

## IT Hardware Industry

## NTAP VAR survey indicates improving demand environment

## Industry Overview

**Demand environment improving; 4Q sales above plan**

45% of the VARs surveyed for C4Q23 saw sales track in line with their plan, and the weighted score for respondents at +0.8% for this survey was up from -0.3% in the prior survey. We use the weighted average score as an indicator of sentiment directionality rather than an absolute indicator. Storage demand sustainability improved in C4Q23 with 35% noting that the storage order pipeline has both long-term & short-term deals (was only 10% in November) and 65% answered that they were unclear if storage demand will sustain through CY24 (down from 90% in C3Q23). We maintain our Underperform rating on NetApp (NTAP) as we see risk to estimates driven by weak macro, potentially weaker product growth, competitive price pressure and any share loss in All Flash Arrays (AFA).

**Discounting slowed in C4Q23**

C2024 revenue outlook for NTAP increased in the survey with respondents expecting +1.2% y/y (vs -0.3% y/y expectation in the prior survey). Storage discounting mostly unchanged q/q as 55% respondents observed that discounting has not changed which was higher than the 35% last quarter. 10% of respondents noted that discounting had come down, the first time since November 2022 that respondents noted a decline in discounting.

**4Q orders sequentially stronger; lead times normalizing**

Order rate in C4Q23 improved q/q with VARs on average observing +0.9% q/q increase vs. -0.8% q/q last quarter. January orders were higher vs December with VARs on average observing +0.8% increase. Backlog also moved lower with 60% of respondents noting a sequential decline and increase from 45% in C3Q23. Lead times also decreased with 50% of respondents observing a reduction in lead times, an increase from 35% in C3Q23.

**NTAP's flash deployments rise slightly, Pure & Dell lead**

An average of 19% of the survey participants' customers currently deploy All-Flash FAS or NetApp's EF/E-series for their flash needs, which is a small increase from 18.5% in the previous survey. NetApp's flash wallet-share was stable at 20%. Pure (50% share, +5% q/q) and Dell (20% share, -5% q/q) were the leading flash vendors with NetApp ranking third. 24% of NetApp's installed base has so far converted to flash-based storage, which is a sequential increase from the 21% observed in the previous survey.

22 February 2024

Equity  
United States  
IT Hardware

**Wamsi Mohan**  
Research Analyst  
BofAS  
+1 646 855 3854  
[wamsi.mohan@bofa.com](mailto:wamsi.mohan@bofa.com)

**Ruplu Bhattacharya**  
Research Analyst  
BofAS  
+1 646 855 0315  
[ruplu.bhattacharya@bofa.com](mailto:ruplu.bhattacharya@bofa.com)

**Joseph Leeman**  
Research Analyst  
BofAS  
[joseph.leeman@bofa.com](mailto:joseph.leeman@bofa.com)

**Nathawan Asdornwised**  
Research Analyst  
BofAS  
[nathawan.asdornwised@bofa.com](mailto:nathawan.asdornwised@bofa.com)

Abbreviations:

AFA: All Flash Array

HCI: Hyper-converged Infrastructure

SMB: Small Medium Business

VAR: Value Added Reseller

S/T: Short Term

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 11 to 14. Analyst Certification on page 10. Price Objective Basis/Risk on page 10.

12662956

Timestamp: 22 February 2024 07:51PM EST

W

## VAR survey takeaways

Our quarterly survey of VARs is designed to provide a closer look at storage channel dynamics. We surveyed 20 VARs, which ranged in size and scope from approx. \$86mn to \$3.4bn in annual sales, with total combined annual revenue of \$7.8bn.

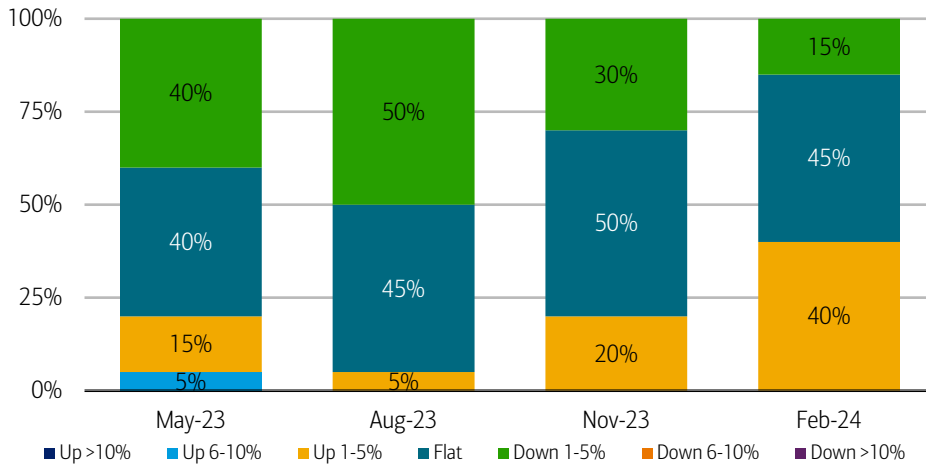
Our main takeaways include:

- In our recent survey, 40% of the VARs indicated upside to their revenue performance vs. planned last quarter. The weighted score for respondents was 0.75% which was also better than the -0.3% in the prior survey.
- Backlog is trending lower. The majority of VARs (60%) said that their backlog was down compared to last quarter, while 0% observed higher backlog and 40% noted backlog is flat q/q (vs 55% last qtr). Lead times are decreasing with 50% of VAR seeing no change in lead times while 0% noted an expansion and 50% saw a reduction in lead times.
- C4Q order growth increased sequentially with VARs on average noting +0.9% q/q. Orders in January were higher MoM than December.
- VARs remain cautious (albeit improving) on storage demand outlook for CY24, with 65% of respondents unclear if storage demand will sustain through CY24 (better than the 90% figure in the last survey).
- Storage discounting by NetApp moderated slightly as only 35% respondents observed that discounting has accelerated which was lower than the 65% noting accelerated discounting last quarter. Another 55% saw no change in discounts (up from 35% in the prior survey) while 10% of respondents saw price increases (up from 0% last qtr).
- HPE's Greenlake program still does not appear to have a material impact on NetApp as 80% of VARs expect no change to either HPE or NetApp sales (was 70% last quarter). 20% of VARs are more likely to sell NetApp products (lower than the previous survey).
- 19% of the participants' customers on average currently deploy All-Flash FAS or NetApp's EF/E-series for their flash needs (flat q/q). Average of 24% of NetApp's installed base has so far converted to flash-based storage (up from 21% in the previous survey).
- NetApp's flash wallet-share was stable at 20%. Pure (50% share, +5% q/q) and Dell (20% share, -5% q/q) were the leading flash vendors with NetApp ranking third.
- Availability of FSx shows some but small positive impact on PCS adoption. Cloud Insights and Spot were the most widely used NetApp Cloud services.
- Component shortages are abating as 90% of the VARs noted that component shortages are not having a meaningful negative impact on NetApp storage sales (vs. 75% in the prior survey). 10% said that NetApp is still facing some impact due to component shortages (vs. 20% in the prior survey).

## Survey Details

**Figure 1: What % above or below plan did the last quarter track?**

In the Jan 2024 survey, the weighted score was +0.8%, up from -0.3% in the prior survey

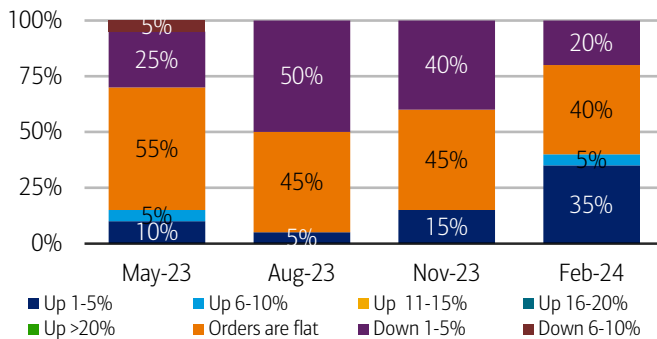


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

**Figure 2: How did order rates trend in C3Q vs C2Q?**

4Q order growth was directionally stronger

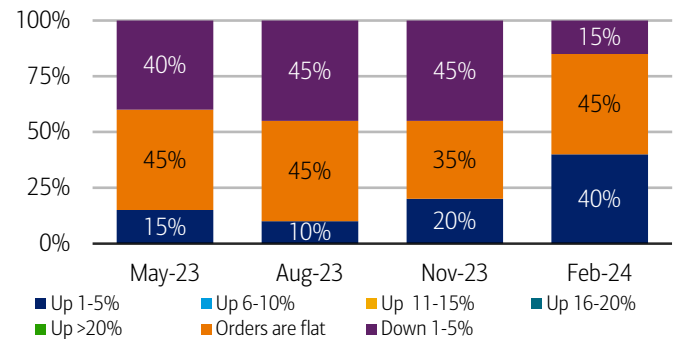


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

**Figure 3: How did order rates trend in January vs. December?**

January orders were higher than December

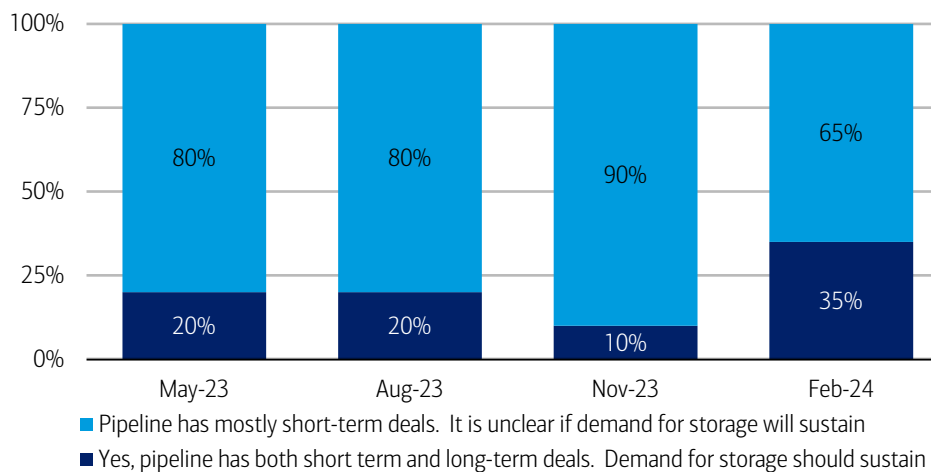


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

#### Figure 4: Looking at pipeline of storage orders, is it a short-term pipeline, or will storage demand sustain throughout CY24?

65% of the respondents were unclear if storage demand will sustain through CY24

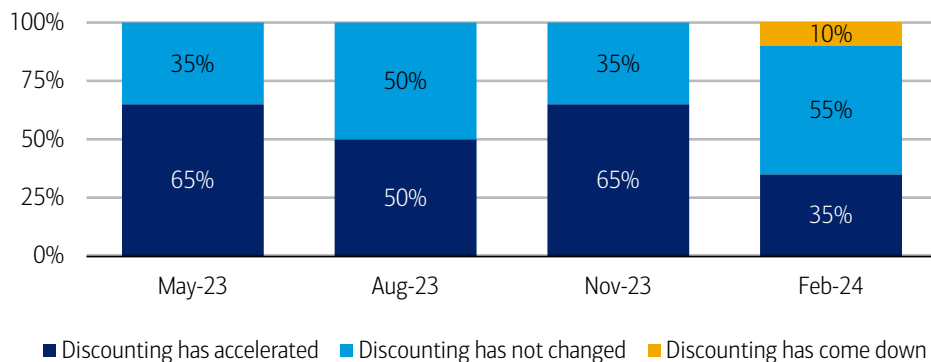


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

#### Figure 5: Has NetApp Storage discounting changed this quarter versus prior quarters?

55% of VARs observed discounting has accelerated this quarter, lower than 65% in the prior survey

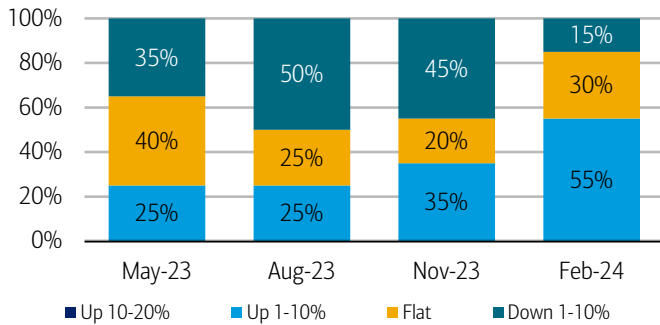


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

### Figure 6: How much do you expect 2024 revenues (from NTAP) to be up/down relative to 2023?

Respondents on average expect their NetApp storage revenue to increase +1.2% y/y in CY2024

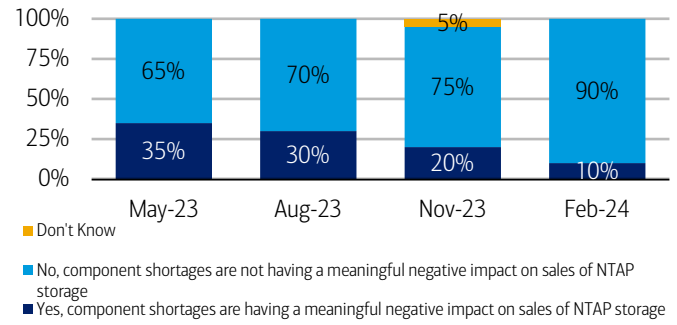


Source BofA Global Research survey

BofA GLOBAL RESEARCH

### Figure 7: Are component shortages negatively impacting storage sales for NTAP?

90% of respondents noted that component shortages are not having a meaningful negative impact on NetApp storage sales

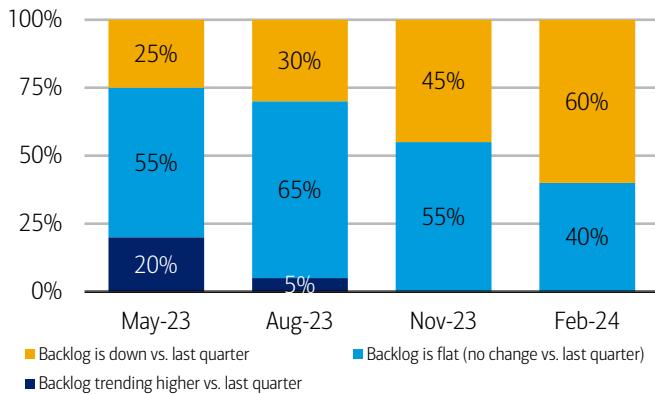


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

### Figure 8: How is your own backlog trending?

60% of VARs said their backlog was lower than last qtr

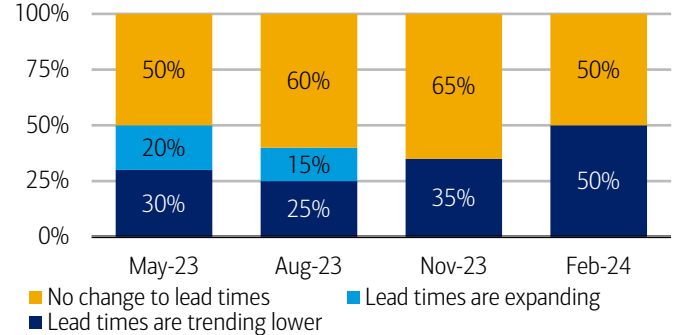


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

### Figure 9: Relative to 3 months ago how are lead times trending?

50% of VARs observed no change to lead times

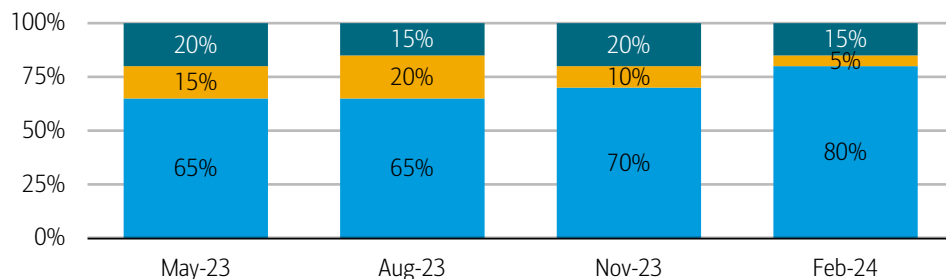


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

**Figure 10: Respondents' views of HP Enterprise and NetApp given the new GreenLake model**

80% of VARs expect no change to end customer sales for either HPE or NetApp



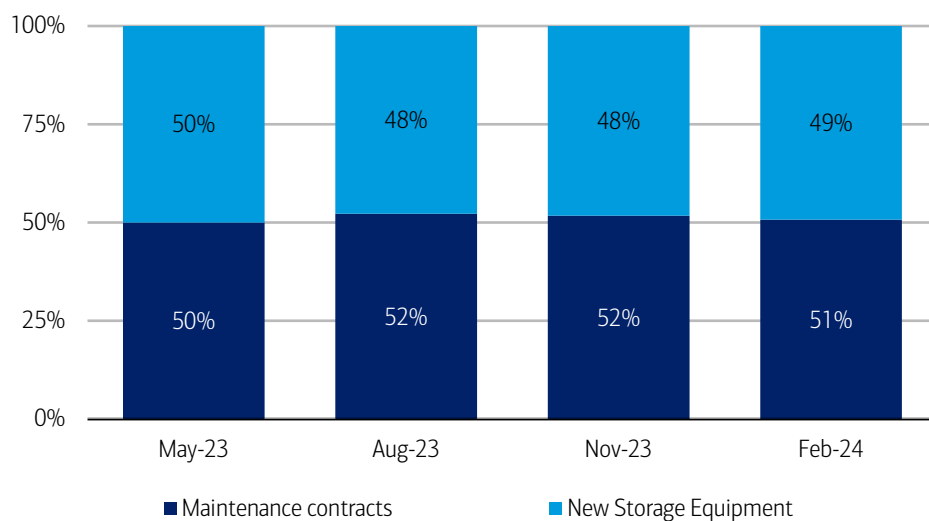
- More likely to sell NetApp products, despite the HPE GreenLake program
- NetApp channel program still better and more likely to sell NetApp products to end-customers
- No change to end-customer sales for either HPE or NetApp
- More likely to offer HPE Storage products to end-customers versus NetApp

Source: BofA Global Research survey

BofA GLOBAL RESEARCH

**Figure 11: Percentage of customers renewing maintenance contracts vs purchasing new storage equipment**

In the February 2024 survey, 51% of customers renewed maintenance contracts

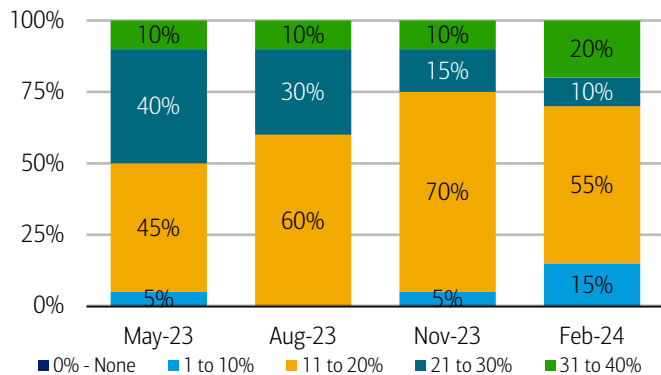


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

**Figure 12: % of customers currently deploying NetApp's flash solutions**

19% of the respondents' customers deploy NetApp's flash solutions, which was slightly lower compared to the previous survey

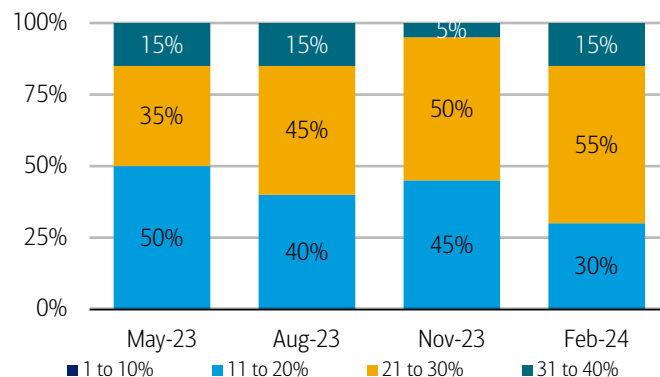


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

**Figure 13: How much of your NTAP installed base has so far converted to flash-based storage?**

An average of 24% of NetApp's installed base has so far converted to flash-based storage

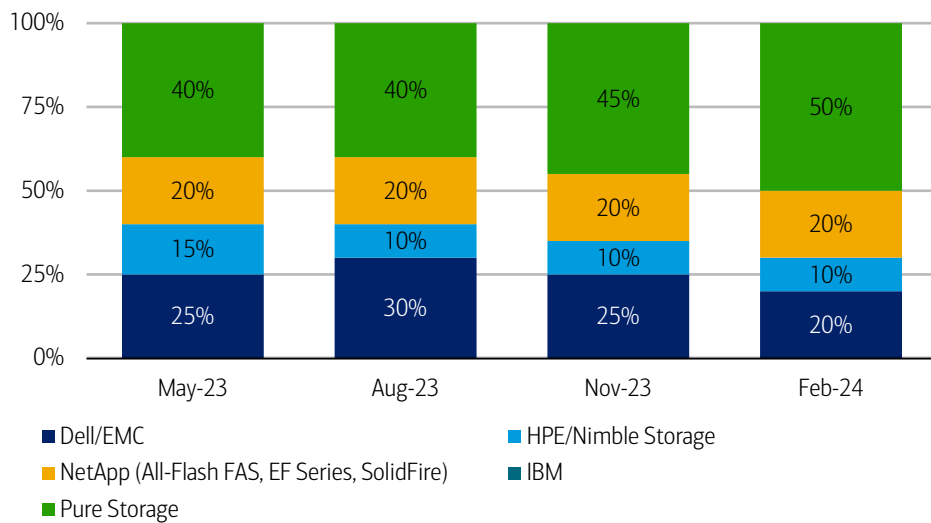


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

**Figure 14: Which vendor has biggest wallet share of flash-based storage spend at your customers?**

NetApp's flash wallet-share was 20%, which was similar to the previous survey

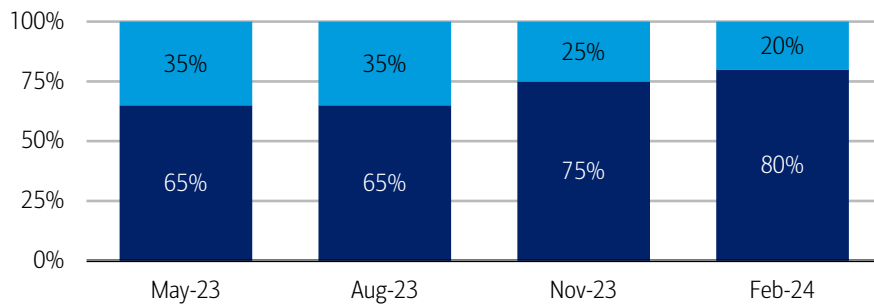


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

**Figure 15: Is the adoption of NTAP PCS improving after the announced of FSx?**

20% of respondents noted moderate impact on NetApp PCS adoption after the announcement of Amazon FSx



■ Moderate impact so far. 5-15% of customers incrementally moving workloads to AWS driven by announcement of FSx

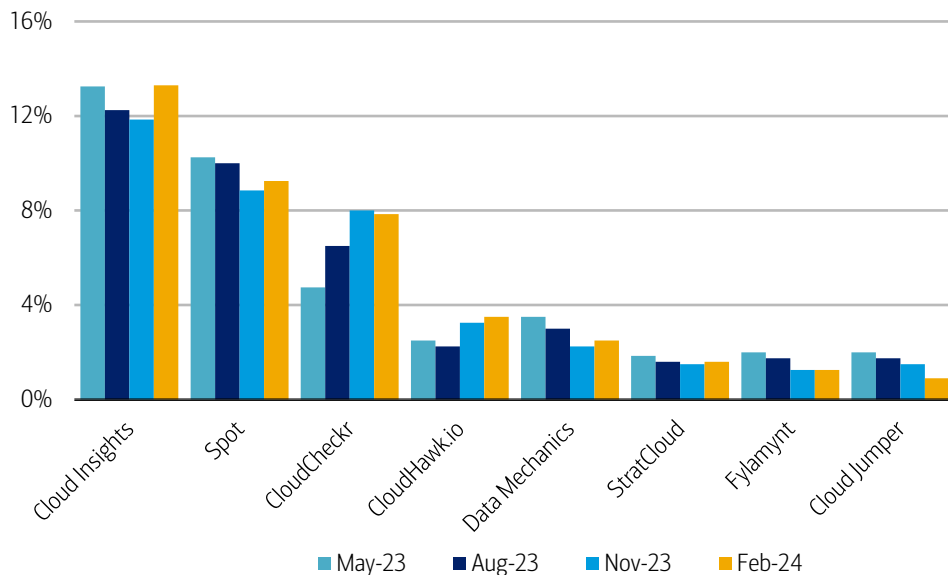
■ Low impact so far. Less than 5% of customers incrementally moving to workloads to AWS driven by FSx

Source: BofA Global Research survey

BofA GLOBAL RESEARCH

**Figure 16: What percent of your customers use each of the following NTAP Cloud services?**

Cloud Insights (13%) and Spot (9%) are the most widely used NetApp Cloud services



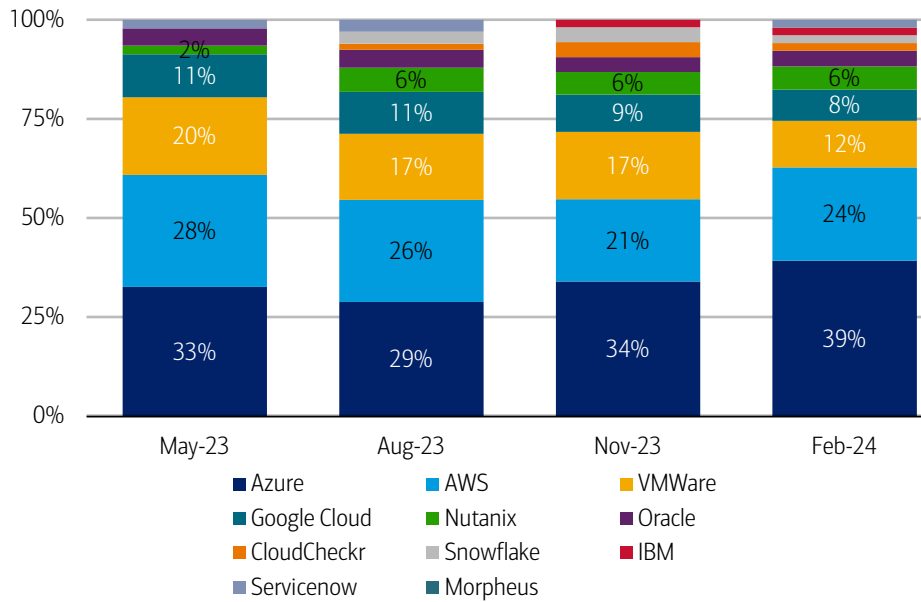
Source: BofA Global Research survey

BofA GLOBAL RESEARCH



**Figure 17: If not NetApp, which of these other vendors to your clients use for Cloud ops?**

Azure, AWS, VMware and Google Cloud are popular choices for customers who do not use NetApp

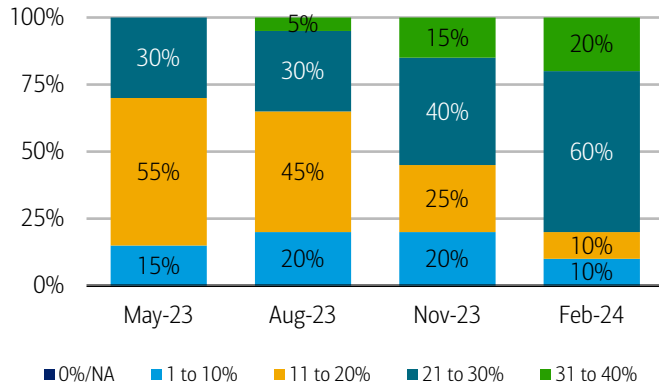


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

**Figure 18: % of customers planning to deploy Nutanix HyperConverged Storage in the next 12 months**

An average 24% of customers plan to deploy Nutanix HyperConverged Storage in the next 12 months

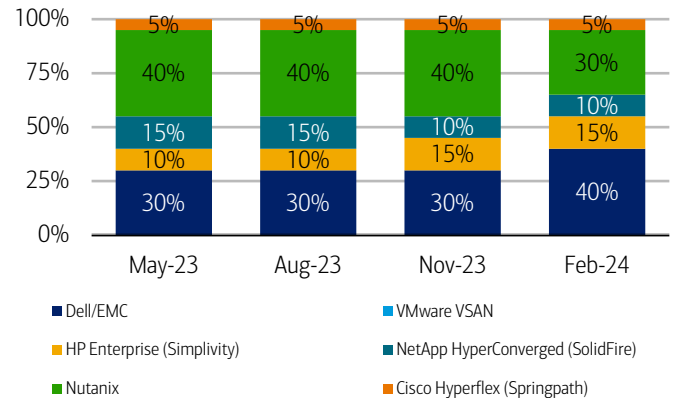


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

**Figure 19: Which vendor has biggest wallet share of HyperConverged (HCI) storage spend at your customers?**

Nutanix and Dell had the biggest wallet-share in HCI storage spend share respectively

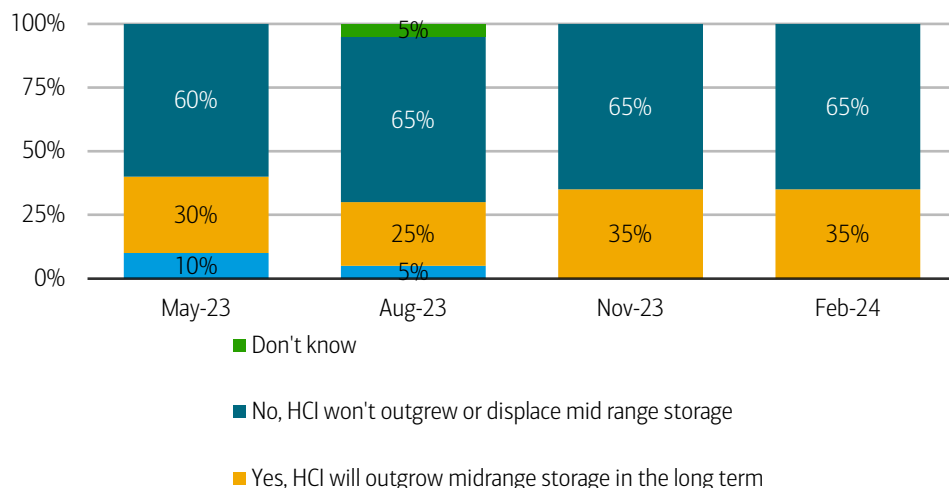


Source: BofA Global Research survey

BofA GLOBAL RESEARCH

**Figure 20: Will Hyperconverged (HCI) outgrow/displace midrange storage?**

65% of VARs do not expect HyperConverged (HCI) to outgrow or displace midrange storage



Source: BofA Global Research survey

BofA GLOBAL RESEARCH

## Price objective basis & risk

### NetApp Inc. (NTAP; B-3-7; \$86.03)

Our price objective (PO) of \$73 is based on 12x C24E EPS of \$6.07. This multiple is at the lower end of its historical range of 10-18x. We believe this multiple balances the benefit of potential revenue growth in All Flash Arrays against the long-term risk from data-center migration to the Cloud, and technological pressure from emerging competitors.

Upside risks are faster-than-expected growth in public cloud revenues and lower drag from investments, unexpected share gain from competitors, unanticipated large M&A, which drives revenue growth faster than expected, and faster-than-expected penetration of Flash into the existing NetApp installed base.

Downside risks are extended component shortage, an unexpected slowdown in the economy, higher-than-expected inflation, stall in the installed base refresh, material share loss in the Flash and Converged technology space, including Hyper Converged to competitors, acceleration of storage moving to the public cloud, and decline in penetration and success beyond the top enterprise accounts.

## Analyst Certification

I, Wamsi Mohan, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

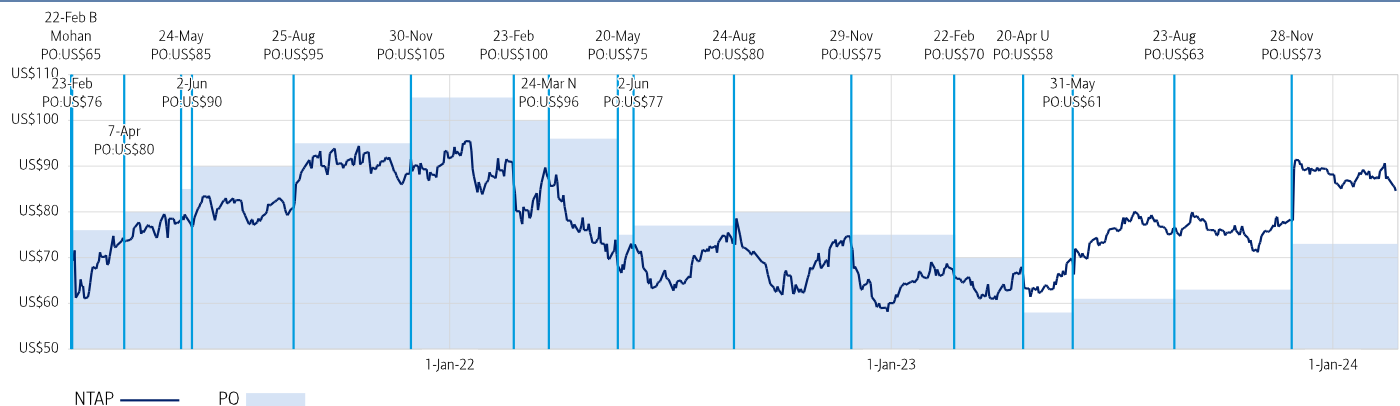
## US - IT Hardware and Technology Supply Chain Coverage Cluster

Investment rating	Company	BofA Ticker	Bloomberg symbol	Analyst
<b>BUY</b>				
	Amphenol	APH	APH US	Wamsi Mohan
	Apple Inc.	AAPL	AAPL US	Wamsi Mohan
	Corning Inc.	GLW	GLW US	Wamsi Mohan
	Dell Technologies Inc.	DELL	DELL US	Wamsi Mohan
	Flex Ltd.	FLEX	FLEX US	Ruplu Bhattacharya
	HP Inc.	HPQ	HPQ US	Wamsi Mohan
	International Business Machines Corp.	IBM	IBM US	Wamsi Mohan
	Jabil Inc.	JBL	JBL US	Ruplu Bhattacharya
	Nutanix Inc	NTNX	NTNX US	Wamsi Mohan
	Roku, Inc.	ROKU	ROKU US	Ruplu Bhattacharya
	Seagate Technology	STX	STX US	Wamsi Mohan
	TD Synnex Corp	SNX	SNX US	Ruplu Bhattacharya
	TE Connectivity Ltd.	TEL	TEL US	Wamsi Mohan
	Western Digital Corporation	WDC	WDC US	Wamsi Mohan
<b>NEUTRAL</b>				
	Arrow Electronics Inc.	ARW	ARW US	Ruplu Bhattacharya
	Avnet Inc.	AVT	AVT US	Ruplu Bhattacharya
	CDW Corp	CDW	CDW US	Ruplu Bhattacharya
	Concentrix Corporation	CNXC	CNXC US	Ruplu Bhattacharya
	Hewlett-Packard Enterprise	HPE	HPE US	Wamsi Mohan
	Pure Storage	PSTG	PSTG US	Wamsi Mohan
	Sensata Technologies Holdings Plc	ST	ST US	Wamsi Mohan
	Teradata Corporation	TDC	TDC US	Wamsi Mohan
<b>UNDERPERFORM</b>				
	DigitalOcean	DOCN	DOCN US	Wamsi Mohan
	NetApp Inc.	NTAP	NTAP US	Wamsi Mohan
	Sanmina Corporation	SANM	SANM US	Ruplu Bhattacharya
	Vishay Intertechnology, Inc.	VSH	VSH US	Ruplu Bhattacharya
<b>RSTR</b>				
	Super Micro Computer Inc.	SMCI	SMCI US	Ruplu Bhattacharya

## Disclosures

## Important Disclosures

## NetApp (NTAP) Price Chart



B: Buy, N: Neutral, U: Underperform, PO: Price Objective, NA: No longer valid, NR: No Rating

The Investment Opinion System is contained at the end of the report under the heading "Fundamental Equity Opinion Key". Dark grey shading indicates the security is restricted with the opinion suspended. Medium grey shading indicates the security is under review with the opinion withdrawn. Light grey shading indicates the security is not covered. Chart is current as of a date no more than one trading day prior to the date of the report.

**Equity Investment Rating Distribution: Technology Group (as of 31 Dec 2023)**

Coverage Universe	Count	Percent	Inv. Banking Relationships <sup>R1</sup>	Count	Percent
Buy	215	53.09%	Buy	111	51.63%
Hold	97	23.95%	Hold	45	46.39%
Sell	93	22.96%	Sell	24	25.81%

**Equity Investment Rating Distribution: Global Group (as of 31 Dec 2023)**

Coverage Universe	Count	Percent	Inv. Banking Relationships <sup>R1</sup>	Count	Percent
Buy	1895	53.62%	Buy	1083	57.15%
Hold	832	23.54%	Hold	454	54.57%
Sell	807	22.84%	Sell	383	47.46%

<sup>R1</sup> Issuers that were investment banking clients of BofA Securities or one of its affiliates within the past 12 months. For purposes of this Investment Rating Distribution, the coverage universe includes only stocks. A stock rated Neutral is included as a Hold, and a stock rated Underperform is included as a Sell.

**FUNDAMENTAL EQUITY OPINION KEY:** Opinions include a Volatility Risk Rating, an Investment Rating and an Income Rating. VOLATILITY RISK RATINGS, indicators of potential price fluctuation, are: A - Low, B - Medium and C - High. INVESTMENT RATINGS reflect the analyst's assessment of both a stock's absolute total return potential as well as its attractiveness for investment relative to other stocks within its Coverage Cluster (defined below). Our investment ratings are: 1 - Buy stocks are expected to have a total return of at least 10% and are the most attractive stocks in the coverage cluster; 2 - Neutral stocks are expected to remain flat or increase in value and are less attractive than Buy rated stocks and 3 - Underperform stocks are the least attractive stocks in a coverage cluster. An investment rating of 6 (No Rating) indicates that a stock is no longer trading on the basis of fundamentals. Analysts assign investment ratings considering, among other things, the 0-12 month total return expectation for a stock and the firm's guidelines for ratings dispersions (shown in the table below). The current price objective for a stock should be referenced to better understand the total return expectation at any given time. The price objective reflects the analyst's view of the potential price appreciation (depreciation).

Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster <sup>R2</sup>
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

<sup>R2</sup> Ratings dispersions may vary from time to time where BofA Global Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

**INCOME RATINGS**, indicators of potential cash dividends, are: 7 - same/higher (dividend considered to be secure), 8 - same/lower (dividend not considered to be secure) and 9 - pays no cash dividend. *Coverage Cluster* is comprised of stocks covered by a single analyst or two or more analysts sharing a common industry, sector, region or other classification(s). A stock's coverage cluster is included in the most recent BofA Global Research report referencing the stock.

Price Charts for the securities referenced in this research report are available on the [Price Charts website](#), or call 1-800-MERRILL to have them mailed.

BofAS or one of its affiliates acts as a market maker for the equity securities recommended in the report: NetApp.

The issuer is or was, within the last 12 months, an investment banking client of BofAS and/or one or more of its affiliates: NetApp.

BofAS or an affiliate has received compensation from the issuer for non-investment banking services or products within the past 12 months: NetApp.

The issuer is or was, within the last 12 months, a non-securities business client of BofAS and/or one or more of its affiliates: NetApp.

BofAS or an affiliate has received compensation for investment banking services from this issuer within the past 12 months: NetApp.

BofAS or one of its affiliates is willing to sell to, or buy from, clients the common equity of the issuer on a principal basis: NetApp.

The issuer is or was, within the last 12 months, a securities business client (non-investment banking) of BofAS and/or one or more of its affiliates: NetApp.

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.

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

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

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

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

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

BofAS and/or Merrill Lynch, Pierce, Fenner & Smith Incorporated ("MLPF&S") may in the future distribute, information of the following non-US affiliates in the US (short name: legal name, regulator): Merrill Lynch (South Africa): Merrill Lynch South Africa (Pty) Ltd., regulated by The Financial Service Board; MLI (UK): Merrill Lynch International, regulated by the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA); BofASE (France): BofA Securities Europe SA is authorized by the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and regulated by the ACPR and the Autorité des Marchés Financiers (AMF). BofA Securities Europe SA ("BofASE") with registered address at 51, rue La Boétie, 75008 Paris is registered under no 842 602 690 RCS Paris. In accordance with the provisions of French Code Monétaire et Financier (Monetary and Financial Code), BofASE is an établissement de crédit et d'investissement (credit and investment institution) that is authorised and supervised by the European Central Bank and the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and regulated by the ACPR and the Autorité des Marchés Financiers. BofASE's share capital can be found at [www.bofam.com/BofASEdisclaimer](http://www.bofam.com/BofASEdisclaimer); BofA Europe (Milan): Bank of America Europe Designated Activity Company, Milan Branch, regulated by the Bank of Italy, the European Central Bank (ECB) and the Central Bank of Ireland (CBI); BofA Europe (Frankfurt): Bank of America Europe Designated Activity Company,

Frankfurt Branch regulated by BaFin, the ECB and the CBI; BofA Europe (Madrid): Bank of America Europe Designated Activity Company, Sucursal en España, regulated by the Bank of Spain, the ECB and the CBI; Merrill Lynch (Australia): Merrill Lynch Equities (Australia) Limited, regulated by the Australian Securities and Investments Commission; Merrill Lynch (Hong Kong): Merrill Lynch (Asia Pacific) Limited, regulated by the Hong Kong Securities and Futures Commission (HKSF); Merrill Lynch (Singapore): Merrill Lynch (Singapore) Pte Ltd, regulated by the Monetary Authority of Singapore (MAS); Merrill Lynch (Canada): Merrill Lynch Canada Inc, regulated by the Canadian Investment Regulatory Organization; Merrill Lynch (Mexico): Merrill Lynch Mexico, SA de CV, Casa de Bolsa, regulated by the Comisión Nacional Bancaria y de Valores; Merrill Lynch (Argentina): Merrill Lynch Argentina SA, regulated by Comisión Nacional de Valores; 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 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.

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.

Foreign currency rates of exchange may adversely affect the value, price or income of any security or financial instrument mentioned herein. Investors in such securities and instruments, including ADRs, 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.

#### BofA ESGMeter Methodology:

ESGMeter is a proprietary metric based on quantitative analysis and fundamental analyst inputs that reflects our assessment of a company's Environmental, Social and Governance-related attributes. The ESGMeter is intended to indicate a company's likelihood of experiencing stronger financial stability (higher return on equity and lower earnings and price volatility) over the next three years relative to peer group. There are three ESGMeter levels - Low, Medium, and High - which indicate whether a company has attributes most likely to translate into superior financial stability (in the case of a High level) or weaker financial stability (in the case of a Low level) over the next three years relative to its peer group. A Medium level suggests that a company exhibits ESG characteristics that are likely associated with financial stability results in line with its peer group over the next three years. Full details of our methodology, financial stability definition and disclaimers are available at [BofA ESGMeter methodology](#). ESGMeter is not indicative of a company's future stock price performance and is not an investment recommendation or rating.

ESGMeter is independent of the BofA Global Research fundamental equity analyst's investment rating, volatility risk rating, income rating or price objective for that company.

#### 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.

Subject to the quiet period applicable under laws of the various jurisdictions in which we distribute research reports and other legal and BofA Securities policy-related restrictions on the publication of research reports, fundamental equity reports are produced on a regular basis as necessary to keep the investment recommendation current.

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.