

Europe Transport

BofA Freight Follower: Ocean and air rates bounce

Industry Overview

Ocean and air rates improve, but temporary in our view

Our tracker of the latest high-frequency freight indicators shows that ocean spot rates increased in October, as blanked sailings helped carriers raise rates. Capacity cuts are helping build momentum for November GRI as liners start negotiating Asia-Europe contracts. Container spot rates are up +1% m-m, putting them 19% above October 2019 levels. We hosted a call with Mr. Tan at Linerlytica and he expects rate declines in near term as the market likely will remain challenged by record influx of new vessel deliveries ([takeaways from call](#)). Air freight rates increase by +5% in October, as demand continued to see an improvement (though we note this can be partially attributed to seasonality of air cargo demand), while capacity increased +12% y-y in September as belly capacity recovery continues.

Ocean: TP rates down, liners increase blank sailings

Ocean rates improved +1% m-m in October as liners were successful in raising rates on most secondary routes. Rates to the USWC fell -8% m-m. Global container volumes increased +4% y-y in August, better than the +0.2% increase in July, as y-y comps started to ease. Port of Los Angeles volumes increased +5% y-y in September (-4% vs 2019), better than -3% in August, on easier comps, which will continue to soften until November (October comps 5% easier). National Retail Federation (NRF) in its latest Global Port Tracker expects Sept/Oct volumes to be 3-4% above 2019 levels, with Nov/Dec at least 9% higher, as consumer spending remains resilient, according to NRF. Liners continue to add more capacity with new ship deliveries amidst weak market conditions and c1% of the fleet remains idle (ex-shipyards). Shipping speeds have decreased slightly, after hitting a previous low in February.

Air: volumes up +2% y-y in September, rates +5% in Oct

Air freight rates were up +c5% m-m in October (+28% vs 2019) as demand improved. Shanghai to N. America rates were up +c14% m-m while Shanghai to Europe rates increased +c6%. Global air freight volumes increased +2% y-y in September as per IATA data, flat vs August, with September comps becoming easier. Global air cargo capacity was up +12% y-y in September, as belly capacity continued to recover. September capacity was +c4% above 2019 levels, same as in July. Global loads increased 1.8ppt m-m to 43.8% in September (down c4.8ppt y-y).

Demand trends lacklustre

BAC US aggregated credit and debit card data shows card spending per household was largely flat in September y-y. See the latest monthly [BofA on USA](#) report for limitations, disclosures and methodology in connection with BAC card data. Retail inventories are 34% higher than 2019 levels in August, per the US Census Bureau, see Exhibit 52. Furniture, building materials and general merchandise inventory to sales ratios were above 2019 levels while clothing and autos were below (Exhibit 53).

>> Employed by a non-US affiliate of BofAS and is not registered/qualified as a research analyst under the FINRA rules.

Refer to "Other Important Disclosures" for information on certain BofA Securities entities that take responsibility for the information herein in particular jurisdictions.

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 18 to 19.

12616500

Timestamp: 26 October 2023 12:30AM EDT

26 October 2023

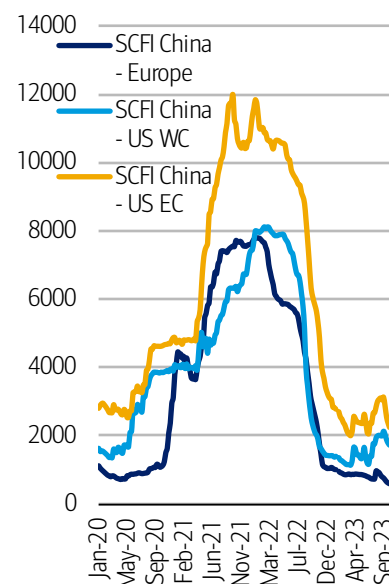
Equity
Europe
Transport

Muneeba Kayani >>
Research Analyst
MLI (UK)
+44 20 7996 5208
muneeba.kayani@bofa.com

Paul Kirjanovs >>
Research Analyst
MLI (UK)
+44 20 7996 1082
paul.kirjanovs@bofa.com

Exhibit 1: SCFI indices by trade lane

Asia-USWC rates lower by 8% m-m in Oct.



Source: Clarksons

BofA GLOBAL RESEARCH

Definitions:

USWC: US West Coast

USEC: US East Coast

SCFI: Shanghai Containerized Freight Index

TP: Transpacific

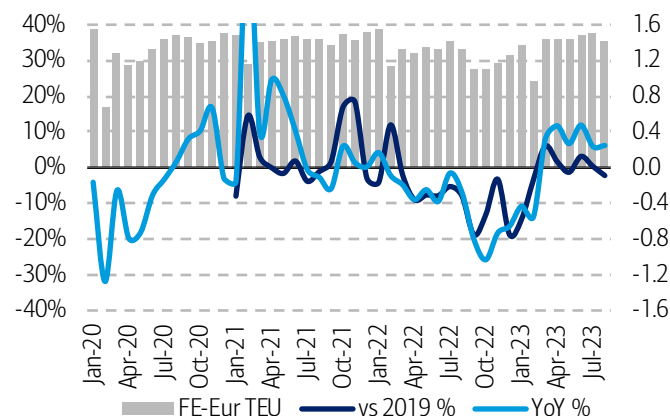
IATA: International Air Transport Association

Container shipping data

Shipping Volumes

Exhibit 2: Far East – Europe volumes (TEU) and growth (%)

Asia to Europe volumes were up c6% YoY in Aug 2023



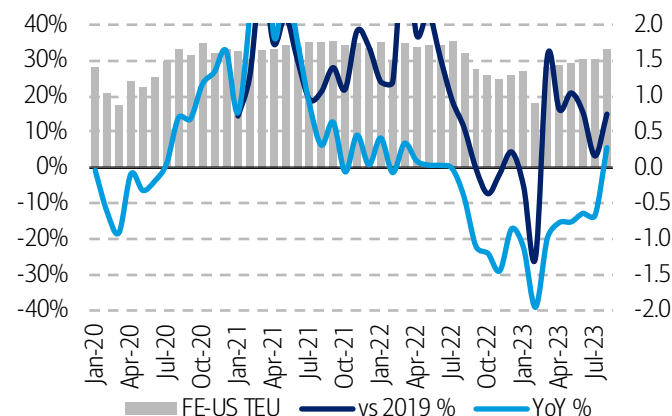
TEU: Twenty-foot equivalent unit.

Source: Alphaliner, Bloomberg

BofA GLOBAL RESEARCH

Exhibit 3: Far East – US volumes (TEU) and growth (%)

Transpacific volumes were up c6% YoY in Aug 2023

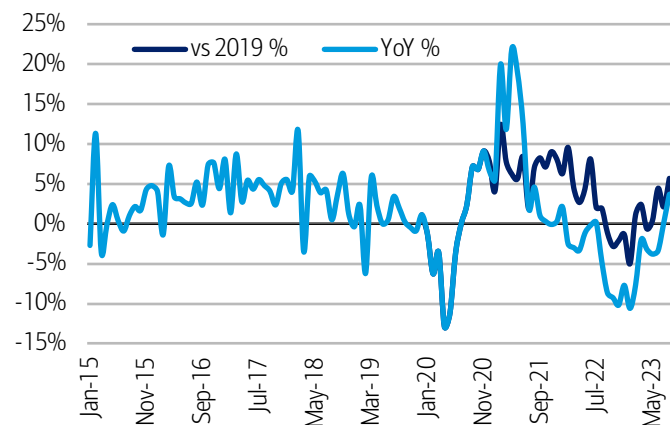


Source: Alphaliner

BofA GLOBAL RESEARCH

Exhibit 4: Global container shipping volumes (YoY and vs 2019 %)

Global container volumes were up 4% YoY and were up 6% vs 2019 in August 2023

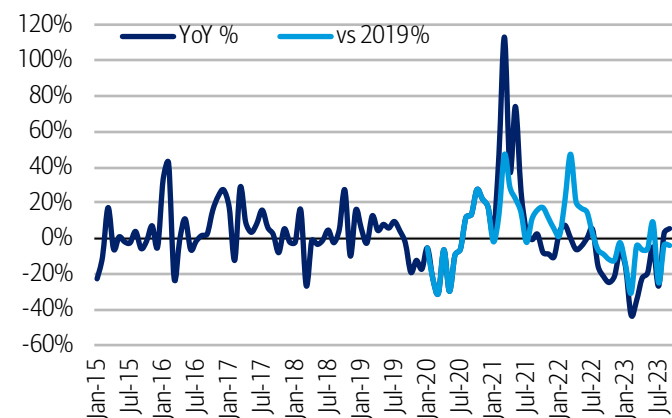


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 5: Container shipping volumes at Port of Los Angeles (YoY and vs 2019 %)

Container volumes at the Port of Los Angeles were up 5% YoY and were down 4% vs 2019 in September 2023



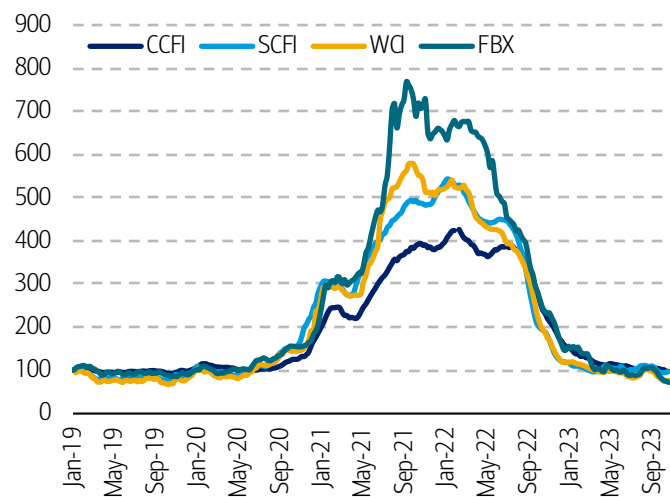
Source: Port of Los Angeles

BofA GLOBAL RESEARCH

Shipping rates

Exhibit 6: Container shipping freight rates, indexed to January 2019

SCFI increased 1% month-on-month

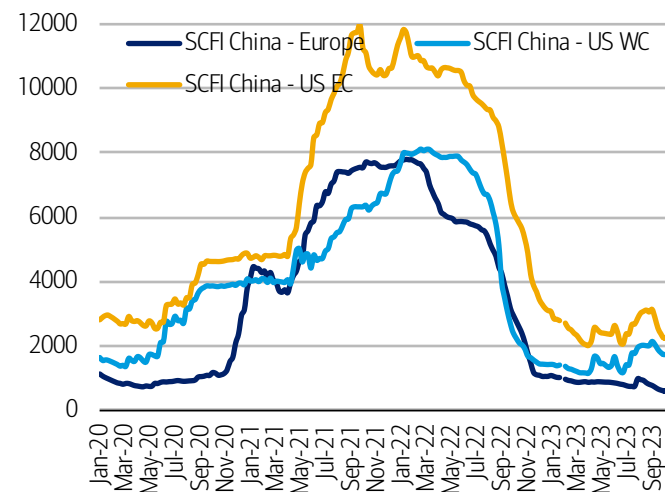


Source: Refinitiv Eikon, Drewry, Bloomberg

BofA GLOBAL RESEARCH

Exhibit 7: SCFI indexes by trade lane

Asia-USWC rates are lower by 8% month-on-month

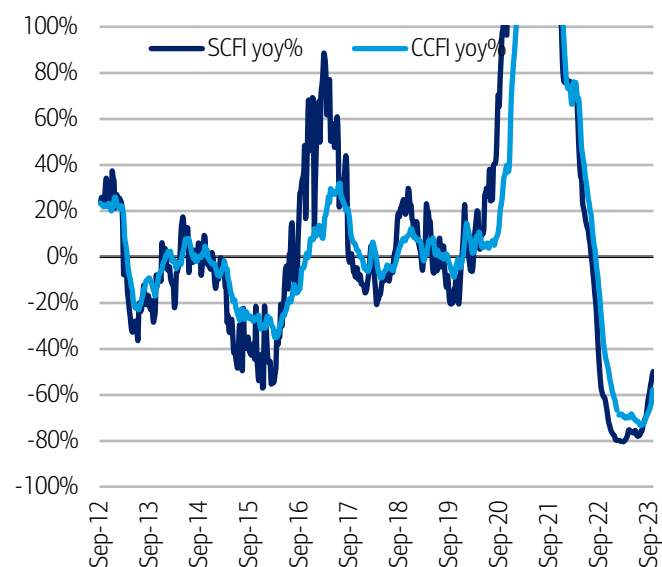


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 8: Container shipping freight rates, y-y % change

SCFI is down c.50% y-y in October



Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 9: CCFI quarterly average (2022-23)

CCFI is -5% lower QoQ so far in 4Q23

		1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23
CCFI	CCFI	3,444	3,157	2,950	1,615	1,087	938	876	836
	CCFI Europe	5,526	5,060	4,738	2,497	1,411	1,154	1,059	944
	CCFI USWC	2,596	2,502	2,331	1,079	781	707	733	715
	CCFI USEC	2,682	2,796	2,844	1,746	1,161	886	870	835
% YoY	CCFI	78%	46%	-1%	-51%	-68%	-70%	-70%	-48%
	CCFI Europe	81%	45%	-7%	-53%	-74%	-77%	-78%	-62%
	CCFI USWC	96%	69%	14%	-53%	-70%	-72%	-69%	-34%
	CCFI USEC	81%	59%	23%	-31%	-57%	-68%	-69%	-52%
% QoQ	CCFI	6%	-8%	-7%	-45%	-33%	-14%	-7%	-5%
	CCFI Europe	5%	-8%	-6%	-47%	-43%	-18%	-8%	-11%
	CCFI USWC	12%	-4%	-7%	-54%	-28%	-9%	4%	-2%
	CCFI USEC	6%	4%	2%	-39%	-34%	-24%	-2%	-4%

Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 10: SCFI quarterly average (2022-23)

SCFI is -10% lower QoQ so far in 4Q23

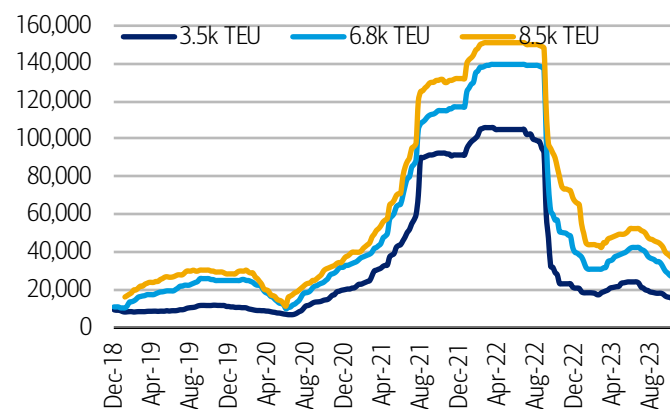
		1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23
SCFI	SCFI	4,851	4,211	3,279	1,375	969	984	986	889
	SCFI Europe	7,435	5,959	4,656	1,490	926	848	776	572
	SCFI USWC	8,032	7,773	5,278	1,627	1,265	1,419	1,884	1,741
	SCFI USEC	11,008	10,409	8,557	4,126	2,438	2,366	2,768	2,214
% YoY	SCFI	74%	29%	-24%	-71%	-80%	-77%	-70%	-35%
	SCFI Europe	81%	15%	-36%	-80%	-88%	-86%	-83%	-62%
	SCFI USWC	100%	68%	-8%	-76%	-84%	-82%	-64%	7%
	SCFI USEC	130%	47%	-19%	-62%	-78%	-77%	-68%	-46%
% QoQ	SCFI	3%	-13%	-22%	-58%	-30%	2%	0%	-10%
	SCFI Europe	-3%	-20%	-22%	-68%	-38%	-8%	-9%	-26%
	SCFI USWC	18%	-3%	-32%	-69%	-22%	12%	33%	-8%
	SCFI USEC	2%	-5%	-18%	-52%	-41%	-3%	17%	-20%

Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 11: 6-12 month Timecharter rates

Short-term charter rates declined in October...

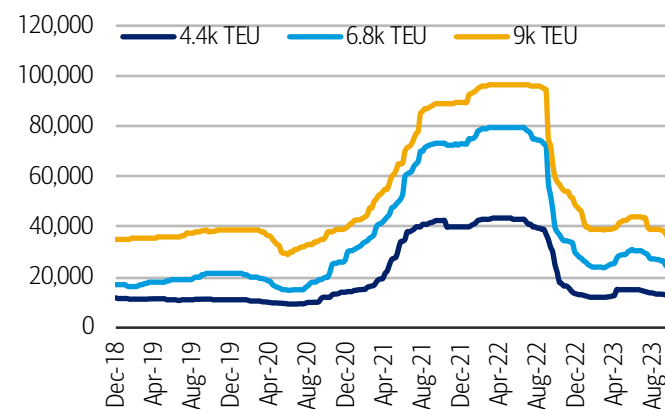


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 12: 3-5 years Timecharter rates

... with medium-term rates also decreasing in October

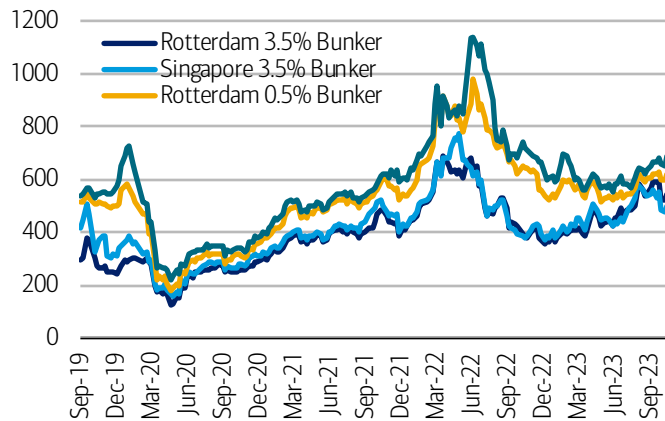


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 13: Bunker fuel prices (\$ per tonne)

Bunker fuel prices were volatile over the past month. ...

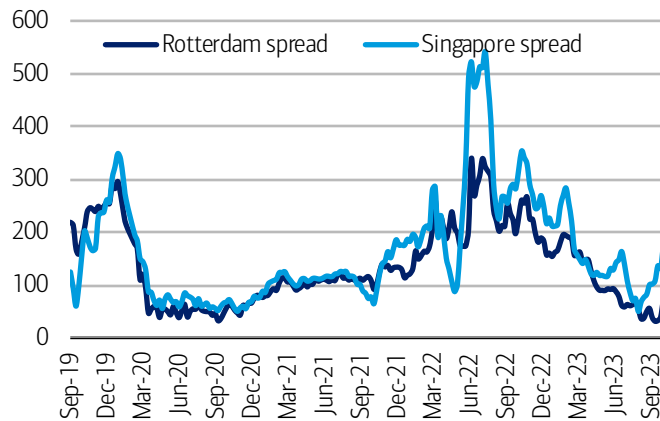


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 14: Rotterdam and Singapore 0.5% to 3.5% spread (ppts)

... while the high and low sulphur spread expanding

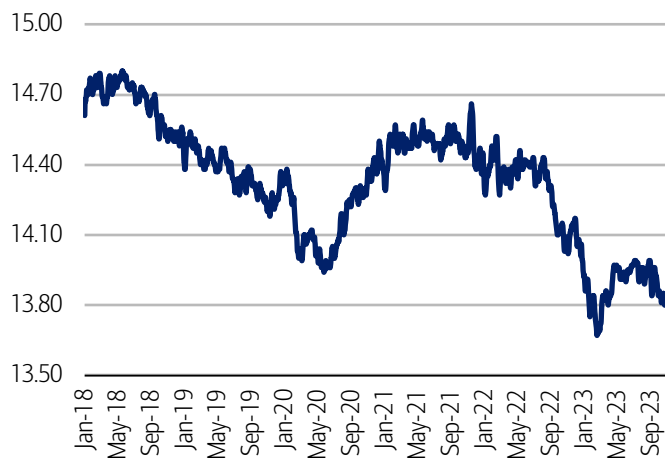


Source: Clarksons

BofA GLOBAL RESEARCH

Shipping speed**Exhibit 15: Containership speed (Daily average speed Knots)**

Average speed started to decrease again post hitting a low earlier this year



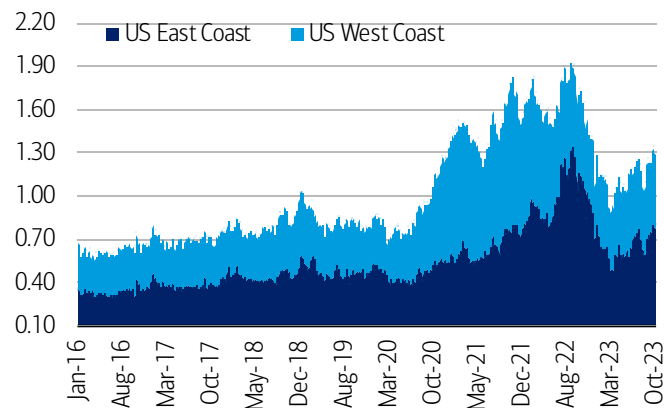
Source: Clarksons

BofA GLOBAL RESEARCH

Port disruption

Exhibit 16: Vessels in port – US East Coast & West Coast (TEUm)

US East Coast and West Coast port congestion increased in October

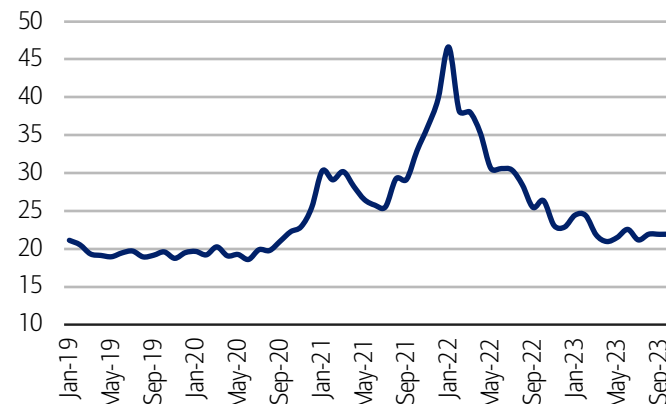


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 17: China to USWC average containership duration (days)

Transpacific transit times remained unchanged in October 2023

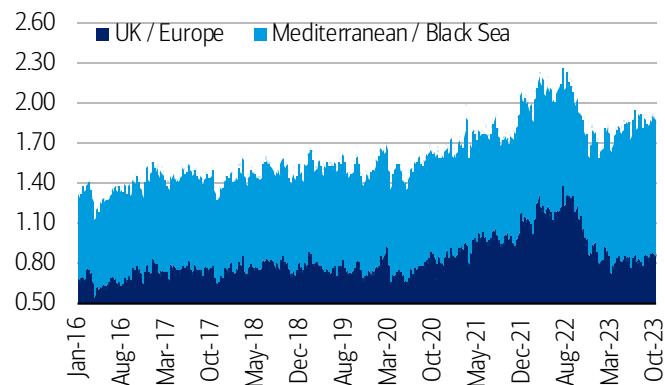


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 18: Vessels in Port – UK/Europe & Mediterranean (TEUm)

Port congestion in UK and Mediterranean is elevating

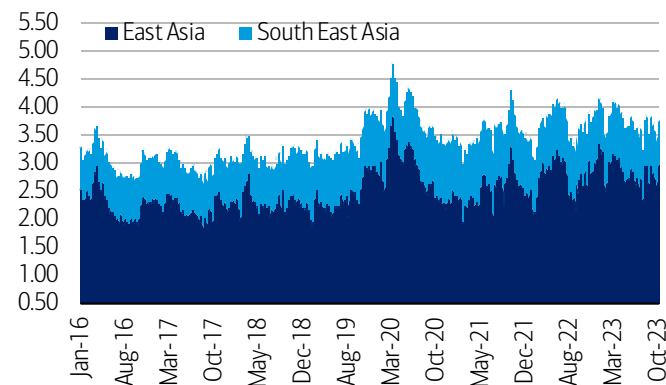


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 19: Vessels in port – East and South-East Asia (TEUm)

Port congestion in East Asia and South-East Asia is increasing

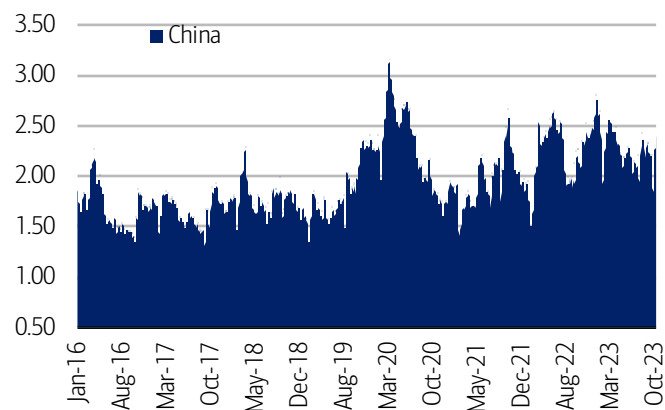


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 20: Vessels in port – China (TEUm)

Chinese port congestion has decreased over the past month

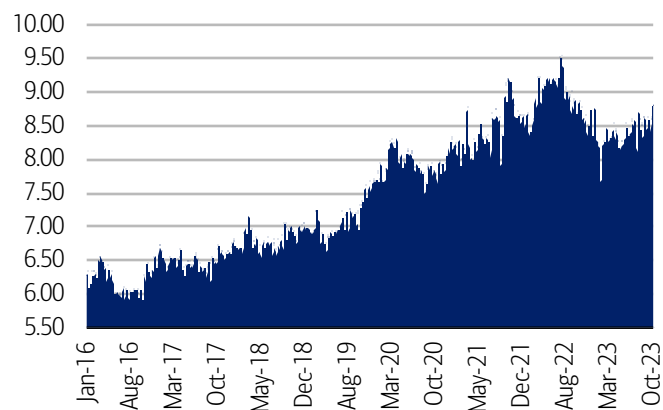


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 21: Vessels in port - Global (TEUm)

Global port congestion elevated but remains well below peak levels

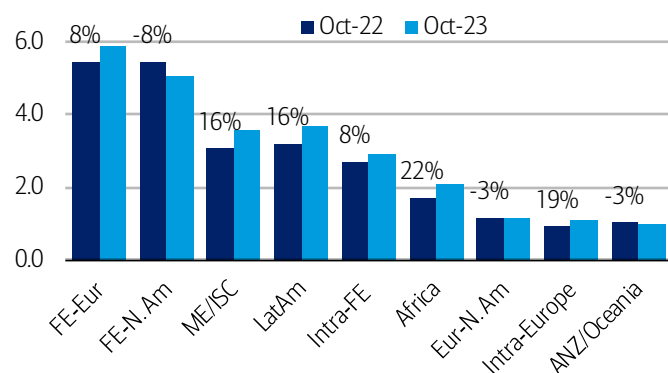


Source: Clarksons

BofA GLOBAL RESEARCH

Capacity deployment**Exhibit 22: Global deployment by cellular TEU capacity (TEUm)**

Asia to N. America has seen the biggest YoY cut in capacity at -8%

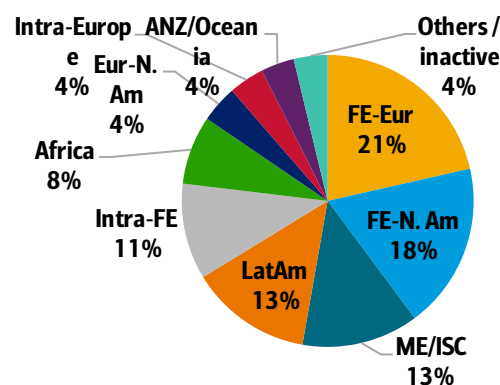


Source: Alphaliner

BofA GLOBAL RESEARCH

Exhibit 23: Global deployment by TEU capacity in October-23 (% of total)

Asia-Europe and Asia- N. America dominate global trade lanes



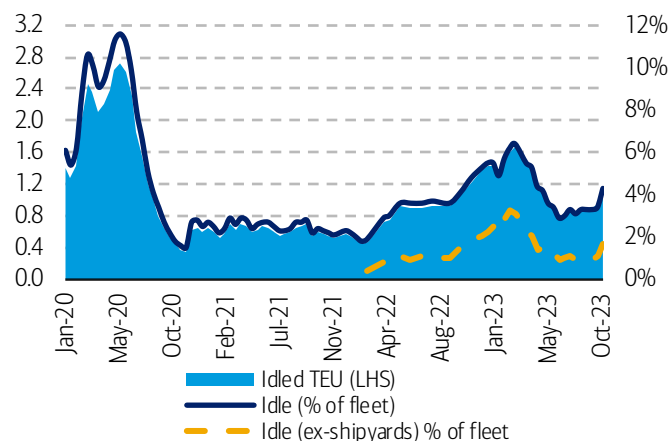
Source: Alphaliner

BofA GLOBAL RESEARCH

Idle capacity

Exhibit 24: Idled TEU (and % of global fleet)

Idling (excluding capacity at shipyards) has increased slightly to c1.7% of global fleet

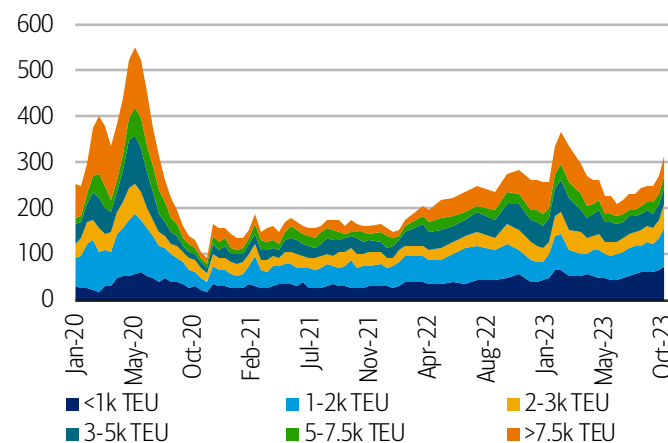


Source: Alphaliner

BofA GLOBAL RESEARCH

Exhibit 25: Idled TEU breakdown by vessel size (number)

Inactivity remained stable across size segments



Source: Alphaliner

BofA GLOBAL RESEARCH

New orders

Exhibit 26: Global orderbook to fleet (%)

The global orderbook to fleet ratio remained broadly flat at c27%

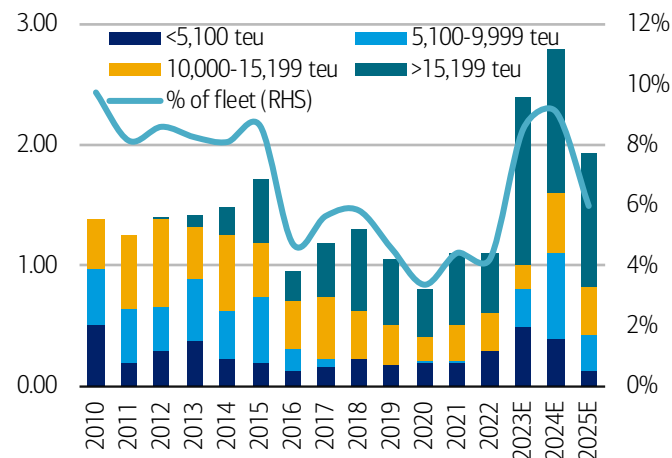


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 27: Deliveries per year (TEUm) and % of fleet

There will be a big step up in fleet deliveries in 2023-24E

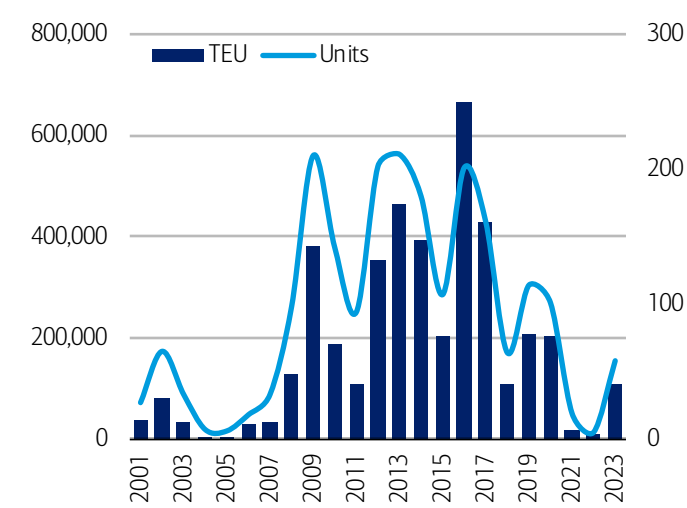


Source: Alphaliner

BofA GLOBAL RESEARCH

Scrapping

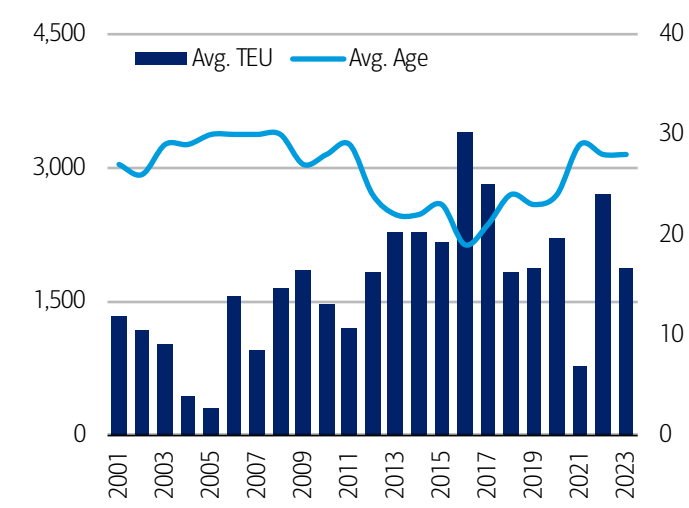
Exhibit 28: TEUs and Units deleted during the year
Deletions 2023 YTD are below pre-Covid levels



Source: Alphaliner

BofA GLOBAL RESEARCH

Exhibit 29: Average TEUs and Age of scrapped vessels
Average age of scrapped vessels has increased



Source: Alphaliner

BofA GLOBAL RESEARCH

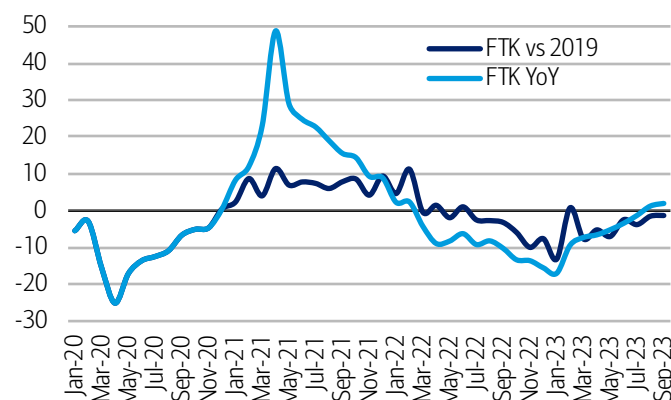


Air freight data

Air Freight Volumes

Exhibit 30: Global FTK (% vs 2019 and % YoY)

Global air cargo volumes were up c2% YoY in September 2023



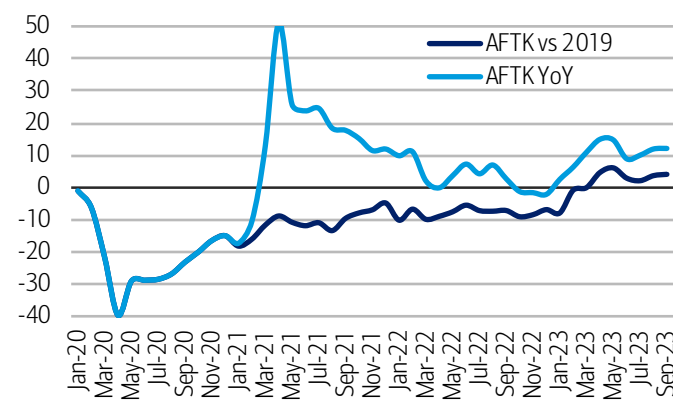
FTK: Freight tonne-kilometres

Source: IATA

BofA GLOBAL RESEARCH

Exhibit 31: Global AFTK (% vs 2019 and % YoY)

Global air cargo capacity was up c12% YoY in September 2023



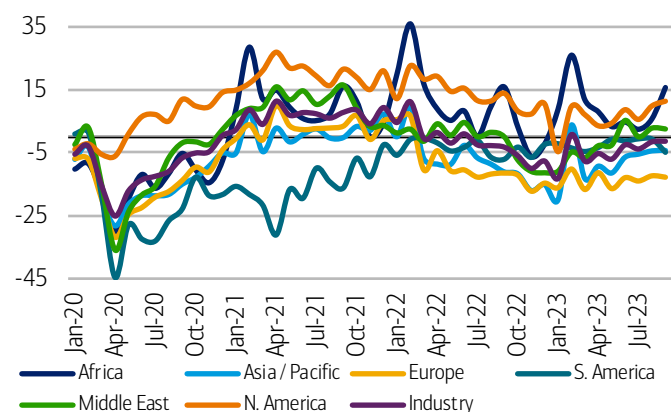
AFTK: Available freight-tonne-kilometres

Source: IATA

BofA GLOBAL RESEARCH

Exhibit 32: FTK growth by region (% vs 2019)

Volumes increased the most in N. America vs 2019 levels in September 2023

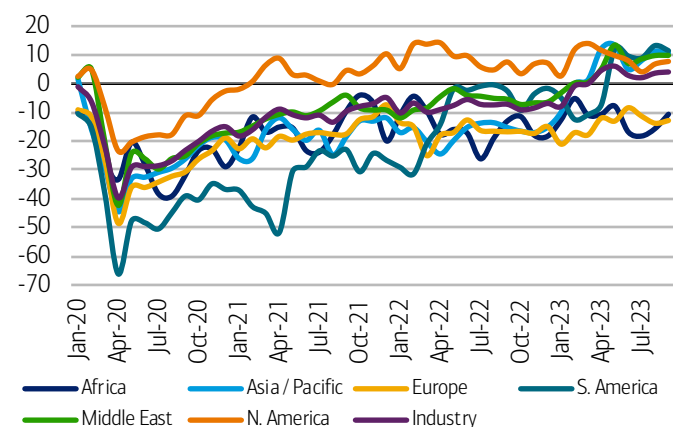


Source: IATA

BofA GLOBAL RESEARCH

Exhibit 33: AFTK growth by region (% vs 2019)

Capacity was mixed across regions' vs 2019 levels in September 2023

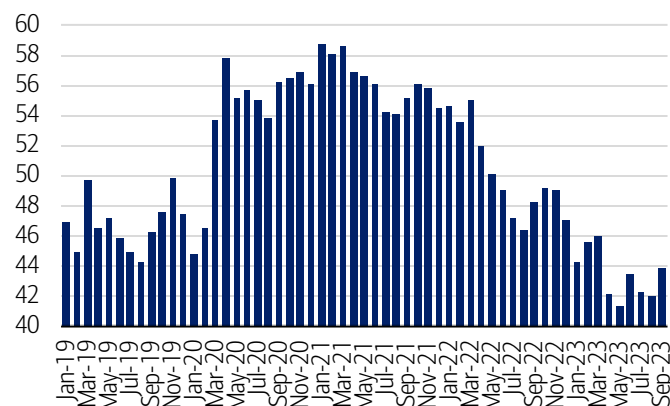


Source: IATA

BofA GLOBAL RESEARCH

Exhibit 34: Global air freight load factor (%)

Load factor remains broadly stable m-m at c44% in September 2023

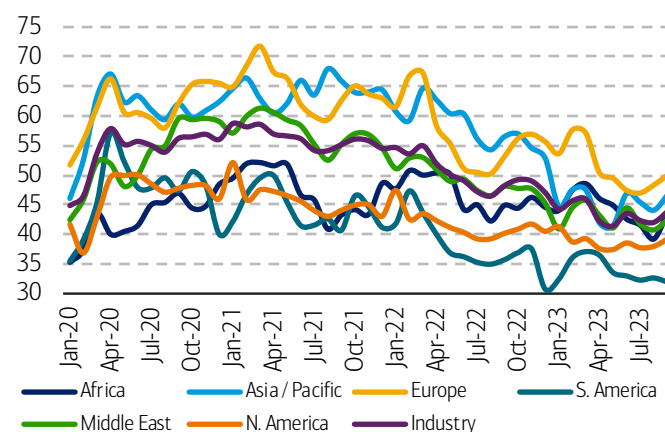


Source: IATA

BofA GLOBAL RESEARCH

Exhibit 35: Air freight load factor by region (%)

Load factor improved in most regions' vs 2019 levels in September 2023



Source: IATA

BofA GLOBAL RESEARCH

Air Freight Rates**Exhibit 36: Shanghai to Europe Air Cargo Index (USD per kg)**

China to Europe air freight rates were up +c6% M-o-M in October

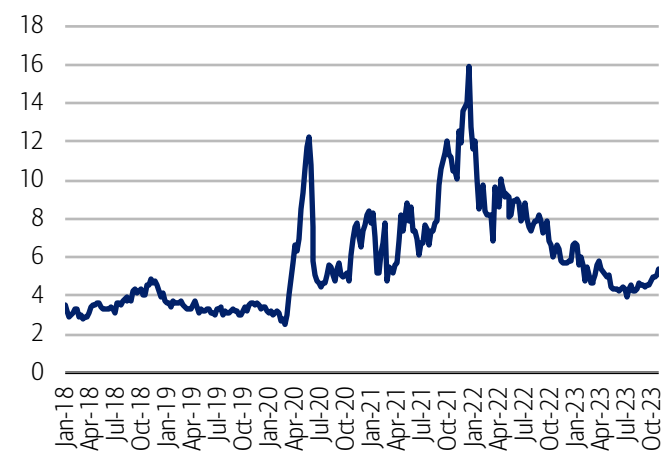


Source: Refinitiv Eikon (Baltic Air Freight Indices powered by TAC data)

BofA GLOBAL RESEARCH

Exhibit 37: Shanghai to North America Air Cargo Index (USD per kg)

China to N. America air freight rates were up by +c 14% M-o-M in October



Source: Refinitiv Eikon (Baltic Air Freight Indices powered by TAC data)

BofA GLOBAL RESEARCH

Exhibit 38: Baltic Exchange Air Freight Index

Global air freight rates were up +c5% M-o-M in October



Source: Refinitiv Eikon (Baltic Air Freight Indices powered by TAC data)

BofA GLOBAL RESEARCH



European road freight rates

Exhibit 39: Europe road freight rates (indexed to January 2019)

European road freight rates were 38% above 2019 levels in Sep '23



Source: BofA Global Research, Transport Intelligence, Uply. Note: average of selection of routes.
BofA GLOBAL RESEARCH

Exhibit 40: Road freight rates out of Germany (indexed to January 19)

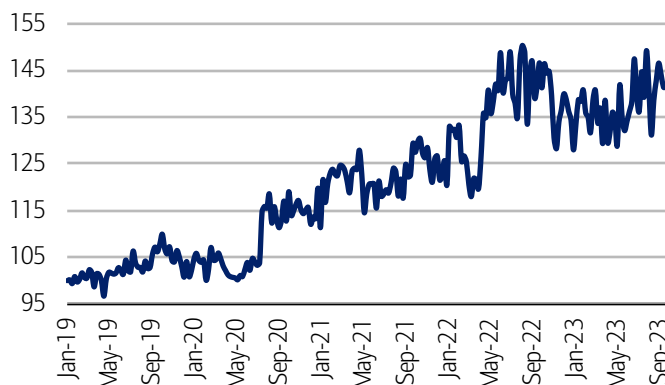
German outbound road freight rates were 37% above 2019 levels in Sep '23



Source: BofA Global Research, Transport Intelligence, Uply. Note: average of selection of routes.
BofA GLOBAL RESEARCH

Exhibit 41: Road freight rates out of France (indexed to January 19)

French outbound road freight rates were 42% above 2019 levels in Sep '23



Source: BofA Global Research, Transport Intelligence, Uply. Note: average of selection of routes.
BofA GLOBAL RESEARCH

Exhibit 42: Road freight rates out of UK (indexed to January 19)

UK outbound road freight rates were 37% above 2019 levels in Sep '23



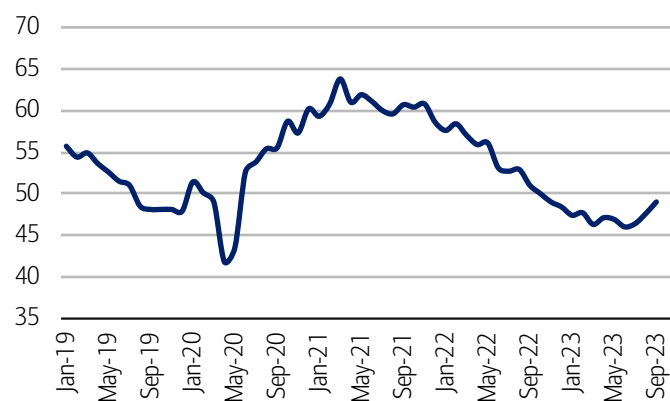
Source: BofA Global Research, Transport Intelligence, Uply. Note: average of selection of routes.
BofA GLOBAL RESEARCH

Demand drivers

PMI indicators

Exhibit 43: US ISM Manufacturing

US PMI increased to c49 in September 2023

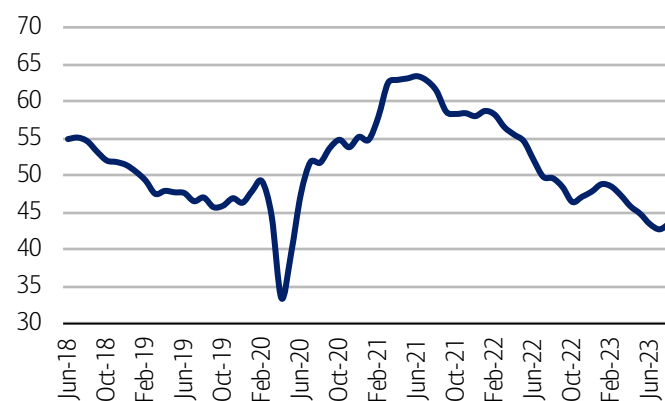


Source: Datastream, Institute for Supply Management (ISM)

BofA GLOBAL RESEARCH

Exhibit 44: Eurozone Manufacturing Purchasing Managers Index (PMI)

Euro area PMI remained flat at c43 in September 2023



Source: Datastream, IHS Markit

BofA GLOBAL RESEARCH

US consumption trends

Exhibit 45: Daily US retail (ex. Auto) spending based on BAC aggregated daily card data (% YoY, 7-day moving average of spending level)

US retail (ex. auto) spending was down c1% YoY in the week ending Oct. 14

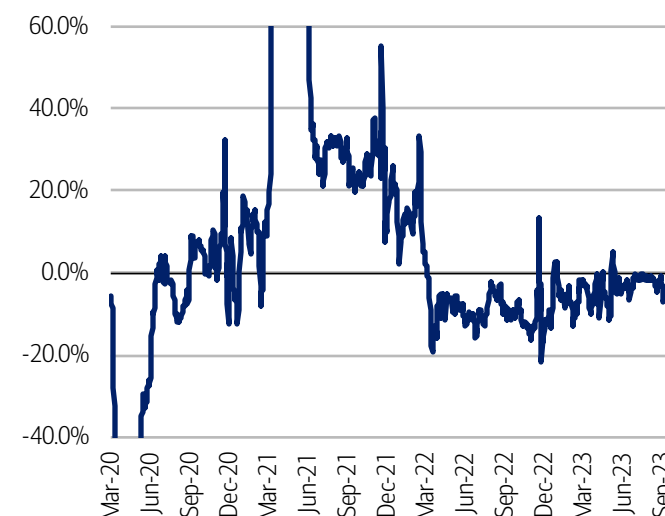


Source: BAC internal data.

BofA GLOBAL RESEARCH

Exhibit 46: Daily US clothing spending based on BAC aggregated daily card data (% YoY, 7-day moving average of spending level)

US clothing spending was down c9% YoY in the week ending Oct. 14



Source: BAC internal data.

BofA GLOBAL RESEARCH

Exhibit 47: Daily US general merchandise spending based on BAC aggregated daily card data (% YoY, 7-day moving average of spending level)

US general merchandise spending was down c2% in the week ending Oct. 14

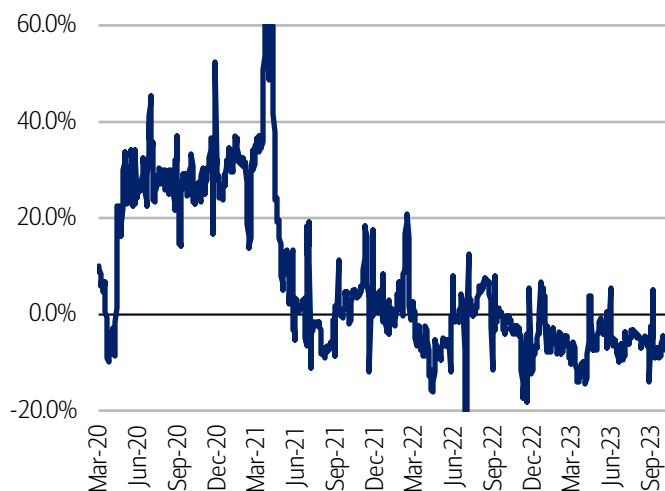


Source: BAC internal data.

BofA GLOBAL RESEARCH

Exhibit 49: Daily US home improvement spending based on BAC aggregated daily card data (% YoY, 7-day moving average of spending level)

US home improvement spending was down c7% YoY in the week ending Oct. 14

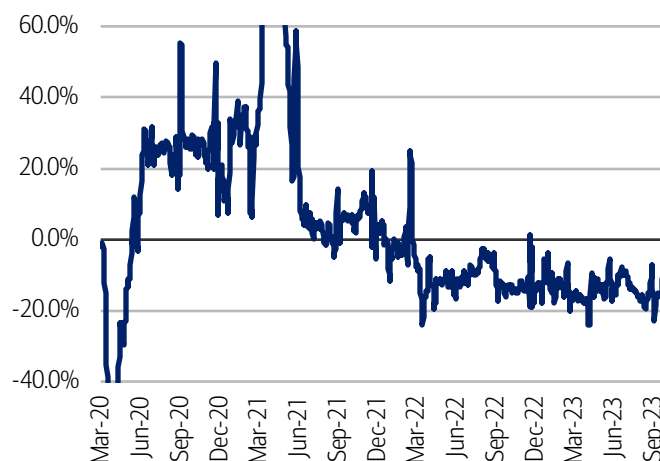


Source: BAC internal data.

BofA GLOBAL RESEARCH

Exhibit 48: Daily US furniture spending based on BAC aggregated daily card data (% YoY, 7-day moving average of spending level)

US furniture spending was down c15% YoY in the week ending Oct. 14



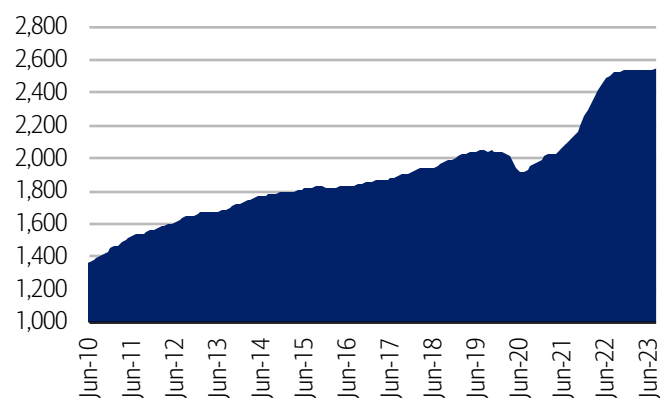
Source: BAC internal data.

BofA GLOBAL RESEARCH

US inventories

Exhibit 50: US total manufacturing and trade inventories (\$bn)

US manufacturing & trade inventories were 24% above 2019 levels in August



Source: US Census Bureau

BofA GLOBAL RESEARCH

Exhibit 51: US total manufacturing and trade inventory to sales ratio

US total inventory to sales ratio remained steady at c1.4 in August

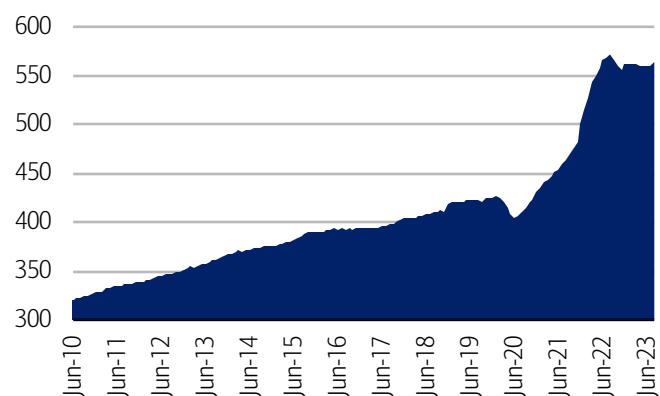


Source: US Census Bureau

BofA GLOBAL RESEARCH

Exhibit 52: US retail (ex-auto) inventories (\$bn)

US retail inventories were 34% above 2019 levels in August 2023

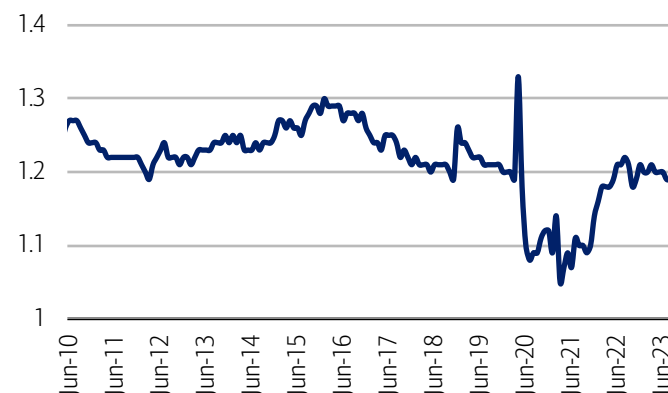


Source: US Census Bureau

BofA GLOBAL RESEARCH

Exhibit 53: US retail (ex-auto) manufacturing and trade inventory to sales ratio

US retail inventory to sales was broadly flat at c1.2 in August 2023

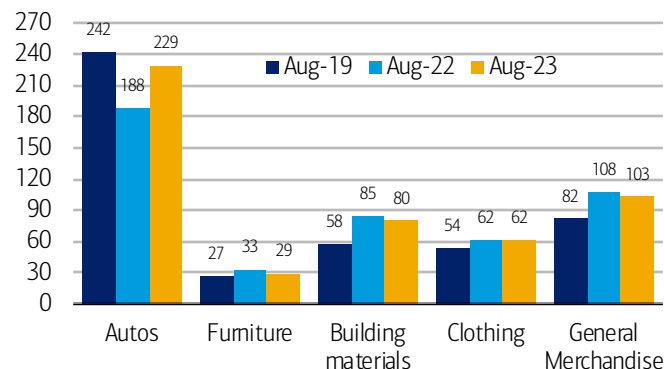


Source: US Census Bureau

BofA GLOBAL RESEARCH

Exhibit 54: US retail inventories by product category (\$bn)

Most retail product inventory levels were above 2019 in August...

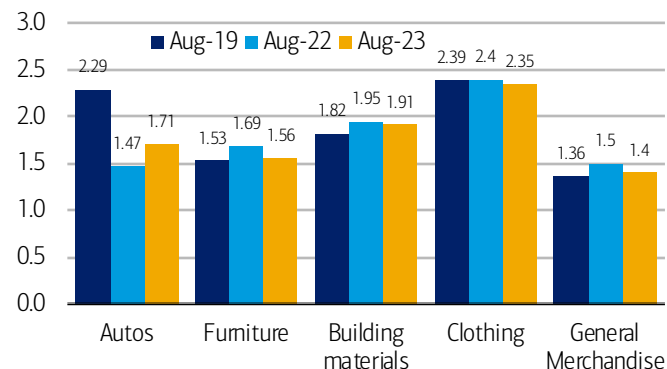


Source: US Census Bureau

BofA GLOBAL RESEARCH

Exhibit 55: US retail inventory to sales ratio by product category

.. while most inventory to sales ratios were near 2019 in August

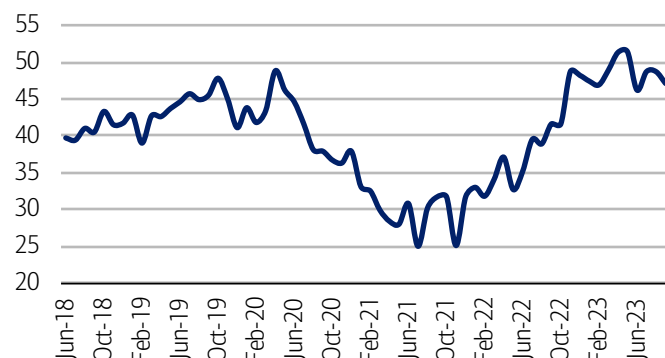


Source: US Census Bureau

BofA GLOBAL RESEARCH

Exhibit 56: US ISM Manufacturing Customers' inventories Index

Customer Inventory Index declined to c47 in September 2023



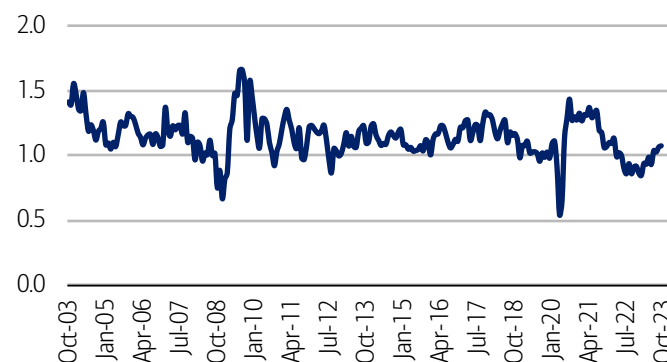
Source: Refinitiv Eikon

Note: A reading of 50 means breakeven levels

BofA GLOBAL RESEARCH

Exhibit 57: US De-stocking cycle (ISM Manufacturing PMI new orders / inventories)

New orders are rising while business inventories decline

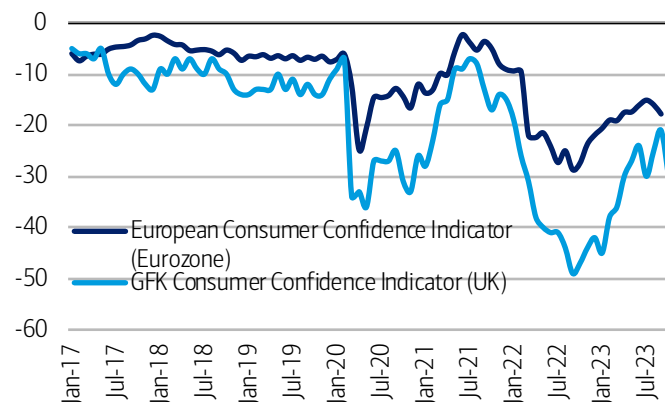


Source: Datastream

BofA GLOBAL RESEARCH

Consumer sentiment**Exhibit 58: Consumer confidence indicators (Eurozone & UK, monthly)**

Eurozone and UK consumer confidence deteriorates in September

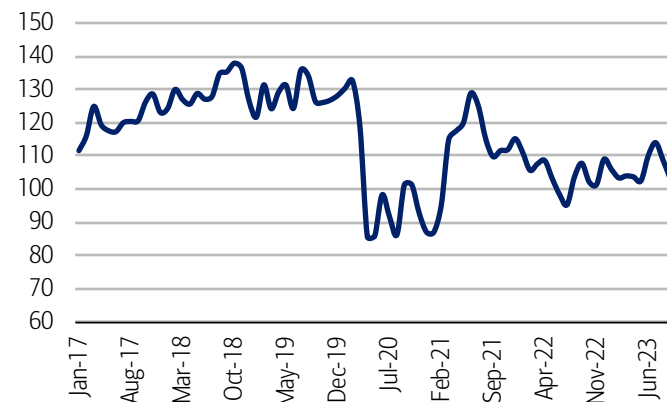


Source: Datastream

BofA GLOBAL RESEARCH

Exhibit 59: US consumer confidence indicator

US consumer confidence declined in September



Source: Datastream, The Conference Board

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.

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

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.

Copyright and General Information:

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

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

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

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

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

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

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

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

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