

Japan Viewpoint

YCC removal dovish if BoJ keeps current monthly JGB purchases

BoJ's policy normalization – focus on balance sheet policy

We expect the BoJ to declare its 2% price stability target “in sight,” end NIRP, and the overall framework of YCC in either the March or April MPM. Our base case has been the April, but recent newsflow point to an increasing probability that the move comes at the central bank's next policy meeting, on 18-19 March. Given that investors have fully priced in NIRP removal by April, the BoJ's decisions around its balance sheet policy, particularly its purchases of JGBs, are a bigger source of potential volatility for markets. In this report we discuss our view on the BoJ's management of its bond purchases “post-NIRP,” and market implications.

YCC vs Quantity: normalization options

Following the exit from NIRP, the BoJ largely has three options for how it communicates its JGB purchase guidelines: 1) Transition to “soft YCC”, with continued focused on the level of yields; 2) Flow target with guidelines for monthly JGB purchase quantities; 3) Stock target focusing on the balance of JGB holdings. As indicated by media reports, our base case is that the BoJ moves to a flow target, initially establishing a monthly guideline for JGB purchases of around JPY6trn/month, in line with the current purchase pace of JPY5.9trn/mo. Since this is slightly above the average pace of expected redemptions for the BoJ's JGB holdings in FY24 (JPY5.6trn/mo), it implies that the size of the BoJ balance sheet will remain largely flat for now. The BoJ is unlikely to shift the target purchase pace and officially announce QT before its second hike to 0.25% (base case = Oct 2024).

Market implications

We think investors would do well to look at the detail of potential policy changes. Keeping YCC and removing the floor for purchase quantities (established by the overshooting commitment to expanding monetary base) would actually be hawkish as the BoJ can reduce the pace of JGB buying to drive yields higher. In contrast, a decision to scrap YCC may be initially perceived as hawkish by markets. However, if the BoJ communicates to the market that the pace of its JGB purchases will remain largely unchanged from current levels, as we expect under our base case, the JGB market would stabilize as markets price out the risk of quantitative tightening (QT) in the near term.

Flow target of JPY6tn monthly JGB purchases = dovish

If it chooses flow target of JPY6tn/month, the 10yr JGB yield may stabilize around 0.75% (0.7-0.80% range), and USD/JPY's decline would be limited to 145. We focus on the BoJ's guidance on rate hikes and balance sheet policy. If guidance is also dovish, it increases the risk of a further rise in USD/JPY and high pressure economy as the market would expect continued tight supply/demand balance in the JGB market and indicates the board's dovishness. Coupled with accelerating structural outflows from Japan, the lack of reductions to the BoJ's bond purchases in 2024 raises the risk of USD/JPY rising to 160 by 2025. The risk against our base case is therefore an earlier start of QT in 2H24 (vs 2025).

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 10 to 12.

12667150

Timestamp: 12 March 2024 11:03AM EDT

13 March 2024

Rates Research
Japan

Shusuke Yamada, CFA
FX/Rates Strategist
BofAS Japan
+81 3 6225 8515
shusuke.yamada@bofa.com

Izumi Devalier
Japan and Asia Economist
BofAS Japan
+81 3 6225 6257
izumi.devalier@bofa.com

Takayasu Kudo
Japan and Asia Economist
BofAS Japan
+81 3 6225 8592
takayasu.kudo@bofa.com

Tomonobu Yamashita
Rates Strategist
BofAS Japan
+81 3 6225 7950
tomonobu.yamashita@bofa.com

QT: Quantitative tightening

NIRP: Negative interest rate policy

MPM: Monetary policy meeting

BoJ: Bank of Japan

YCC: Yield curve control

QE: Quantitative easing

JGB Japanese government bond

QQE: Quantitative and qualitative easing

No cut to JGB purchases = risk of BoJ seen too dovish

On March 8, Jiji press reported the following, without naming a source:

- (1) The BoJ is considering scrapping yield curve control in favor of a new “quantitative” policy framework that will show the outlook for the central bank’s upcoming bond buying amounts;
- (2) The transition to the new framework would be delivered alongside the exit from negative interest rate policy (NIRP), as early as the 18-19 March MPM;
- (3) For the time being, the guideline for monthly bond purchases would be based on the current pace, which is slightly less than JPY6tn
- (4) While the commitment to maintain the current pace of bond purchases is designed to prevent a rapid rise in JGB yields associated with the exit from NIRP and transition to policy normalization, it is also intended to improve bond market functioning by allowing further fluctuations in yield
- 5) That said, in the event of a sudden rise in yields, the BoJ would respond nimbly, i.e. by increasing its JGB purchases.

Jiji’s report, which we view as credible, raises the likelihood that yield curve control will be scrapped at the time of its policy overhaul and replaced with a directive focusing on the flow of its monthly JGB purchases, which is likely to be set at “around JPY6trn.”

The market has shown a hawkish reaction to the reports, with the 10yr JGB yield rising to 0.77% from 0.73% over the weekend. However, the lack of a cut to the BoJ’s monthly purchases would keep supply/demand balance in the JGB market tight and would have dovish implications for the rates/FX market in 2024.

Unless accompanied by hawkish guidance on further rate hikes (which is not our base case), or signals that the JPY6trn may be reduced further in due course, the BoJ’s upcoming exit from NIRP/YCC may be interpreted as a “dovish hike,” limiting the rise in long-end yields and making the current rally in the yen short-lived.

Below, we discuss our views on the BoJ’s policy, focusing on its balance sheet policy and draw market implications.

Lingering uncertainties around balance sheet policy

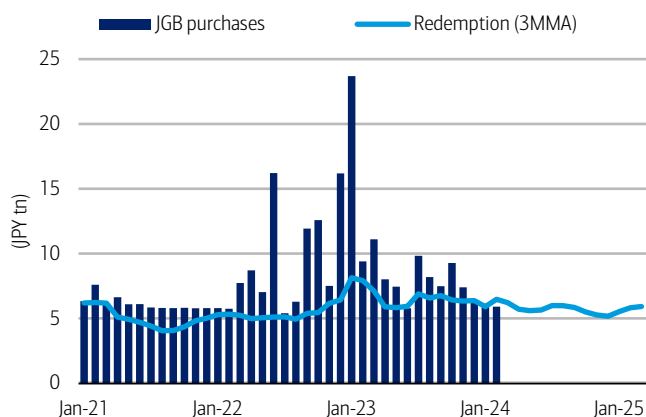
While the markets’ focus has thus far been focused on the timing and likelihood of NIRP removal, the BoJ has indicated that upcoming policy changes would likely involve a fairly comprehensive overhaul of its current large-scale easing program ([BoJ Watch: Jan MPM Summary of Opinions: further signals for Mar/Apr policy change](#), 31 January 2024).

This would include potential revisions to the overall framework of yield curve control, as well as the 2% inflation overshooting commitment, which obliges the BoJ to continue expanding the monetary base, until its price stability target is durably achieved.

Repeated adjustments to the YCC de facto ceiling for the 10yr JGB yield have allowed the central bank to gradually reduce its monthly JGB purchases, to JPY 5.9trn as of February. This is slightly above the average pace of redemptions on the central bank’s JGB holdings, which we estimate at JPY5.6trn in FY24 (Exhibit 1). Therefore, further reductions to the BoJ’s bond purchase pace would imply a reduction of the BoJ’s balance sheet.

Exhibit 1: BoJ's JGB buying (monthly) vs redemption (3mma)

BoJ still buys around as much as amount of redemption in its JGB portfolio

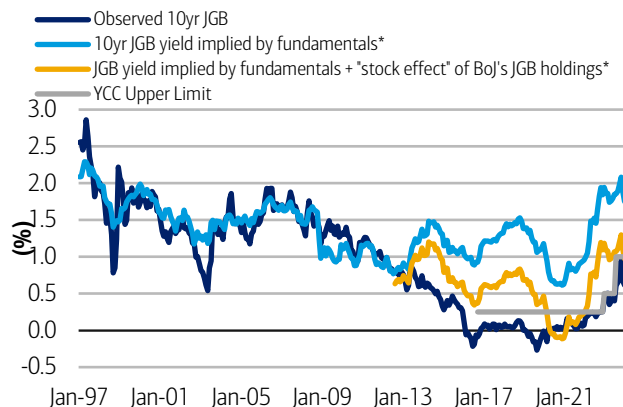


Source: BoJ, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 2: BofA's 10yr JGB yield "fair value" analysis

10yr JGB yield has room to rise if BoJ QT



Source: BoJ, MIC, MHLW, Bloomberg, BofA Global Research

*Inputs of "fundamentals": PCV (core CPI, active job openings-to-applicants ratio), 10yr UST yield

[Liquid Insight: BoJ could act if 10yr JGB yield hits 75bp 09 August 2023](#)

BofA GLOBAL RESEARCH

We expect the 2% overshooting commitment to be abolished

We expect the 2% inflation overshooting commitment to be abolished when the BoJ exits NIRP ([BoJ Watch: Jan MPM Summary of Opinions: further signals for Mar/Apr policy change](#), 31 January 2024). Though this would, in theory, allow the BoJ to reduce its JGB purchases further, resulting in QT, the BoJ has indicated that changes to its bond purchases would be made with a view to avoiding "discontinuities" in policy and the markets.

For example, in his speech in February, vice governor Uchida said the YCC framework is "a form of quantitative easing (QE) implemented through JGB purchases" so "simply terminating it is not the end of the story. Regardless of whether the framework will be terminated or be continued in some way, the Bank must consider how to proceed with subsequent JGB purchases and how to maintain the stability of markets during that process."

Uchida's comments imply that, even if the BoJ formally ends the yield curve control framework at the time of its policy overhaul, it is highly unlikely to abruptly stop buying JGBs, given its outsized influence on the JGB markets. But there are lingering uncertainties as to how quickly it will reduce its purchases. Given that the BoJ's cumulative JGB buying has likely contained the level of the yields by a significant margin (Exhibit 2), its decisions around its balance sheet policy, particularly its purchases of JGBs, are a bigger source of potential volatility for markets.

YCC vs Quantity: normalization options

Following the exit from NIRP, the BoJ largely has three options for how it determines, communicates its directive for JGB purchases.

1) Transition to "soft YCC": Though the BoJ may formally end its overall framework for QQE+YCC, as part of declaring its 2% price stability target "in sight," it could choose to retain a "reference yield" for the 10yr JGB yield. For example, it could retain "1%" or slightly higher level, as a soft ceiling for the 10yr JGB yield. The pace of bond purchases would then be determined endogenously by market conditions.

2) Flow target: In this scenario, the BoJ would abandon a price target for bonds and establish guidelines for JGB purchases focusing on the quantity of monthly purchases, which stood at around JPY5.9trn/month as of Feb '24.

3) Stock target: This scenario would also see the BoJ return to guidelines focusing on the balance of JGB holdings, which stood at around JPY597trn as of Feb 2024.

Note that prior to the introduction of YCC, in September 2016, the BoJ's policy directive committed the central bank to "purchase JGBs so that their amount outstanding will increase at an annual pace of about JPY80trn."

Jiji's report suggests if the BoJ removes YCC and moves to a quantity target, it would opt for guidelines focusing on the flow of purchases, not the stock of JGB holdings.

Base case: flow target, with no immediate QT

Our base case is that the BoJ moves to a flow target, establishing a monthly guideline for gross JGB purchases. Removing YCC and moving to a flow target can simply the policy framework and avoid the risk of YCC, but the hurdle for QT would increase (on pros/cons of each policy, see: Pros/Cons of YCC vs flow target).

Following the Jiji report, the monthly guideline is likely to be JPY6tn, around the current purchase pace of JPY5.9tn if the BoJ is to choose the flow target. Given that this is around the pace of expected redemptions in FY24 (JPY5.6tn), our forecast assumes that the size of the BoJ's JGB holdings will remain largely unchanged in 2024.

As the BoJ would be careful to not send an overly hawkish signal as it conducts policy exit, the BoJ is unlikely to lower the target purchase pace before its second hike, which we expect in 4Q24. This is consistent with our expectation that quantitative tightening (QT) would be delayed until 2025.

Risk of an earlier QT

However, uncertainty remains high, including how the BoJ communicates its future steps on rate hikes and balance sheet. The BoJ stressing it could reduce the JPY6tn guideline if conditions allow would lead the market to price in the risk of an early start of QT. The BoJ signaling some scope for deviation from the JPY6tn guideline – i.e. Ueda says JPY6tn only a guideline, not a hard target and they will manage it flexibly – could also make the market expect stealth QT – further reductions in JGB purchases.

On a dovish direction, the BoJ scrapping YCC but retaining unlimited fixed rate bond buying operations as a backstop in the JGB market would be a dovish surprise.

We think the risk against our base case is an earlier start of gradual QT in 2H24, considering net benefits QT would bring and the risk of USD/JPY overshooting on depressed domestic yields (see: Risk/benefits of quantitative tightening).

Market implications

Near term: Keeping YCC hawkish, flow target of JPY6tn dovish

We think investors would do well to look at the detail of potential policy changes. The market's reaction to a removal of YCC may be initially hawkish. However, if the BoJ communicates to the market that it would maintain the pace of bond buying in case of flow target policy, the JGB market would stabilize as it expects stable bond buying by the BoJ in the near term (see: Pros/Cons of YCC vs flow target).

Keeping YCC but removing the floor for purchase quantities (established by the overshooting commitment to expanding monetary base) would actually be hawkish as the BoJ can reduce the pace of JGB buying to drive yields higher.

Given positioning, there is a scope for USD/JPY's sell-off (see: [FX Watch: Japan BoP: yen's spring rally 08 March 2024](#)). If it scraps YCC and establishes a new guideline for flow JGB purchases at JPY6tn/month, as the Jiji report implies, the 10yr JGB yield may stabilize around 0.75% (0.7-0.80% range), and USD/JPY's decline would be limited to 145. If the BoJ retains YCC while scrapping the 2% overshooting commitment for the monetary base, we think the 10yr JGB yield can rise to 0.9-1.0% in the near-term and USD/JPY fall to 143-145.

Risk of uncomfortable rise in USD/JPY, risk of an earlier QT

Coupled with structural outflows from Japan and a resilient US economy (see: [FX Watch: Japan BoP: yen's spring rally 08 March 2024](#)), the lack of reductions to the BoJ's bond purchases throughout 2024 raises the risk of USD/JPY rising to 160 by 2025, potentially leading to a further rise in inflation expectations amidst a high-pressure economy.

With strong momentum in the spring wage negotiations and the risk of tight JGB demand/supply balance driving USD/JPY higher, the risk against our base case is therefore an earlier start of gradual QT in 2H24 (vs 2025).

Exhibit 7: Expected market reaction to BoJ's potential policy choice upon normalization

YCC to be hawkish, flow target to be dovish if JPY6tn in the near-term

	YCC (1% soft upper limit plus/minus 50bp allowance range)	Flow target (BoJ to keep the current pace of JGB buying with a bias to reduce over time)
Short-term implications	Hawkish as BoJ seen to reduce JGB purchases to let yields rise *10yr JGB to rise to 0.9% *USD/JPY to fall to 143-145	Less hawkish as BoJ unlikely to significantly reduce JGB buying immediately *10yr JGB stabilizes around 0.75% *USD/JPY's fall limited to 145

Source: BofA Global Research

BofA GLOBAL RESEARCH

Appendix

Risk/benefits of quantitative tightening

We discuss benefits and risk QT could bring. There are benefits that QT would bring, which could make the BoJ consider QT if conditions allow in coming months/quarters as it proceeds with policy normalization.

- **Improved bond market functioning:** After starting QQE in April 2013, the BoJ has been buying at least 43% of gross JGB issuance every month (Exhibit 3). As the BoJ has crowded out private investors from the market, measures of JGB market functioning have deteriorated (Exhibit 4). One of the opinions expressed at the December 2023 BoJ workshop conducting a "Broad-Perspective Review Of Monetary Policy" was that BoJ JGB holdings in excess of 70% of outstanding issuance reduces market trading volume. BoJ purchases of 5-10yr JGBs in January were equivalent to about 70% of new issuance during the month (see: [Japan Rates Watch: Policy revision expectations rising but BoJ unlikely to reduce Rinban ops 08 February 2024](#)).
- **Correct JGB's "overvaluation":** The BoJ's significant JGB buying has lowered the 10yr JGB yield well below the level implied by fundamentals (currently 1.7%, Exhibit 2). Depressed JGB yields have caused USD/JPY to rise as the US-Japan real interest rate spreads have widened to the highest level since 2007. As the risk of inflation relative to the risk of deflation has been rising, scaling back bond purchases could help bring policy back to an appropriate level by reducing the overvaluation of JGBs.
- **Create room for monetary easing in the future:** The size of the BoJ's balance sheet has risen to above 120% of Japan's GDP, by far the biggest among major central banks, creating outsized excess JPY liquidity (Exhibit 5). QT could help normalize the size of the BoJ's balance sheet and JPY's liquidity, and create room for monetary easing in the future.
- **Reduce the amount of payments of interests on excess reserves to banks:** When the BoJ exits NIRP, it would start paying net positive interests on excess reserve. QT could reduce the size of excess reserves and the amount of interest paid to banks. While slipping into negative income or negative equity should not, in

theory, constrain the BoJ's ability to implement monetary policy, ballooning interest rate payments could become a political and social issue (see [Impact of potential BoJ rate hikes \(part 3\): Effect on BoJ finances](#), 10 October 2023).

Risks associated with QT

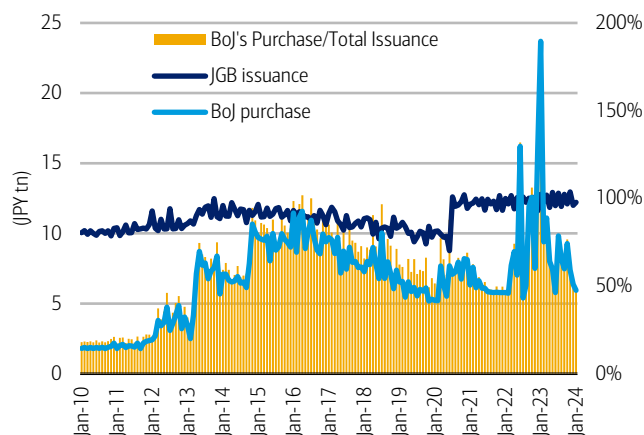
However, potential risks associated with QT could make the BoJ cautious in proceeding with QT, judging from its cautious and gradual approach to policy normalization to date:

- **Destabilization of the bond market:** As the BoJ scales back bond buying, the bond market, which has been under significant influence of the BoJ, could destabilize.
- **Unintended tightening signal:** QT could also send stronger policy tightening signal to the market. The BoJ's recent communications imply it wants to maintain certain level of policy accommodation after it exits NIRP.
- **Unrealized losses in the BoJ's JGB portfolio:** QT could drive JGB yields higher, which could lead to unrealized losses in the BoJ's JGB portfolio (see: [Japan Watch: Impact of potential BoJ rate hikes \(part 3\): Effect on BoJ finances 10 October 2023](#)). Although the BoJ does not mark to market its JGB holdings, as noted above, the deterioration of the BoJ's balance sheet could become a political issue and, at worst, lower the market and public's trust in the yen.

The upshot is that the BoJ's QT may not start right away and would be gradual even if it starts to reap these benefits of QT while avoiding the risks. Rapid explicit QT would be seen risky by the BoJ, as it could destabilize the bond market and send a policy tightening signal to the market when the BoJ's confidence level for sustainable 2% inflation is still not high enough to justify aggressive policy tightening.

Exhibit 4: BoJ's monthly JGB purchases vs gross JGB issuance

BoJ still buying about 50% of the total JGB issuance per month

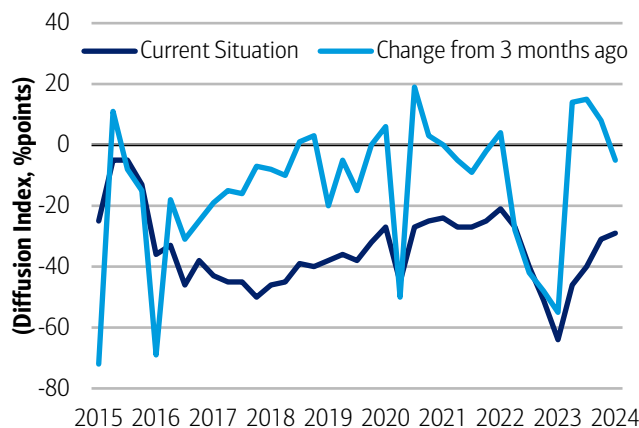


Source: MoF, BoJ, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 5: Measures of the degree of bond market functioning (BoJ's Bond Market Survey; latest = Feb 2024)

Scope for a recovery in bond market functioning

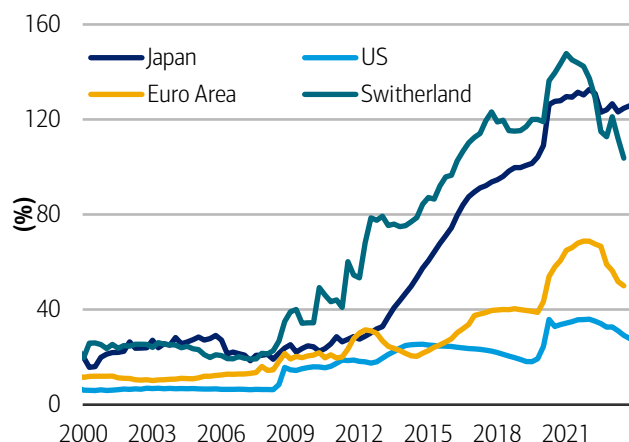


Source: BoJ, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 6: Central banks' balance sheets as % of nominal GDP

BoJ's BS exceeds 120% of nominal GDP

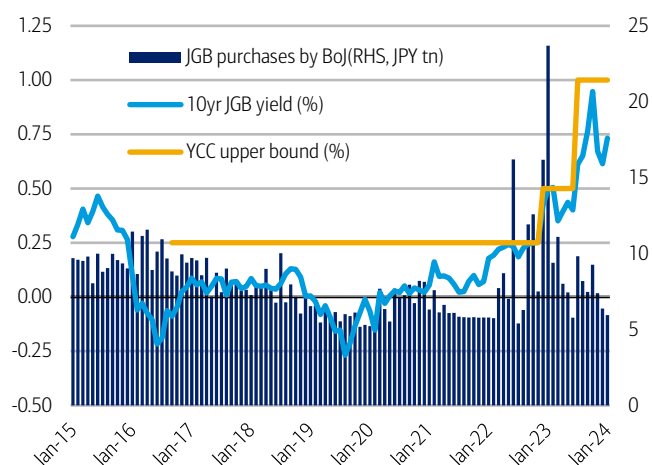


Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Exhibit 7: 10yr JGB yield, YCC and JGB purchases by the BoJ

BoJ increased its JGB purchases to defend the YCC



Source: BoJ, Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Pros/Cons of YCC vs flow target**YCC: Best option today for stealth QT but risk of YCC attack**

- **Procyclical** – YCC's biggest trait is its procyclicality. The presumption is that the BoJ would want to contain the impact of external shocks on the JGB market. It is easier for the BoJ to reduce JGB buying when foreign rates are stable or falling, while it may have to increase JGB buying when foreign rates are rising.
- **Today's environment = stealth QT possible** – Given the Fed's easing bias and the BoJ's willingness to let yields rise, the BoJ can reduce JGB buying to drive yields higher without explicit QT policy.
- **Ultimately, can contain yield level** – Another benefit of YCC is that the BoJ can ultimately justify containing the JGB yields by increased JGB purchases. This may be seen attractive to policymakers given Japan's high level of public debt outstanding and the BoJ's huge JGB holdings (though the BoJ does not have to mark-to-market).
- **Risk of YCC attack = unwanted rise in BS, higher FX vol** – However, if US rates rise, the market may attack YCC and the BoJ may have to defend it by increased JGB buying as it did in 2022 and 2023, leading to an unwanted balance sheet expansion by the BoJ (Exhibit 6) and another volatile rise in USD/JPY.
- **Arbitrariness of yield target** – Another issue is the arbitrariness of the yield target. The BoJ's choice for the "reference" price for the 10yr JGB yield should, in theory, be based on its assumptions regarding Japan's neutral rate. However, we think the central bank is reluctant to present a view on r^* at this point, given the inherent difficulties involved in its measurement as well as the fact that Japan's inflation regime is still in a transitional state. Without a proper debate on the neutral rate, the yield target can be seen arbitrary and too subjective by the market.

In summary, YCC would be the best option today if the BoJ wants to reduce JGB buying / holdings through stealth QT given a stable US rates environment. If the BoJ is to target 1% initially, the current bond buying pace, which has contained the 10yr JGB yield around 0.7%, would need to be slowed down. However, YCC's defining feature is its procyclicality and thus remains vulnerable in a higher US rates environment, as we saw in 2022 and 2023.

Flow target: Autonomy on balance sheet control but higher hurdle for QT

- **BoJ can control balance sheet** – The BoJ can take back full control of its balance sheet if it shifts to a flow target on its JGB holdings and let the market decide the yield level.
- **Strong signaling impact and higher hurdle for QT/QE** – Flow target policy would have a strong signaling impact as it implies the BoJ wants to expand or reduce its balance sheet. For this reason, the hurdle for QT and QE would be higher.
- **Limited control of yield curve** – The flip side of a flow target is the lack of control over the yield curve. It can impact the yield curve by adjusting the flow target, but flexibility would be limited given the signaling impact a change in the flow target has.

A flow target may be more orthodox than YCC as it does not intend to control the yield curve and it can be countercyclical. However, the lack of a hard backstop for JGB yields and strong signaling impact would raise the hurdle for QT. If the BoJ chooses to target the monthly JGB purchase at JPY6trn as reported, demand supply/demand balance in the JGB markets would remain tight.

Exhibit 8: 3 most likely options of BoJ's policy on bond buying: policy features and pros/cons

Keeping YCC would be hawkish, removing YCC and moving to a flow target of JPY6tn/month would be dovish

	YCC	Flow target
Policy target	10yr yield (point target with allowance range)	Balance of BoJ's JGB holdings
Cyclicality	Procyclical	Countercyclical
Market control vs balance sheet control	Strong market control vs weak BS control	Weak market control vs strong BS control
Pros	Immediate stealth QT possible Controllability of yield curve	Full control of quantity Strong signaling impact
Cons	Policy's procyclicality (YCC attack risk) Arbitrariness of yield target	High hurdle for QT/QE Lack of backstop in JGB market

Source: BofA Global Research

BofA GLOBAL RESEARCH

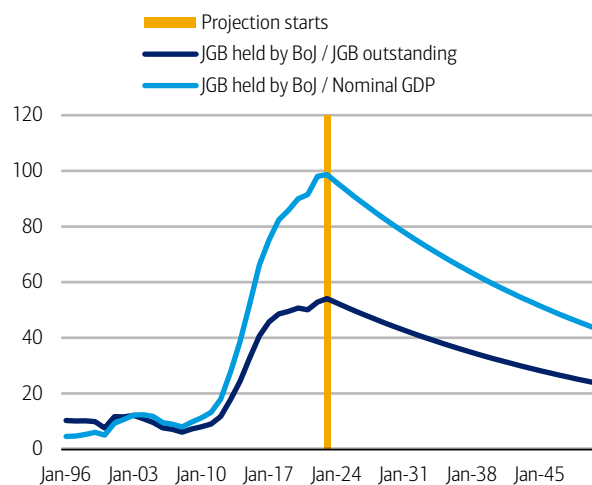
“Nominal QT” vs “real QT”

While our and market focus is on nominal QT, we think the aspect of real QT is also important from a longer-term perspective. For example, 3% nominal GDP growth would accumulate to 16% compound growth in 5 years, 34% in 10 years and 81% in 20 years (Exhibit 9). Even if the BoJ keeps the size of its JGB holdings unchanged, its share of nominal GDP and the JGBs outstanding (assuming the size of debt grows in parallel to the economy) will decline over time.

This “real QT” aspect could also exert upward pressure on yields over time as it erodes the stock effect of the BoJ's cumulative JGB purchases. However, if the BoJ is to rely on “real QT” without nominal QT, policy could remain too loose, exerting upward pressure on inflation breakeven and USD/JPY.

Exhibit 9: BoJ's JGB holdings as percentage of Japan's nominal GDP and JGB outstanding (assuming no change in JGB holdings and 3% nominal growth and JGB outstanding from 2024)

BoJ's JGB holdings will shrink relative to Japan's economy and JGB market over time if economy grows



Source: BofA Global Research, Cabinet Office, BoJ

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.

Individuals identified as economists do not function as research analysts under U.S. law and reports prepared by them are not research reports under applicable U.S. rules and regulations.

Macroeconomic analysis is considered investment research for purposes of distribution in the U.K. under the rules of the Financial Conduct Authority.

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

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

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

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

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

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

jurisdiction and, if not licensed, do not hold themselves out as being able to do so. BofAS and/or MLPF&S is the distributor of this information in the US and accepts full responsibility for information distributed to BofAS and/or MLPF&S clients in the US by its non-US affiliates. Any US person receiving this information and wishing to effect any transaction in any security discussed herein should do so through BofAS and/or MLPF&S and not such foreign affiliates. Hong Kong recipients of this information should contact Merrill Lynch (Asia Pacific) Limited in respect of any matters relating to dealing in securities or provision of specific advice on securities or any other matters arising from, or in connection with, this information. Singapore recipients of this information should contact Merrill Lynch (Singapore) Pte Ltd in respect of any matters arising from, or in connection with, this information. For clients that are not accredited investors, expert investors or institutional investors Merrill Lynch (Singapore) Pte Ltd accepts full responsibility for the contents of this information distributed to such clients in Singapore.

General Investment Related Disclosures:

Taiwan Readers: Neither the information nor any opinion expressed herein constitutes an offer or a solicitation of an offer to transact in any securities or other financial instrument. No part of this report may be used or reproduced or quoted in any manner whatsoever in Taiwan by the press or any other person without the express written consent of BofA Securities.

This document provides general information only, and has been prepared for, and is intended for general distribution to, BofA Securities clients. Neither the information nor any opinion expressed constitutes an offer or an invitation to make an offer, to buy or sell any securities or other financial instrument or any derivative related to such securities or instruments (e.g., options, futures, warrants, and contracts for differences). This document is not intended to provide personal investment advice and it does not take into account the specific investment objectives, financial situation and the particular needs of, and is not directed to, any specific person(s). This document and its content do not constitute, and should not be considered to constitute, investment advice for purposes of ERISA, the US tax code, the Investment Advisers Act or otherwise. Investors should seek financial advice regarding the appropriateness of investing in financial instruments and implementing investment strategies discussed or recommended in this document and should understand that statements regarding future prospects may not be realized. Any decision to purchase or subscribe for securities in any offering must be based solely on existing public information on such security or the information in the prospectus or other offering document issued in connection with such offering, and not on this document.

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

Futures and options are not appropriate for all investors. Such financial instruments may expire worthless. Before investing in futures or options, clients must receive the appropriate risk disclosure documents. Investment strategies explained in this report may not be appropriate at all times. Costs of such strategies do not include commission or margin expenses.

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 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.