA Japan: BoFA Securities Japan Co., Ltd., regulated by the Financial Services Agency; Merrill Lynch (Seoul): Merrill Lynch International, LLC Seoul Branch, regulated by the Financial Supervisory Service; Merrill Lynch (Taiwan): Merrill Lynch Securities (Taiwan) Ltd., regulated by the Securities and Futures Bureau; BoFA India: BoFA Securities India Limited, regulated by the Securities and Exchange Board of India (SEBI); Merrill Lynch (Israel): Merrill Lynch Israel Limited, regulated by Israel Securities Authority; Merrill Lynch (DIFC): Merrill Lynch International (DIFC Branch), regulated by the Dubai Financial Services Authority (DFSA); Merrill Lynch (Brazil): Merrill Lynch S.A. Corretora de Títulos e Valores Mobiliários, regulated by Comissão de Valores Mobiliários; Merrill Lynch KSA Company: Merrill Lynch Kingdom of Saudi Arabia Company, regulated by the Capital Market Authority.

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

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

This report may contain a short-term trading idea or recommendation, which highlights a specific near-term catalyst or event impacting the issuer or the market that is anticipated to have a short-term price impact on the equity securities of the issuer. Short-term trading ideas and recommendations are different from and do not affect a stock's fundamental equity rating, which reflects both a longer term total return expectation and attractiveness for investment relative to other stocks within its Coverage Cluster. Short-term trading ideas and recommendations may be more or less positive than a stock's fundamental equity rating.

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.

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 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 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.