

Shipping - Global

Shipping & supply chain high frequency tracker #52

Industry Overview

Tracking the high frequency shipping data

This report contains our favorite charts to track the shipping cycle. Container freight rates face more pressure into the seasonal slack season with not enough discipline being shown to support rate hike efforts for now. Tanker remains volatile but we see seasonal tailwinds into the winter with macro and OPEC+ supply discipline key for the 2024 outlook. And while dry bulk rates are seasonally surging for now, forward curves suggest the peak could be near with downside particularly into December and 1Q24.

Container: More pain into the slack season

US container import volumes are trending +6% above 2019 levels through September with a mild seasonal upturn seen in 3Q23 (+4% QoQ) given US inventories are broadly back to normal. Discipline remains elusive with idling at <1% of the world's fleet and Panama Canal disruptions still small. Spot rates are averaging 24% above 2019 levels but our checks suggest more downside into the seasonally weaker period before an inevitable bounce into the pre-CNY rush or when rates get too low to enforce some temporary supply discipline. We also see weaker Europe spot rates also impacting Europe annual contracting season starting soon with YoY repricing lower looking likely.

Tanker: Seasonal tailwinds coming into the winter

Spot VLCC rates rebounded in late September on stronger crude exports out of the Middle East, Latam and Africa, but have since faded into early October on macro risks, Chinese holidays, and with media reporting that Russia is considering easing its diesel export ban. Seasonality remains supportive into the winter months with VLCC rates expected to bounce towards US\$35-40k/day. Key swing factor into 2024 remains macro (do we get a recession?) and the ability of Saudi & Russia to stay supply disciplined in the face of surging Brent prices.

Bulk: Nearing the peak of the seasonal rate upturn

Capesize freight rates have nearly doubled from July lows boosted by ramping Brazil / Australian exports with Chinese iron ore port inventories down to near 2020 COVID lows. Supramax and handysize rates have also bounced US\$+5-7k/day from the 3Q23 lows helped by grain seasonality - although the data shows that port congestion and Panama Canal delays might have passed the worst. Forward curves suggest the best is probably passing for freight rates now with a seasonal fade likely into December 2023 and 1Q24.

04 October 2023

Equity
Global
Shipping

Nathan Gee, CFA >>
Research Analyst
Merrill Lynch (Singapore)
+65 6678 0418
nathan.gee@bofa.com

Ken Hoexter
Research Analyst
BofAS
+1 646 855 1498
ken.hoexter@bofa.com

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

Hiro Nakakura, CFA >>
Research Analyst
Merrill Lynch (Singapore)
hiro.nakakura@bofa.com

Isabella Zeng >>
Research Analyst
Merrill Lynch (Singapore)
isabellazeng@bofa.com

Abbreviations

CNY: Chinese New Year

VLCC: Very Large Crude Carrier

>> 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 21 to 23.

12607806

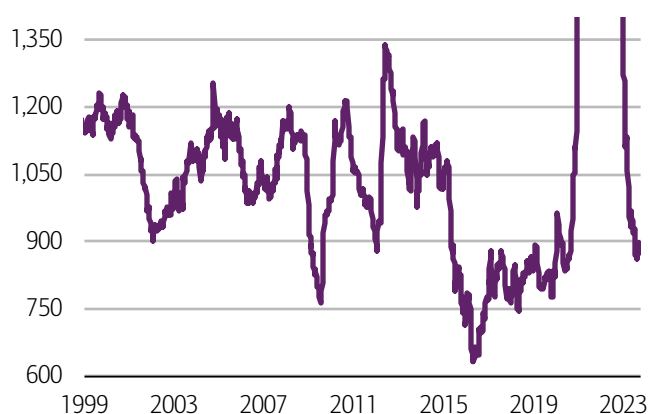
Timestamp: 04 October 2023 07:40AM EDT

Container shipping

Blended freight rates

Exhibit 1: China Containerized Freight Index, 1999-2023

CCFI trending at 852



Source: Shanghai Shipping Exchange

Exhibit 2: CCFI quarterly average, 2022-23

CCFI trending -7% QoQ lower in 3Q23

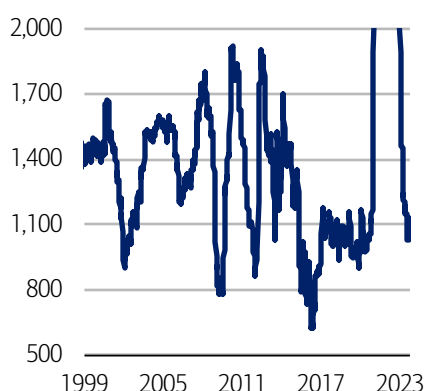
CCFI	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23
CCFI	3,444	3,157	2,950	1,615	1,087	938	876
CCFI Europe	5,526	5,060	4,738	2,497	1,411	1,154	1,059
CCFI USWC	2,596	2,502	2,331	1,079	789	707	733
CCFI USEC	2,682	2,796	2,844	1,746	1,161	886	870
% YoY							
CCFI	75%	46%	-1%	-51%	-68%	-70%	-70%
CCFI Europe	77%	45%	-7%	-53%	-74%	-77%	-78%
CCFI USWC	95%	69%	13%	-53%	-70%	-72%	-69%
CCFI USEC	79%	59%	22%	-31%	-57%	-68%	-69%
% QoQ							
CCFI	5%	-8%	-7%	-45%	-33%	-14%	-7%
CCFI Europe	5%	-8%	-6%	-47%	-44%	-18%	-8%
CCFI USWC	12%	-4%	-7%	-54%	-27%	-10%	4%
CCFI USEC	6%	4%	2%	-39%	-34%	-24%	-2%

Source: Shanghai Shipping Exchange

BofA GLOBAL RESEARCH

Exhibit 3: CCFI Europe, 1999-2023

CCFI Europe at 993

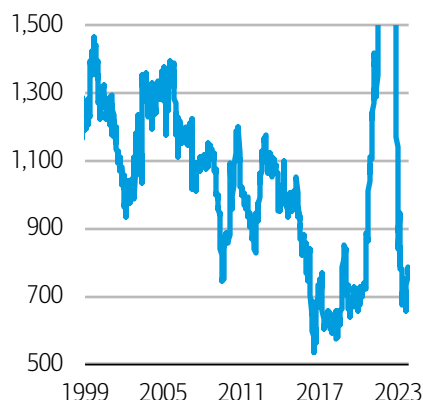


Source: Shanghai Shipping Exchange

BofA GLOBAL RESEARCH

Exhibit 4: CCFI US west coast, 1999-2023

CCFI US west coast at 747

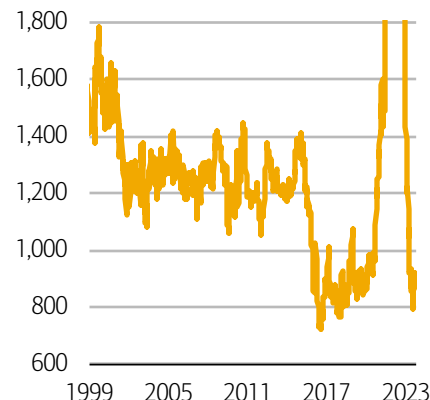


Source: Shanghai Shipping Exchange

BofA GLOBAL RESEARCH

Exhibit 5: CCFI US east coast, 1999-2023

CCFI east coast tracking at 860

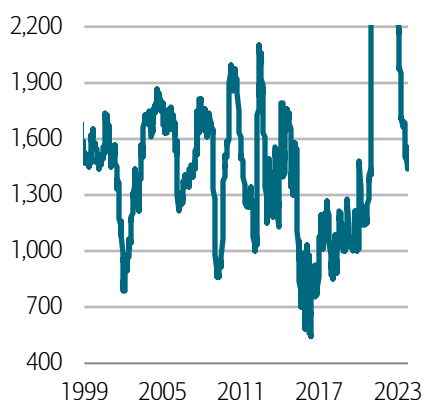


Source: Shanghai Shipping Exchange

BofA GLOBAL RESEARCH

Exhibit 6: CCFI Mediterranean, 1999-2023

CCFI Med tracking at 1,345

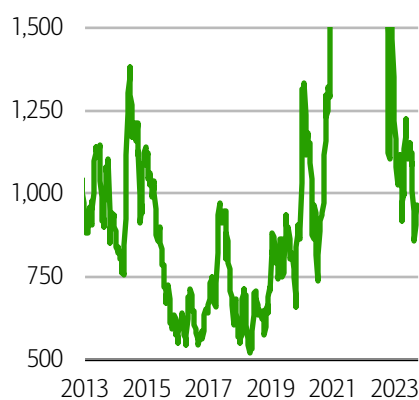


Source: Shanghai Shipping Exchange

BofA GLOBAL RESEARCH

Exhibit 7: CCFI Middle East, 2013-23

CCFI Middle East at 936

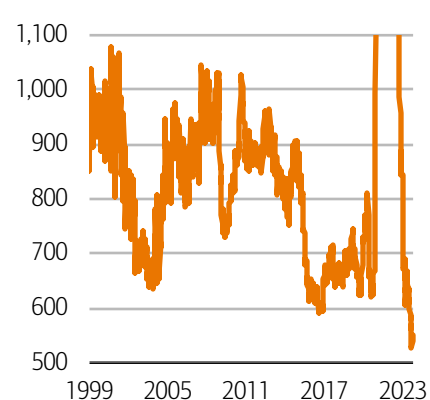


Source: Shanghai Shipping Exchange

BofA GLOBAL RESEARCH

Exhibit 8: CCFI Singapore, 1999-2023

CCFI Singapore at 582



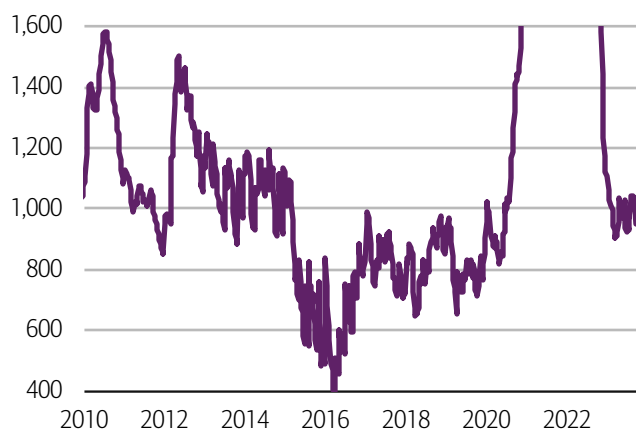
Source: Shanghai Shipping Exchange

BofA GLOBAL RESEARCH

Spot freight rates

Exhibit 9: Shanghai Containerized Freight Index, 2010-23

SCFI at 887



Source: Shanghai Shipping Exchange

Exhibit 10: SCFI quarterly average, 2022-23

SCFI trending flat QoQ in 3Q23

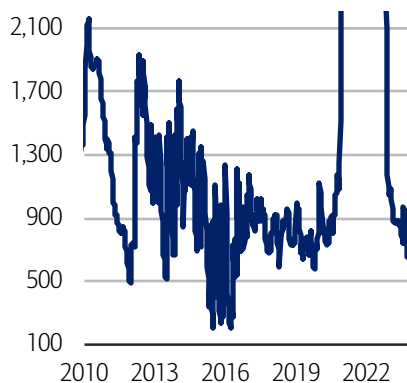
SCFI	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23
SCFI	4,851	4,211	3,279	1,375	969	983	986
SCFI Europe	7,435	5,959	4,656	1,490	926	848	776
SCFI USWC	8,032	7,773	5,278	1,627	1,265	1,419	1,884
SCFI USEC	11,008	10,409	8,557	4,126	2,438	2,366	2,768
% YoY							
SCFI	74%	29%	-24%	-71%	-80%	-77%	-70%
SCFI Europe	81%	15%	-36%	-80%	-88%	-86%	-83%
SCFI USWC	100%	68%	-9%	-76%	-84%	-82%	-64%
SCFI USEC	130%	47%	-20%	-62%	-78%	-77%	-68%
% QoQ							
SCFI	3%	-13%	-22%	-58%	-30%	2%	0%
SCFI Europe	-3%	-20%	-22%	-68%	-38%	-8%	-9%
SCFI USWC	18%	-3%	-32%	-69%	-22%	12%	33%
SCFI USEC	2%	-5%	-18%	-52%	-41%	-3%	17%

Source: Shanghai Shipping Exchange

BofA GLOBAL RESEARCH

Exhibit 11: SCFI Asia-Europe, 2010-23 (USD/TEU)

SCFI Europe at US\$599/TEU

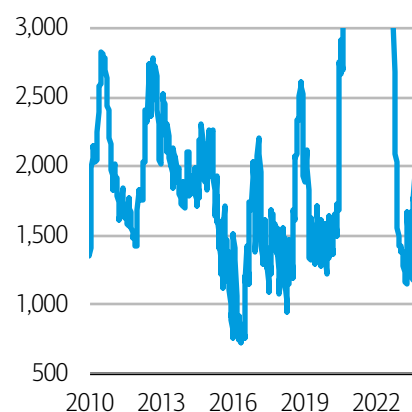


Source: Shanghai Shipping Exchange

BofA GLOBAL RESEARCH

Exhibit 12: SCFI Asia-US west coast, 2010-23 (USD/FEU)

SCFI USWC at US\$1,729 /FEU

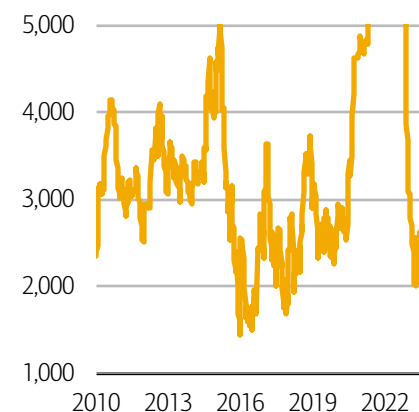


Source: Shanghai Shipping Exchange

BofA GLOBAL RESEARCH

Exhibit 13: SCFI Asia-US east coast, 2010-23 (USD/FEU)

SCFI USEC at US\$2,249/FEU

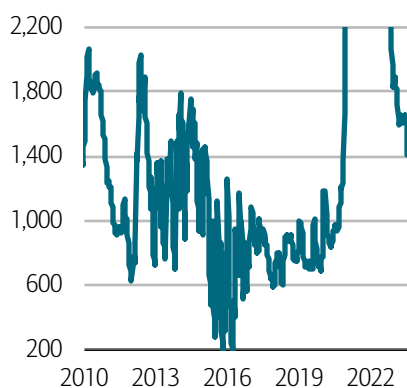


Source: Shanghai Shipping Exchange

BofA GLOBAL RESEARCH

Exhibit 14: SCFI Asia-Mediterranean, 2010-23 (USD/TEU)

SCFI Med at US\$1,166 /TEU

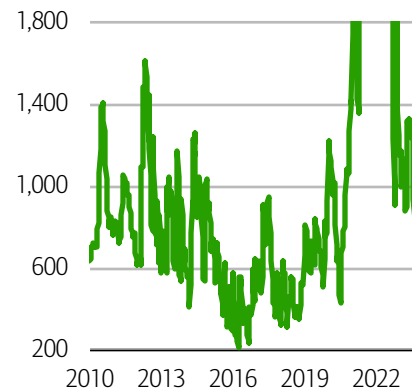


Source: Shanghai Shipping Exchange

BofA GLOBAL RESEARCH

Exhibit 15: SCFI Asia-Middle East, 2010-23 (USD/TEU)

SCFI Middle East US\$790/TEU

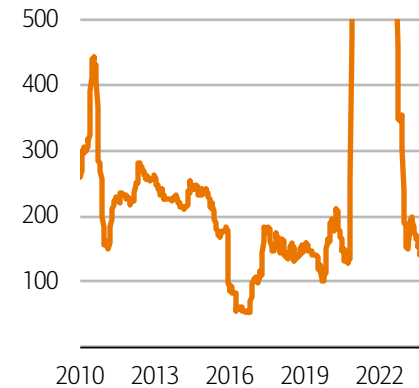


Source: Shanghai Shipping Exchange

BofA GLOBAL RESEARCH

Exhibit 16: SCFI Asia-Singapore, 2010-23 (USD/TEU)

SCFI Singapore at US\$176 /TEU



Source: Shanghai Shipping Exchange

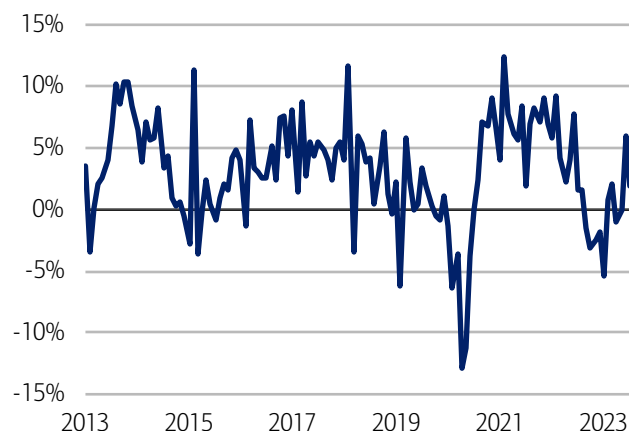
BofA GLOBAL RESEARCH



World trade trends

Exhibit 17: Global container volume growth (YoY %)*

World trade 1.8% above 2019 levels in July

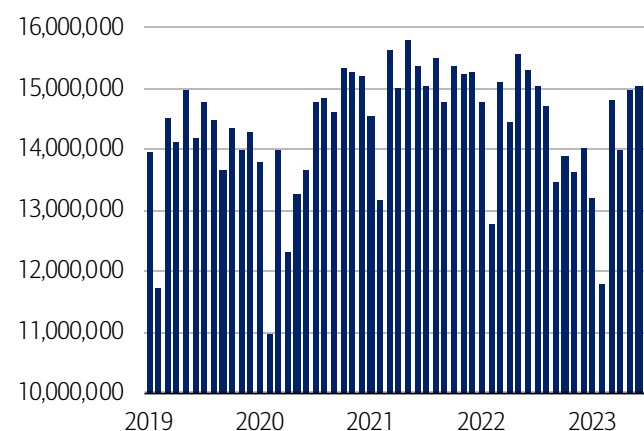


Source: CTS. * 2021 data compared to 2019

BofA GLOBAL RESEARCH

Exhibit 18: Global monthly container volumes (TEU), 2019-23

World trade seasonally rebounded in May-July 2023

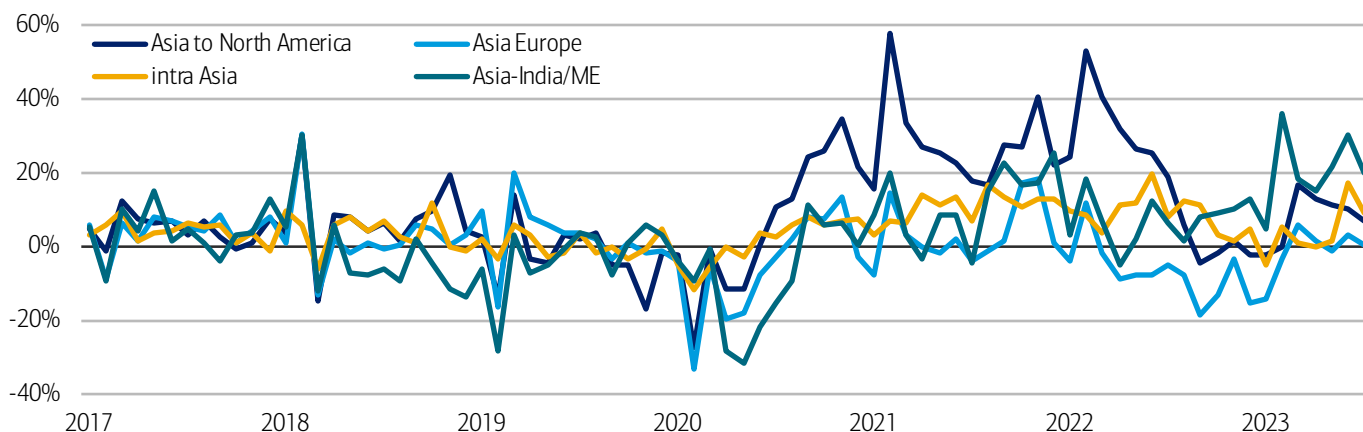


Source: CTS

BofA GLOBAL RESEARCH

Exhibit 19: Container volumes by route (% YoY, 2017-23*)

Key trade lane volumes are all above 2019 levels



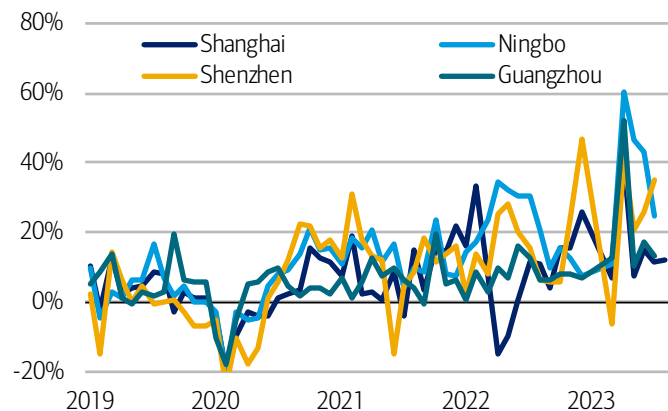
Source: CTS *2021-23 relative to 2019 levels

BofA GLOBAL RESEARCH

Chinese trade trends

Exhibit 20: Chinese monthly port data (% YoY), 2019-23

Shanghai volumes flat MoM in August



Source: Company reports

BofA GLOBAL RESEARCH

Exhibit 21: China truck traffic index, 2020-23

China trucking demand has been stable but started to decline in early Oct



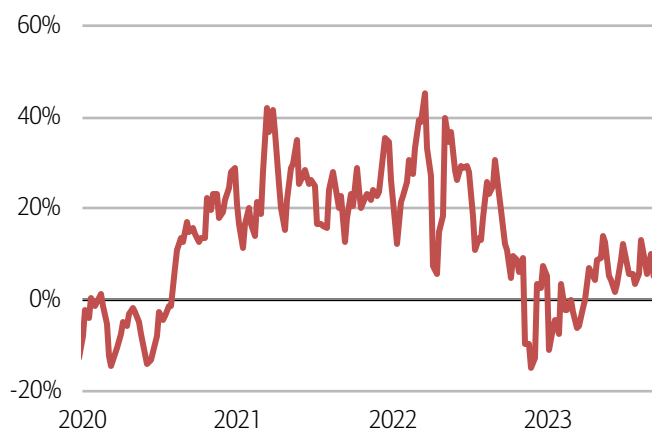
Source: G7

BofA GLOBAL RESEARCH

US high frequency container volumes

Exhibit 22: US weekly container imports vs 2019 levels

US weekly imports trending +7% above 2019 levels in late September

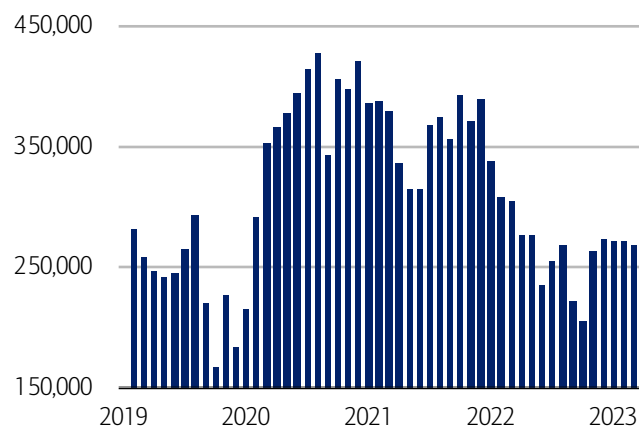


Source: PIERs

BofA GLOBAL RESEARCH

Exhibit 24: US furniture monthly imports (TEU), 2019-23

US furniture imports around 268k TEU/month in August

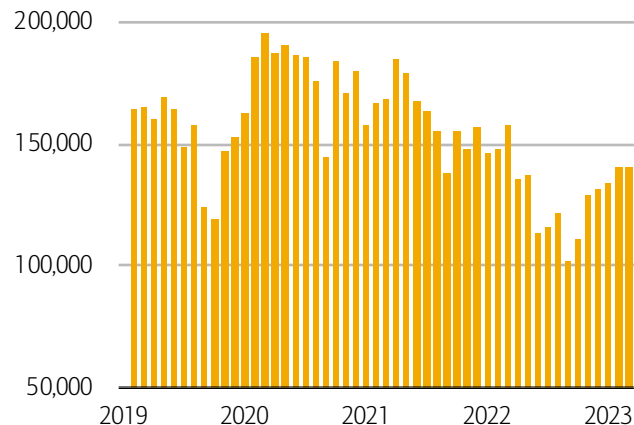


Source: PIERs

BofA GLOBAL RESEARCH

Exhibit 26: US electronic monthly imports (TEU), 2019-23

US electronics imports trending at 140k TEU/month in August



Source: PIERs

BofA GLOBAL RESEARCH

Exhibit 23: US weekly container imports (% YoY growth), 2020-23

US weekly imports ~2% YoY in late September

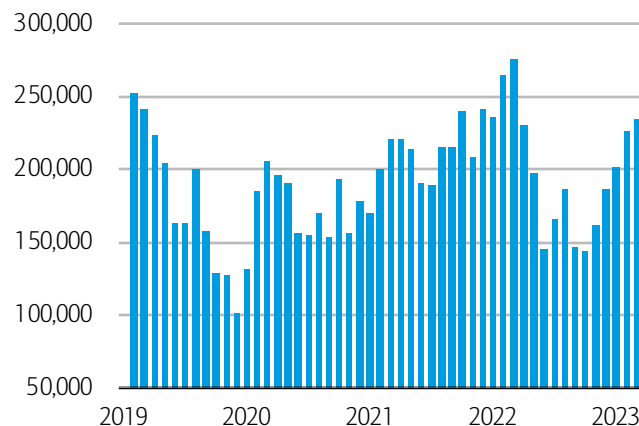


Source: PIERs

BofA GLOBAL RESEARCH

Exhibit 25: US apparel & footwear monthly imports (TEU), 2019-23

US apparel & footwear imports above 234k TEU in August

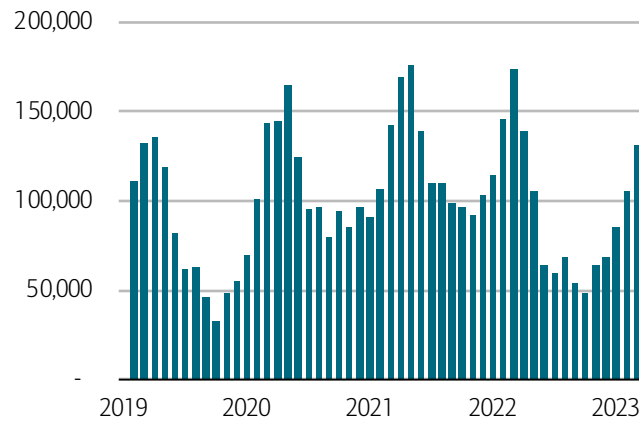


Source: PIERs

BofA GLOBAL RESEARCH

Exhibit 27: US toy & leisure monthly imports (TEU), 2019-23

US toy & leisure imports at 131k TEU in August



Source: PIERs

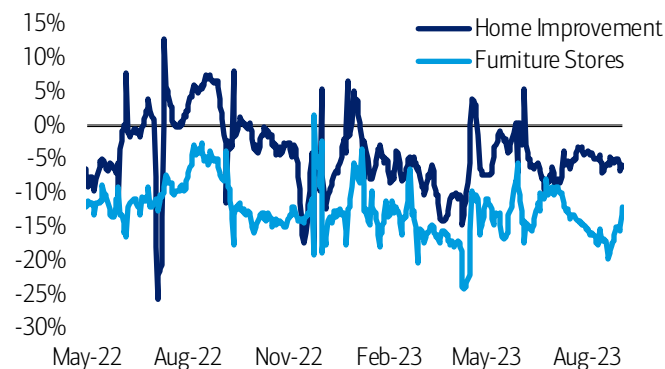
BofA GLOBAL RESEARCH

US consumer reads

For more on BAC card spending data, and a detailed explanation of the methodology, disclaimers, and limitations in connection with such data see our note: [BofA on USA](#).

Exhibit 28: Spending per HH at home improvement and furniture stores, based on BAC aggregated card data (y/y % change of the 7-day ma of spending levels)

Furniture and home improvement spending growth remained negative on a y/y basis in the week ending Sep 2

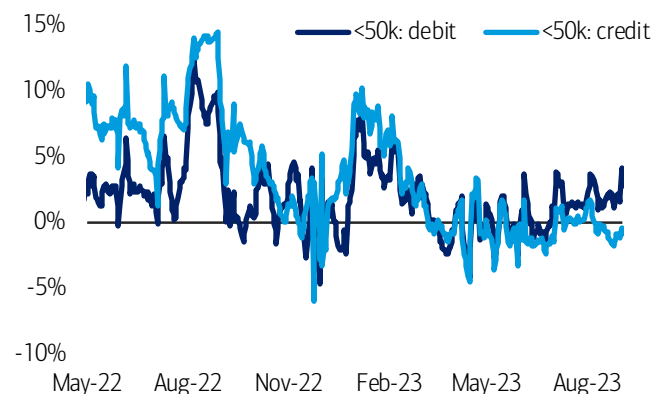


Source: BAC internal data

BofA GLOBAL RESEARCH

Exhibit 30: Total credit card and total debit card spending per HH for lower-income group (y/y % change of the 7-day ma of spending levels)

Lower-income debit card spending growth outpaced credit card spending growth on a y/y basis in the week ending Sep 2

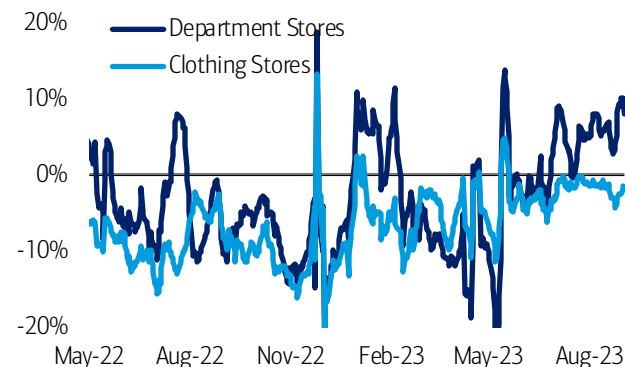


Source: BAC internal data

BofA GLOBAL RESEARCH

Exhibit 29: Spending per HH at department and clothing stores, based on BAC aggregated card data (y/y % change of the 7-day ma of spending levels)

Y/y clothing spending growth has largely been negative for the last year



Source: BAC internal data

BofA GLOBAL RESEARCH

Exhibit 31: Aggregated monthly card spending per HH by major category (%m/m, SA)

Card spending was soft in most categories except gas in August

	Aug-23	Jul-23	Jun-23	May-23	Apr-23	Mar-23
Gas	6.0%	1.7%	0.0%	-3.1%	1.6%	-5.1%
Furniture	-2.8%	-2.7%	-0.3%	1.2%	-0.5%	-3.2%
Home improvement	-1.0%	0.1%	-0.9%	1.0%	0.1%	-2.0%
Clothing	-1.8%	0.9%	-1.4%	1.2%	-0.5%	-0.1%
Grocery	0.1%	-0.3%	0.3%	1.3%	-0.3%	0.4%
General Merchandise	-0.6%	1.0%	-1.1%	0.8%	1.0%	-3.3%
Department Store	-2.8%	0.4%	-1.5%	0.5%	-0.4%	-1.9%
Restaurants	-0.3%	0.5%	0.0%	0.0%	0.3%	-0.3%
Lodging	-0.8%	-1.5%	0.0%	0.3%	-0.8%	-2.0%
Airlines	-0.7%	1.5%	-1.3%	1.0%	-1.8%	-1.3%
Total online retail (card not present)	-0.5%	1.6%	0.4%	-0.1%	1.0%	-1.5%

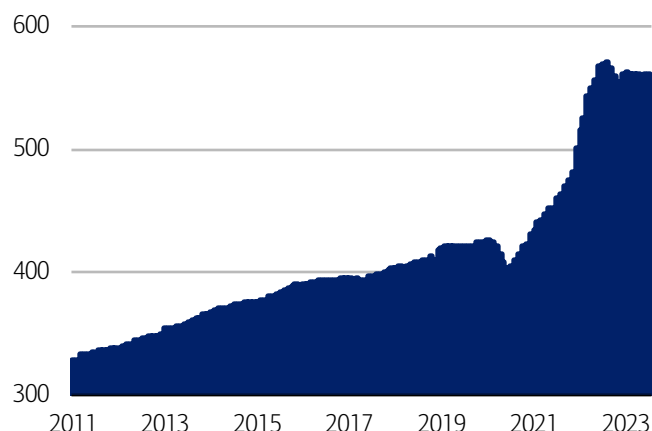
Source: BAC internal data. Card not present is largely online but could include purchases made over the phone.

BofA GLOBAL RESEARCH

US retail inventory levels

Exhibit 32: US retail (ex-auto) inventories (US\$bn), 2011-23

Retail inventories have been stable, still well above pre-COVID levels

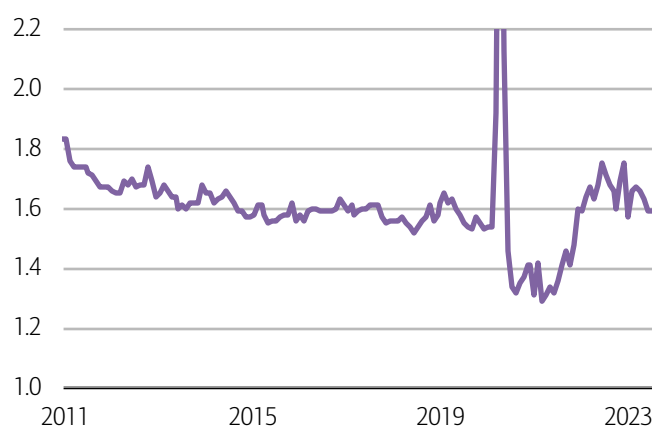


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 34: Furniture – adjusted inventory to sales, 2011-23

Furniture inventory-to-sales is still slightly above pre-COVID levels

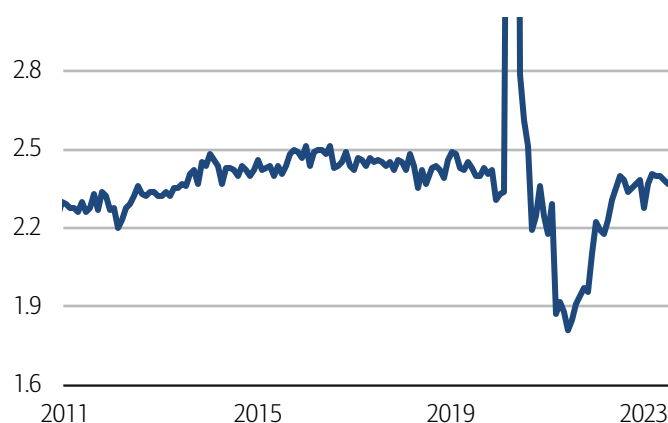


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 36: Clothing – adjusted inventory to sales, 2011-23

Clothing inventory to sales nearly back to pre-COVID levels



Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 33: US retail (ex-auto) inventory to sales ratio, 2011-23

Retail adjusted inventories to sales at 1.2x back to historical average

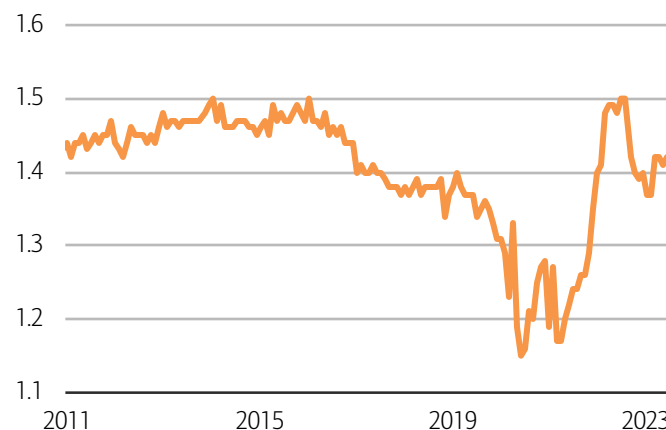


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 35: General merchandise – adjusted inventory to sales, 2011-23

General merchandise inventory-to-sales is back to above 2019 levels

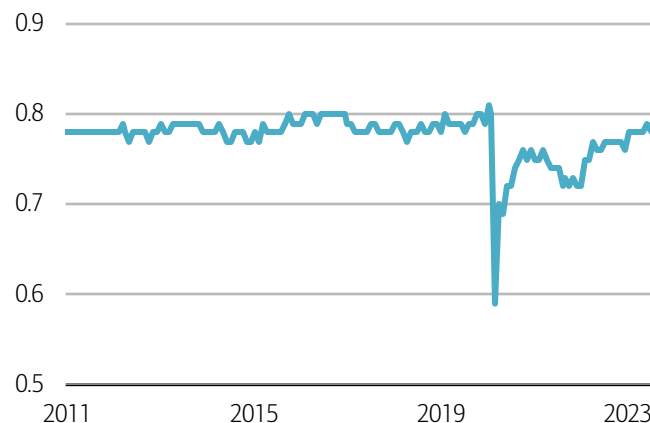


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 37: Food & Beverage – adjusted inventory to sales, 2011-23

Food & beverage inventory to sales still below pre-COVID levels



Source: Bloomberg

BofA GLOBAL RESEARCH



Port congestion & idling

Exhibit 38: Global port congestion - % of fleet, 2020-23

Port congestion at 5.8% of fleet

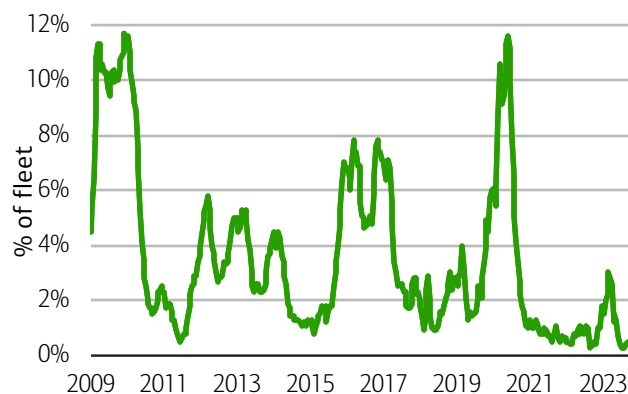


Source: Linerlytica

BofA GLOBAL RESEARCH

Exhibit 39: Global container vessel idling rate (%), 2009-23

Idling rate down to 0.4% of the fleet



Source: Linerlytica, Alphaliner

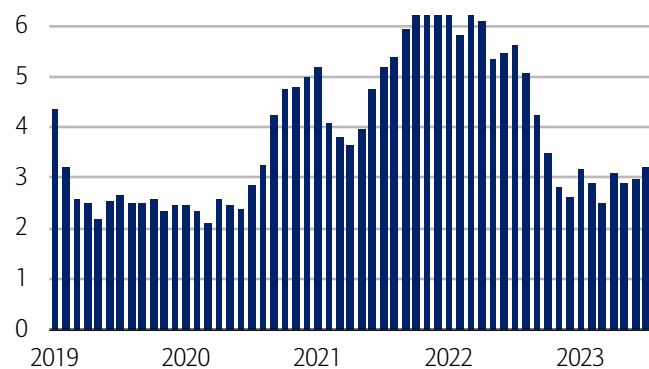
BofA GLOBAL RESEARCH

US inland congestion trackers

Below shows how quickly container boxes move from the terminal yard to inland transport at Port of LA/Long Beach.

Exhibit 40: US West Coast ports – average box dwell time (days)

Boxes are waiting at terminal yards for 2.9 days before pickup

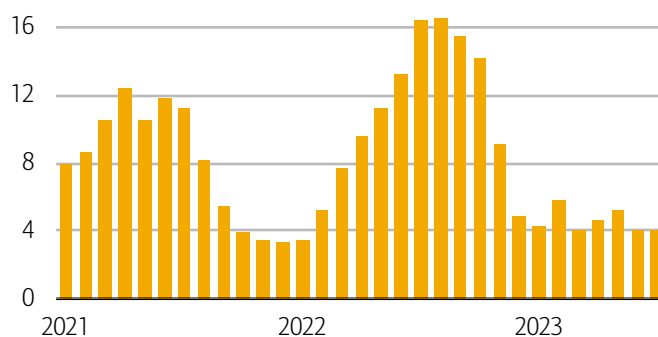


Source: PMSA

BofA GLOBAL RESEARCH

Exhibit 41: US West Coast ports – average rail box dwell time (days)

Boxes are waiting at terminal yards for 4.4 days before rail pickup up



Source: PMSA

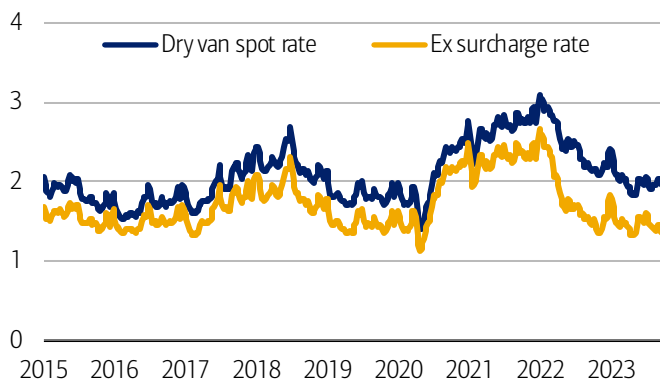
BofA GLOBAL RESEARCH

US trucking & Panama Canal congestion

Below shows US spot trucking rates and truck supply proxied by truck driver employees:

Exhibit 42: Spot trucking rates (US\$/mile), 2015-23

Spot trucking rates relatively flat in August / September

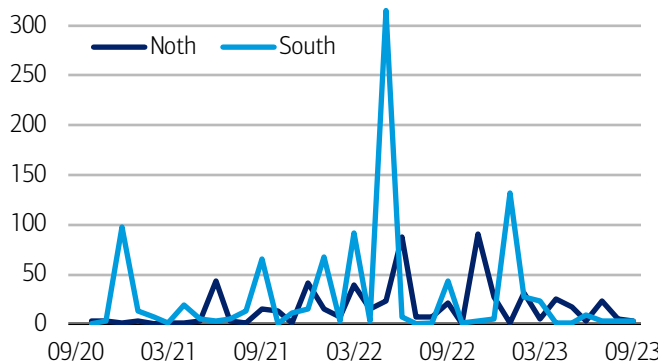


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 43: Panama Canal unscheduled container waiting time (hours)

Unscheduled container ships waiting 2-3 hours, no wait for scheduled ships



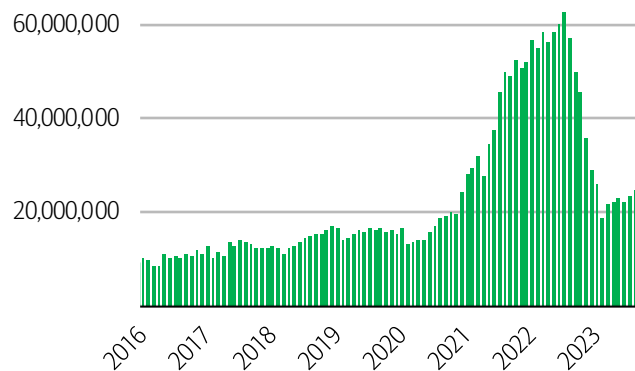
Source: Panama Canal Authority

BofA GLOBAL RESEARCH

Container liner monthly revenue

Exhibit 44: Evergreen – monthly revenue (NT\$k)

Evergreen August monthly revenues: -57% YoY, +6% MoM

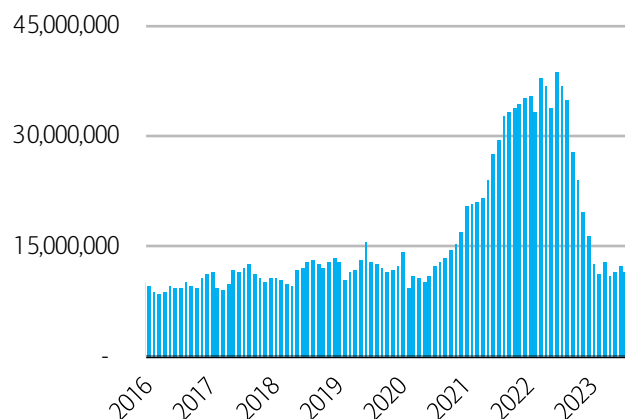


Source: Company reports

BofA GLOBAL RESEARCH

Exhibit 45: Yang Ming – monthly revenue (NT\$k)

Yang Ming August monthly revenues: -65% YoY, -6% MoM



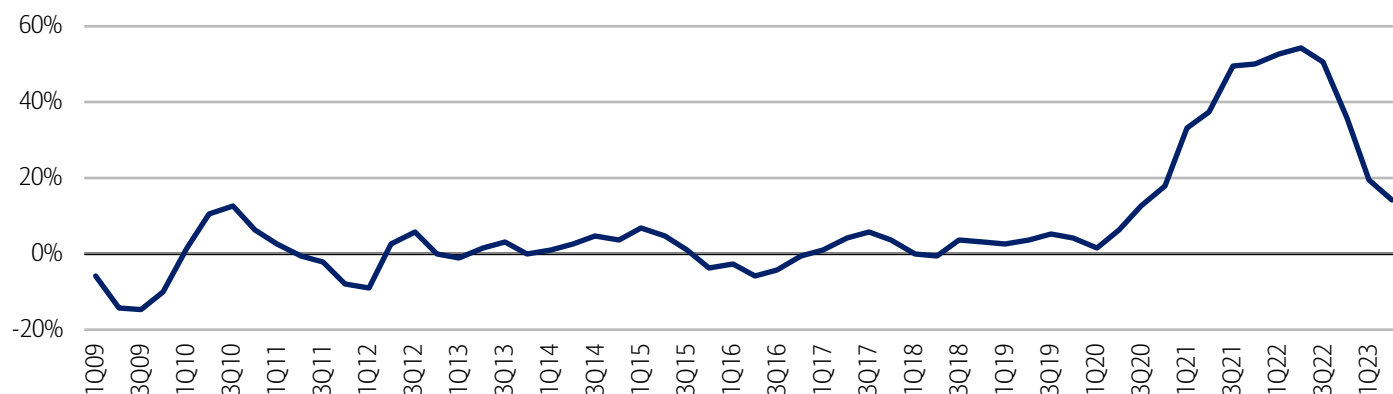
Source: Company reports

BofA GLOBAL RESEARCH

Container liner average EBIT margins

Exhibit 46: Container liner average quarterly EBIT margin, 2009-23

2Q23 operating profit margin of 14%



Source: Linerlytica

BofA GLOBAL RESEARCH

Vessel supply-side trends

Exhibit 47: Container shipping orderbook to fleet, 1996-2023

Container shipping orderbook stands at around 28% of fleet right now

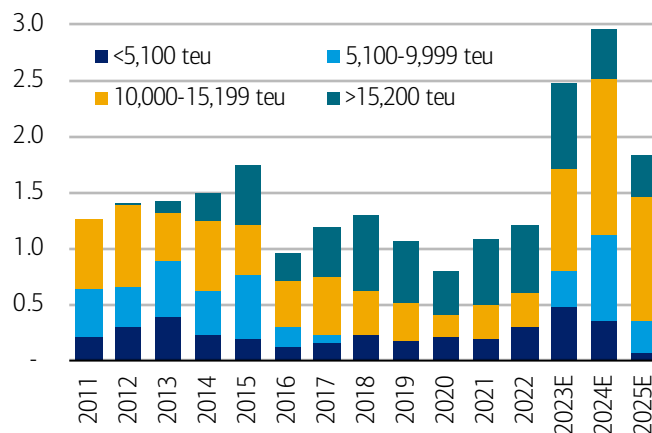


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 48: Delivery by vessel size (mn TEU), 2011-2025E

Deliveries ramping into 2024 with ~ 2.9mn TEU for delivery

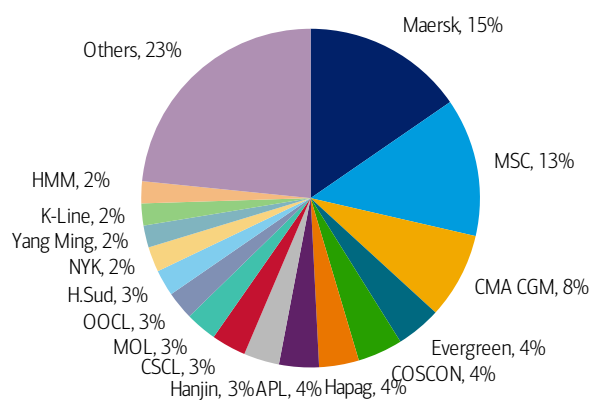


Source: Alphaliner

BofA GLOBAL RESEARCH

Exhibit 49: Container liner capacity share in 2013

Top 16 carriers in 2013 = 77% market share

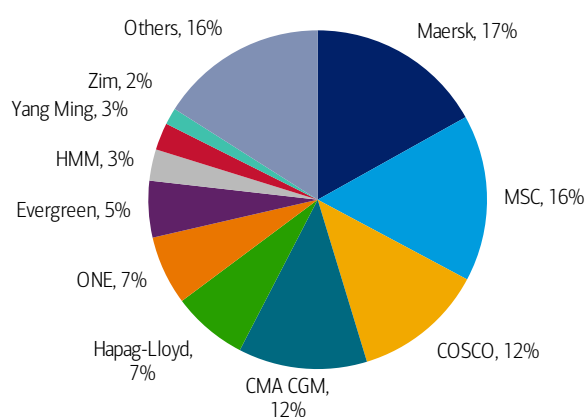


Source: Alphaliner

BofA GLOBAL RESEARCH

Exhibit 50: Container liner capacity share in 2021

Top 10 carriers in 2021 = 85% market share

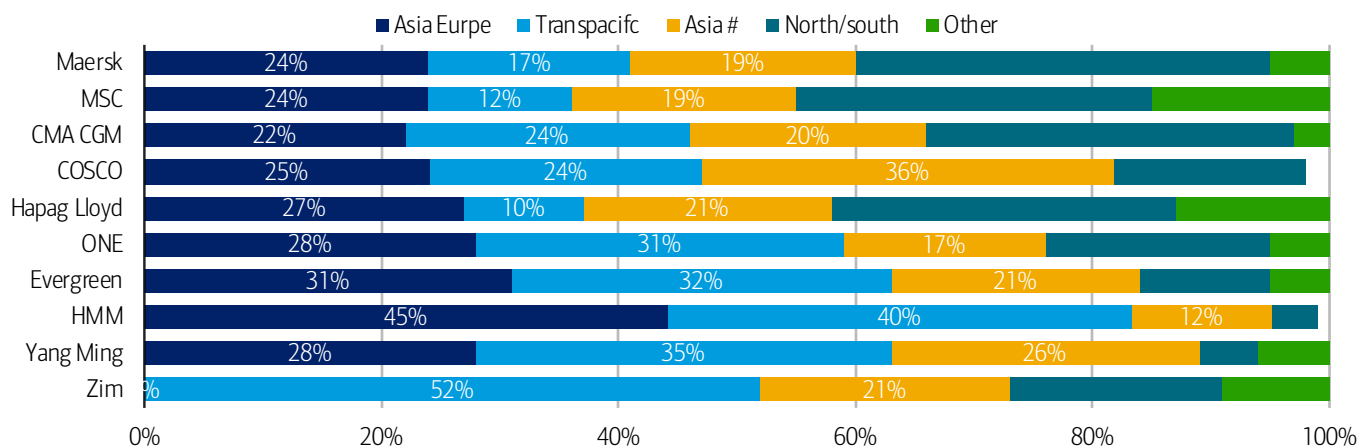


Source: Alphaliner

BofA GLOBAL RESEARCH

Exhibit 51: Container liner capacity by route

Container liner capacity deployment by route

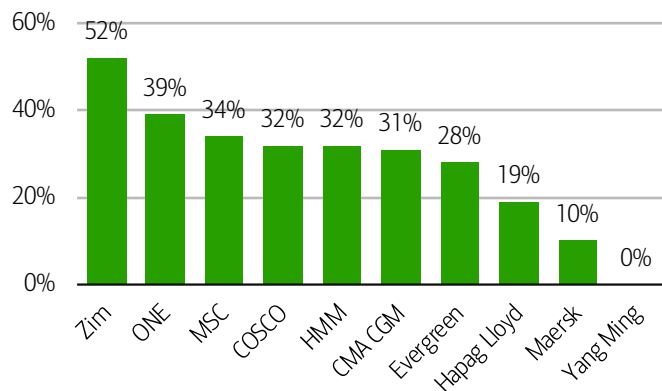


Source: Alphaliner. *Asia includes Middle East, India, Australia

BofA GLOBAL RESEARCH

Exhibit 52: Container liners – orderbook to fleet

Larger orderbooks for Zim, ONE, and MSC

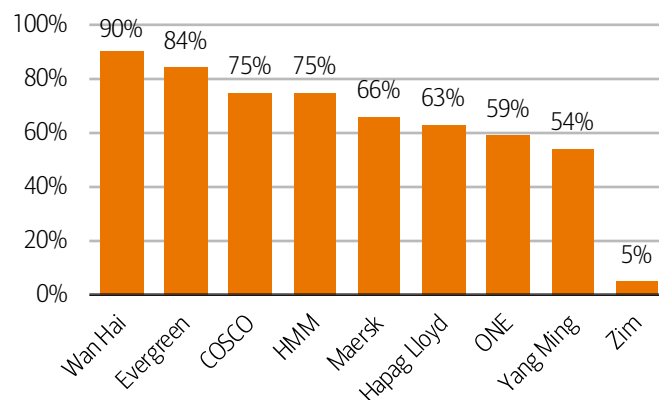


Source: Linerlytica

BofA GLOBAL RESEARCH

Exhibit 53: Container liners - % of fleet which is owned/finance lease

Liners own or finance lease more than half their fleet on average



Source: Linerlytica

BofA GLOBAL RESEARCH

Container shipping costs

Exhibit 54: Average containership charter rate (US\$/day), 2008-23

Average charter rates at ~US\$20K/day



Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 55: Singapore bunker price (US\$/tonne), 2016-23

VLSFO ~US\$680/tonne and HSFO ~US\$550/tonne



Source: Clarksons

BofA GLOBAL RESEARCH

Container vessel speeds & scrapping

Exhibit 56: Container vessel average sailing speed (knots), 2013-23

Container vessels now sailing below 14 knots

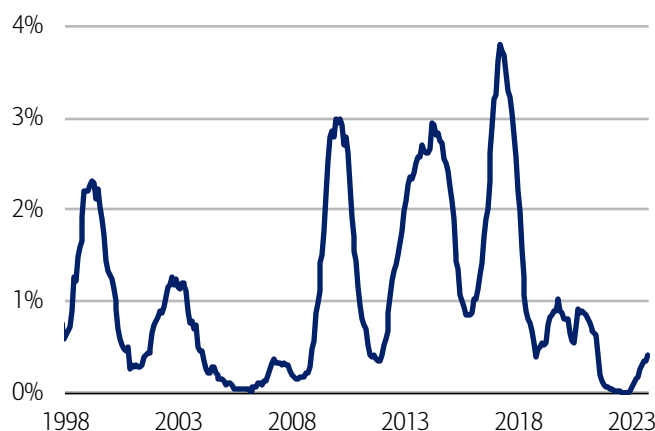


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 57: Container scrap rate (%) – 1998-2023

Scrapping rate down to below 0.5% of fleet



Source: Clarksons

BofA GLOBAL RESEARCH

Container shipping - demand & supply outlook

Exhibit 58: Container shipping demand & supply outlook, 2014-25E

Container shipping faces heavy oversupply into 2023-24

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023E	2024E	2025E
Demand growth (TEU)	5.3%	1.3%	3.0%	6.6%	5.2%	2.5%	-0.7%	6.7%	0.8%	-0.5%	2.7%	2.7%
New vessel deliveries	8.6%	9.4%	4.7%	5.9%	6.1%	4.7%	3.7%	4.5%	4.4%	8.5%	9.7%	6.1%
Demolition	-2.1%	-0.1%	-2.9%	-2.0%	-0.2%	-0.9%	-0.7%	-0.1%	-0.1%	-1.0%	-1.5%	-2.5%
Net Slot Capacity Growth	6.5%	9.4%	1.7%	3.9%	5.9%	3.9%	3.0%	4.4%	4.3%	7.5%	8.2%	3.6%
Impact of change in idle rate	1.4%	-0.7%	-3.5%	2.9%	1.6%	-1.3%	-2.9%	5.2%	0.0%	-2.2%	-2.0%	0.0%
Impact of change in congestion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-1.9%	-5.2%	-4.8%	6.5%	4.3%	0.0%
"In service" capacity growth (TEU)	7.9%	8.7%	-1.7%	6.7%	7.5%	2.6%	-1.8%	4.4%	-0.5%	11.8%	10.5%	3.6%
Effective Demand / Supply balance	-2.6%	-7.4%	+4.7%	-0.1%	-2.3%	-0.1%	+1.1%	+2.3%	+1.3%	-12.3%	-7.8%	-0.8%

Source: BofA Global Research estimates, Linerlytica

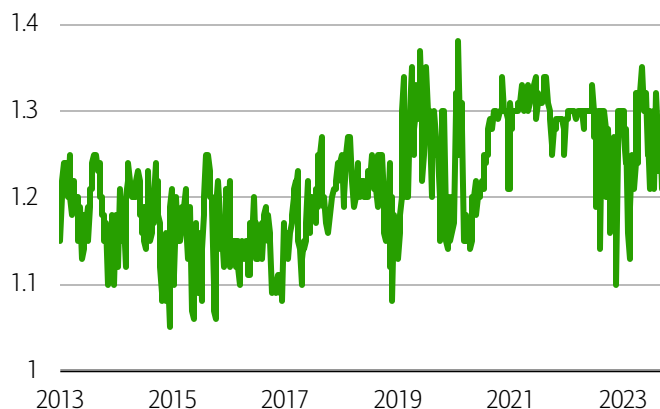
BofA GLOBAL RESEARCH

Tanker shipping

Freight rates

Exhibit 59: VLCC supply vs demand in Middle East #, 2013-23

VLCC supply vs demand in Middle East #

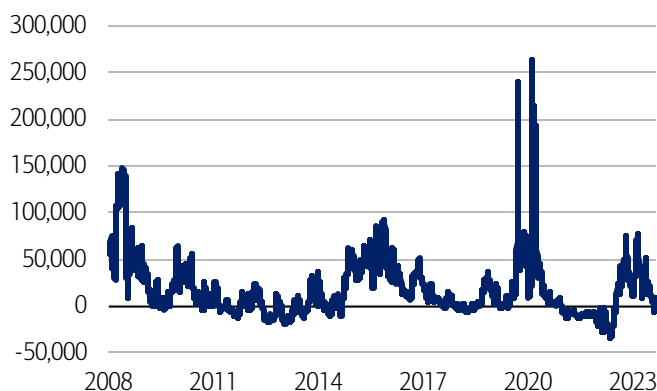


Source: Bloomberg, # 1 indicates equal number of VLCC supply vs demand for next 30 days, 1.1 indicates 10% surplus of VLCC relative to demand in coming 30 days.

BofA GLOBAL RESEARCH

Exhibit 61: VLCC freight rates (US\$/day), 2008-23

Baltic VLCC rates made slightly recovery but still at very low end

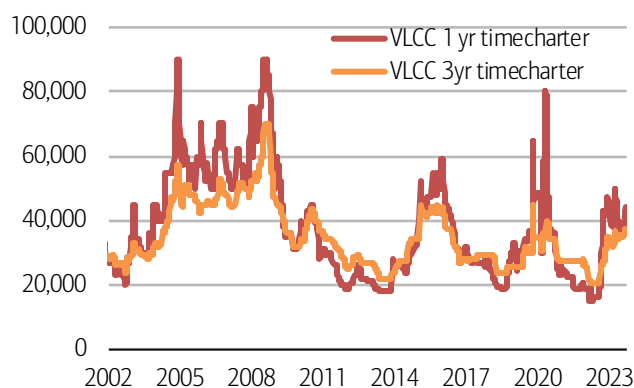


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 63: VLCC time charter rates (US\$/day), 2002-23

One year VLCC time charter rates holding around US\$44k per day



Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 60: Average quarterly tanker rates (US\$/day), 2022-23

Average quarterly tanker rates

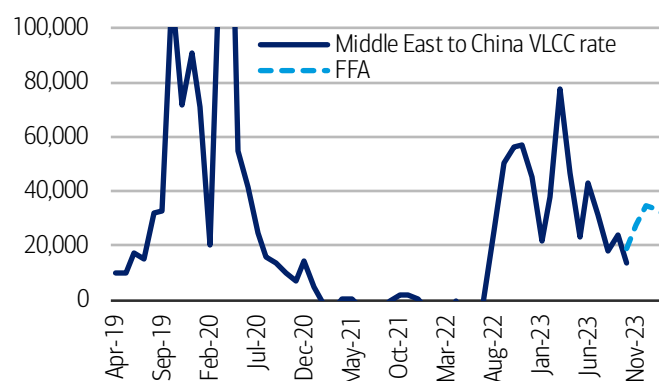
Date	2022	3Q22	4Q22	1Q23	2Q23	3Q23
VLCC	-21,670	9,747	42,823	34,498	25,984	8,807
Suezmax	21,742	21,742	21,742	21,742	21,742	21,742
Aframax	21,860	21,860	21,860	21,860	21,860	21,860
MR	9,749	9,749	9,749	9,749	9,749	9,749
LR2	20,292	20,292	20,292	20,292	20,292	20,292
% YoY						
VLCC	185%	-199%	-633%	-295%	-220%	-10%
Suezmax	-10658%	-1959%	1937%	244%	38%	-65%
Aframax	1418%	7427%	964%	197%	28%	-60%
MR	390%	586%	428%	199%	-24%	-39%
LR2	32%	67%	135%	149%	78%	-3%
% QoQ						
VLCC	22%	-145%	339%	-19%	-25%	-66%
Suezmax	65%	41%	76%	-16%	-34%	-64%
Aframax	63%	30%	70%	-18%	-30%	-59%
MR	246%	18%	4%	-30%	-12%	-4%
LR2	33%	25%	37%	9%	-5%	-32%

Source: Clarksons, Note: 3Q23 data is average of Jul, Aug, Sept data

BofA GLOBAL RESEARCH

Exhibit 62: VLCC freight forward agreement rates (US\$/day)

Forward curve at ~US\$20-35k/day into 4Q23

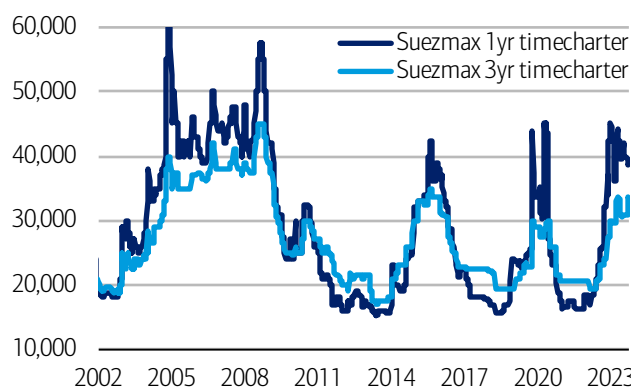


Source: Clarksons, Baltic Exchange

BofA GLOBAL RESEARCH

Exhibit 64: Suezmax time charter rates (US\$/day), 2002-23

One year Suezmax time charter rates around US\$39k per day

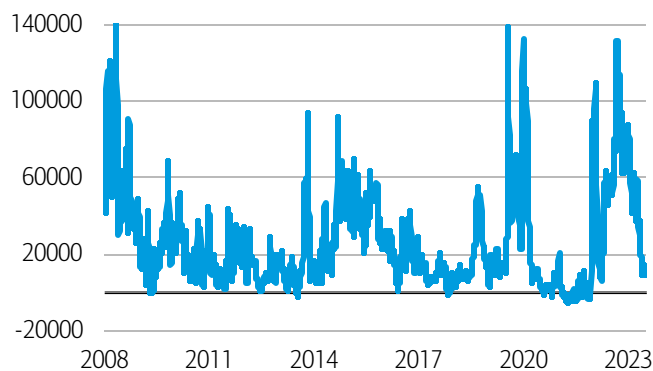


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 65: Suezmax freight rates (US\$/day), 2008-2023

Baltic Suezmax spot down to below US\$10k per day

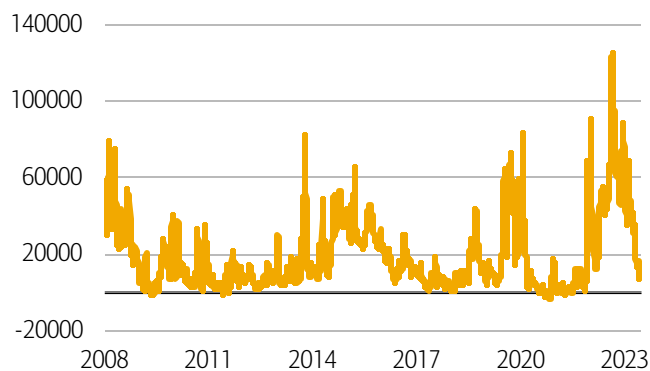


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 66: Aframax freight rates (US\$/day), 2008-23

Aframax rates down below US\$13k per day



Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 67: Seaborne crude oil volumes (% YoY), 2015-23

Seaborne crude tanker volumes recovering to pre COVID levels

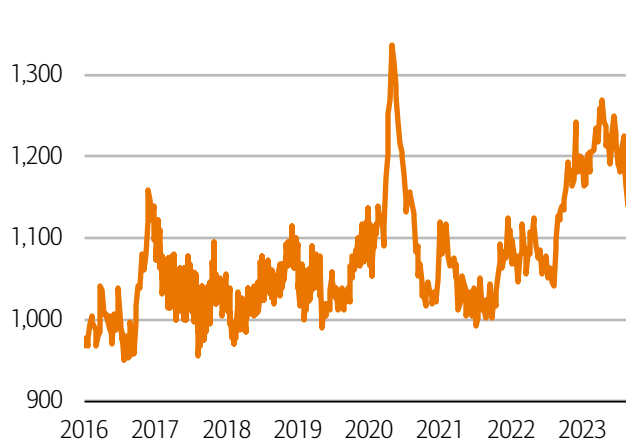


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 68: Crude tanker barrels on the water (mn bbl), 2016-23

Crude tanker demand has come off the peaks

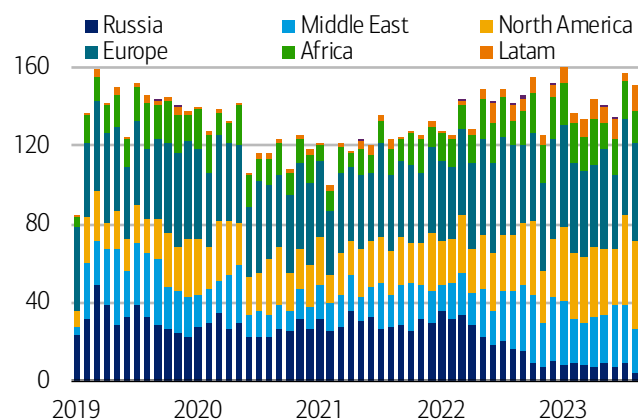


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 69: Western Europe seaborne monthly crude imports from non-Russian producers (mn bbl / month), 2019-23

European imports from non-Russia back to normal

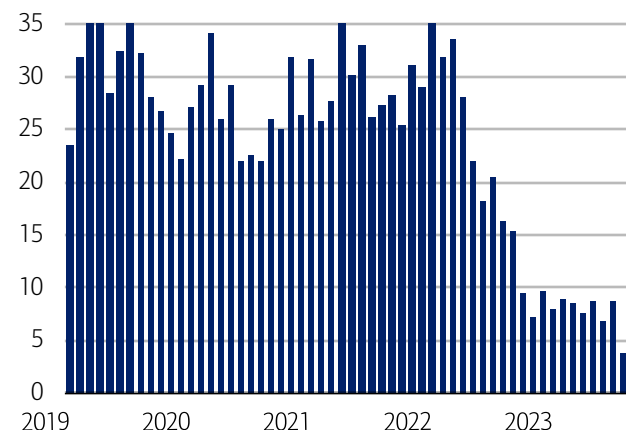


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 70: Western Europe seaborne crude imports from Russia (mn bbl / month), 2019-23

European imports from Russia continue to stay low

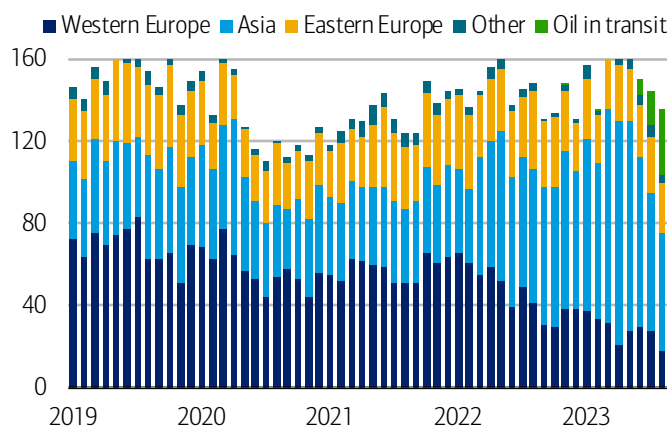


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 71: Russian seaborne crude exports (mn bbl / month), 2019-23

Total Russian crude exports still robust

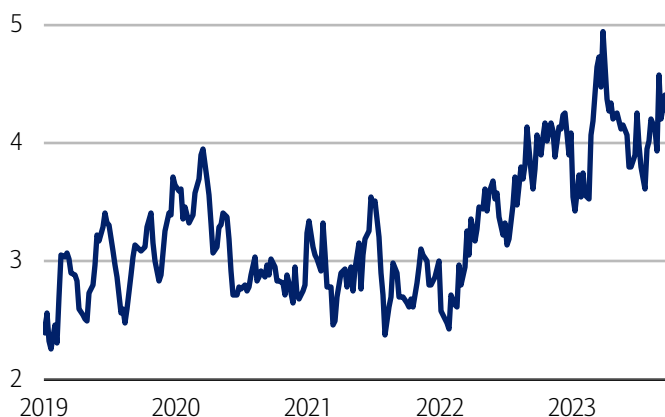


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 73: US crude exports (mn b/d) – 4w MA, 2019-23

US crude oil exports started to recover from the peaks of 1Q23 in August

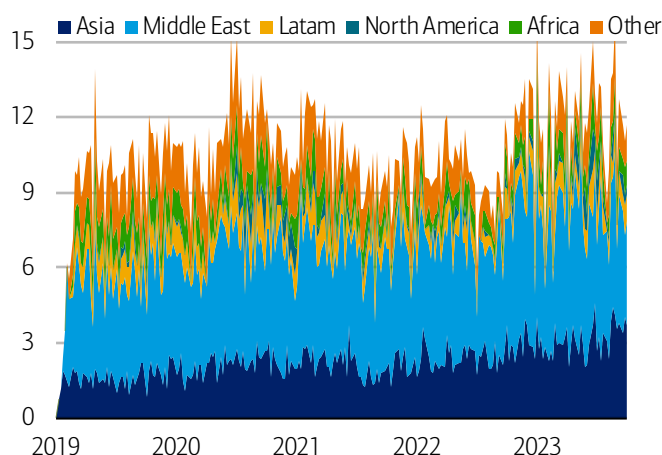


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 75: Chinese weekly crude imports (mn b/d), 2019-23

Chinese imports down from the peak

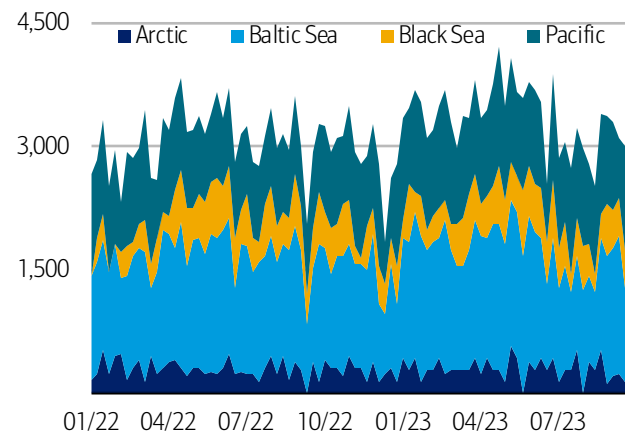


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 72: Russian crude by port (k b/d), 2022-23

Russian exports stayed low in September

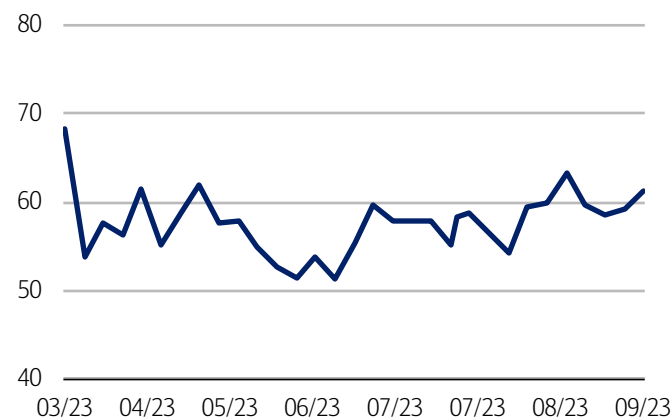


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 74: Weekly crude oil exports (mn b/d), 2023

Global crude oil exports staying robust

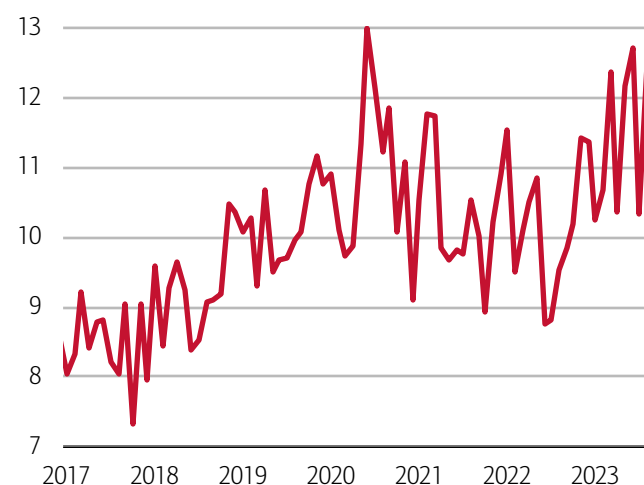


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 76: Chinese crude imports (mn b/d), 2017-23

China crude imports staying volatile



Source: Bloomberg

BofA GLOBAL RESEARCH

Tanker supply

Exhibit 77: Crude tanker orderbook as % of fleet, 1996-23

Crude tanker orderbook to fleet below 4%

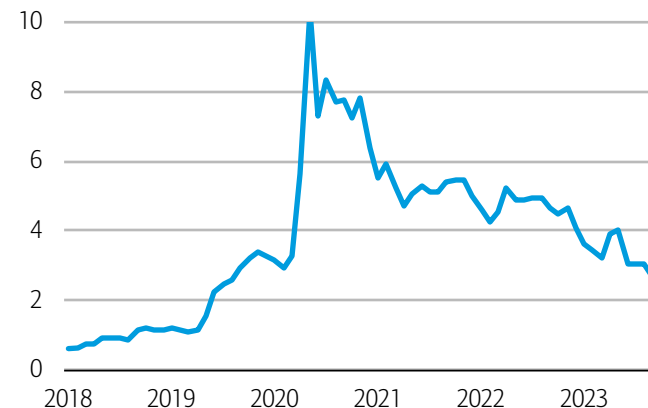


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 78: Crude tanker storage as % of fleet, 2018-23

Tanker storage now below 3.0% of fleet

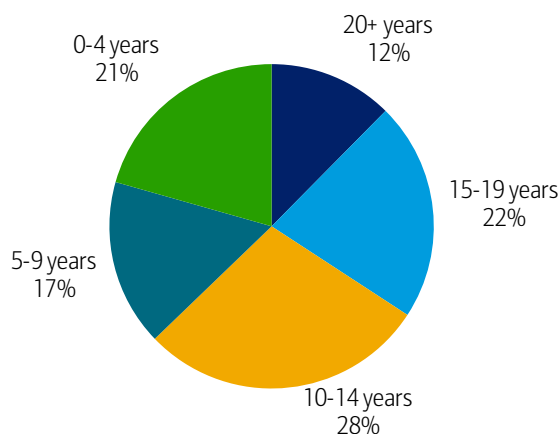


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 79: Crude tanker – age distribution, 2023

34% of fleet is older than 15 years

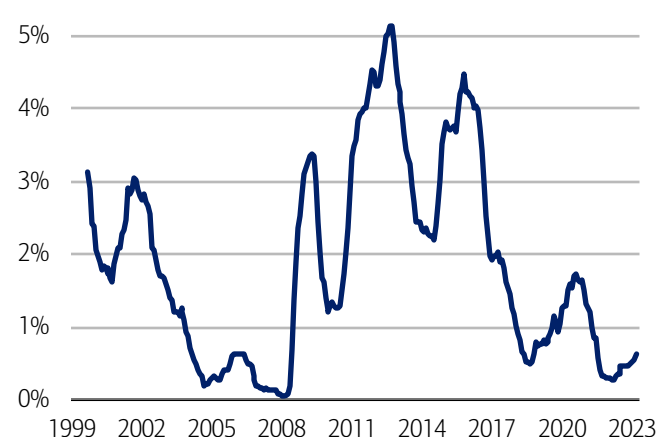


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 80: Tanker scrap rate (%) – 1999-2023

Scraping rate down to around 0.65% of fleet



Source: Clarksons

BofA GLOBAL RESEARCH

Crude tanker demand & supply

Exhibit 81: Crude tanker demand & supply growth forecasts (% YoY), 2014-25E

Crude tanker market fundamentals look positive in the years ahead

Crude tanker	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023E	2024E	2025E
Demand Growth	-0.2%	2.9%	4.0%	5.0%	3.4%	1.1%	-6.7%	-3.7%	7.0%	5.6%	3.0%	1.5%
Effective Fleet Growth	0.4%	1.0%	5.9%	5.9%	1.1%	6.0%	0.9%	-0.1%	3.2%	2.6%	0.7%	0.8%
Demand / supply balance	-0.6%	+1.9%	-1.9%	-0.9%	+2.3%	-4.8%	-7.6%	-3.6%	+3.8%	+3.0%	+2.3%	+0.7%
Crude tanker fleet (mn dwt)	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Fleet, beginning	340	341	347	368	386	388	417	431	442	446	453	451
New delivery	9	8	21	28	21	28	17	17	9	11	3	5
Scrapping rate	(6)	(1.3)	(1.4)	(9)	(17)	(3)	(3)	(9)	(5)	(4)	(5)	(5)
Others	(2)	(0)	1	(0)	(2)	3	0	4	0	0	0	0
Fleet, Ending, Dwt mn **	341	347	368	386	388	417	431	442	446	453	451	451
Growth	0.4%	2.0%	5.8%	5.1%	0.6%	7.4%	3.3%	2.7%	0.9%	1.4%	-0.4%	0.1%
Floating storage adjustment	0.0%	-1.0%	0.1%	0.8%	0.6%	-1.4%	-2.4%	-2.8%	2.3%	1.2%	1.1%	0.7%
Effective supply growth	0.4%	1.0%	5.9%	5.9%	1.1%	6.0%	0.9%	-0.1%	3.2%	2.6%	0.7%	0.8%
Delivery ratio	58%	72%	59%	91%	68%	91%	100%	87%	90%	100%	100%	100%
Scrapping rate	1.8%	0.4%	0.4%	2.4%	4.4%	0.7%	0.8%	2.1%	1.2%	1.0%	1.0%	1.0%
Gross delivery rate	2.7%	2.5%	6.0%	7.6%	5.4%	7.2%	4.1%	3.9%	2.1%	2.4%	0.6%	1.1%

Source: Clarksons, BofA Global Research estimates

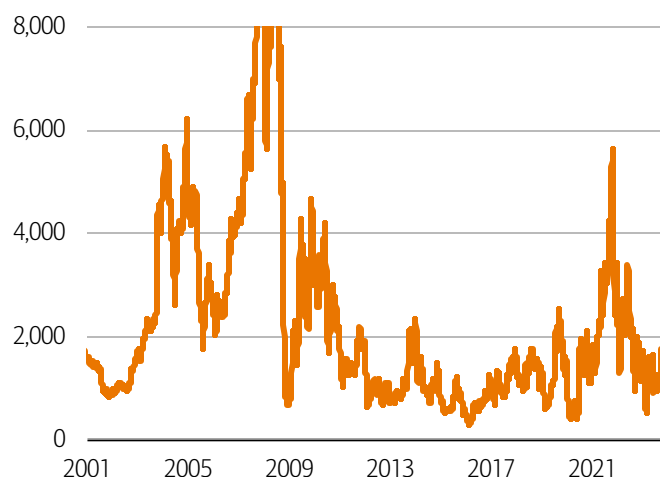
BofA GLOBAL RESEARCH

Dry bulk shipping

Freight rates

Exhibit 82: Baltic Dry Index, 2002-23

BDI at around 1,700

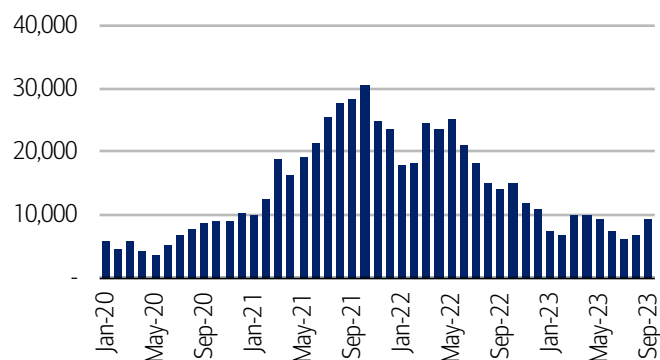


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 84: Handysize spot monthly average (US\$/day), 2020-23*

Spot handysize averaged US\$9.4k/day in September



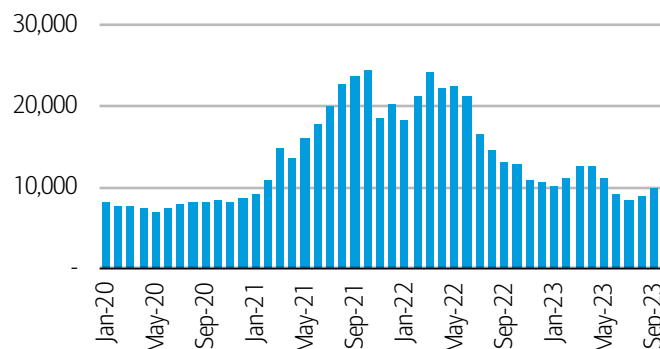
Source: Clarksons, BofA Global Research estimates

*Size and commission adjusted to be comparable to PacBasin average handy rates

BofA GLOBAL RESEARCH

Exhibit 86: Handysize 1yr TC monthly average (US\$/day), 2020-23*

1yr time charter handysize averaging US\$10.2k/day in September



Source: Clarksons, BofA Global Research estimates

*Size and commission adjusted to be comparable to PacBasin average handy rates

BofA GLOBAL RESEARCH

Exhibit 83: Baltic average rates (US\$/day), 2022-23

Dry bulk quarterly average rates

Date	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23
BDI	1,977	2,530	1,870	1,523	1,011	1,313	1,186
Capesize	14,746	21,599	16,906	14,906	9,144	15,561	13,294
Panamax 82	23,218	28,901	18,402	16,050	11,326	12,248	11,836
Supramax 58	25,156	27,566	21,396	14,837	10,171	10,763	9,965
Handysize 38	24,084	26,618	21,514	15,028	9,702	10,414	8,810

% YoY

BDI	14%	-9%	-50%	-56%	-49%	-48%	-37%
Capesize	-14%	-31%	-60%	-65%	-38%	-28%	-21%
Panamax 82	27%	12%	-45%	-45%	-51%	-58%	-36%
Supramax 58	51%	8%	-38%	-51%	-60%	0%	0%
Handysize 38	45%	18%	-33%	-52%	-60%	-61%	-59%

% QoQ

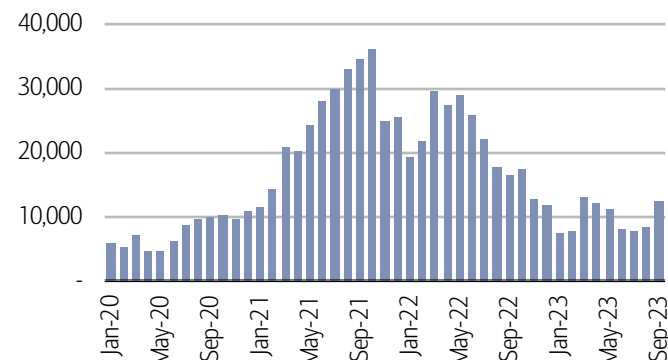
BDI	-43%	28%	-26%	-19%	-34%	30%	-10%
Capesize	-65%	46%	-22%	-12%	-39%	70%	-15%
Panamax 82	-20%	24%	-36%	-13%	-29%	8%	-3%
Supramax 58	-17%	10%	-22%	-31%	-31%	6%	-7%
Handysize 38	-23%	11%	-19%	-30%	-35%	7%	-15%

Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 85: Supramax spot monthly average (US\$/day), 2020-23 *

Spot supramax averaged US\$12.4k/day in September



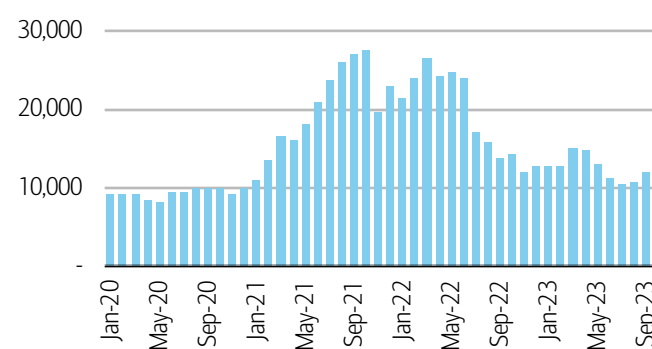
Source: Clarksons, BofA Global Research estimates

* Commission adjusted to be comparable to PacBasin achieved rates

BofA GLOBAL RESEARCH

Exhibit 87: Supramax 1yr TC monthly average (US\$/day), 2020-23 *

1yr time charter supramax averaging US\$12.2k/day in September



Source: Clarksons, BofA Global Research estimates

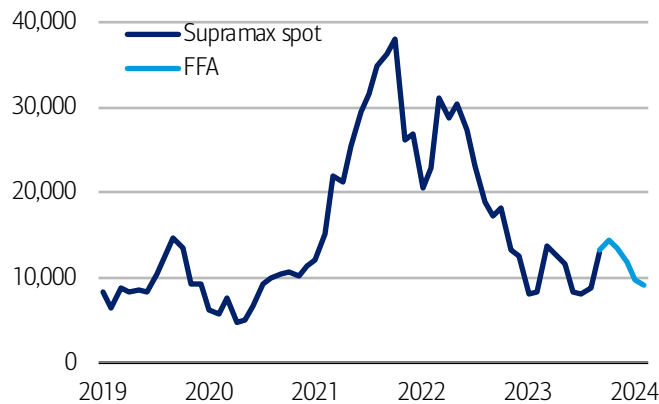
*Size and commission adjusted to be comparable to PacBasin average handy rates

BofA GLOBAL RESEARCH

Handysize & Supramax FFA outlook

Exhibit 88: Supramax - Freight Forward Agreement, 2019-23

Supra forward curves pointing down starting in the year end

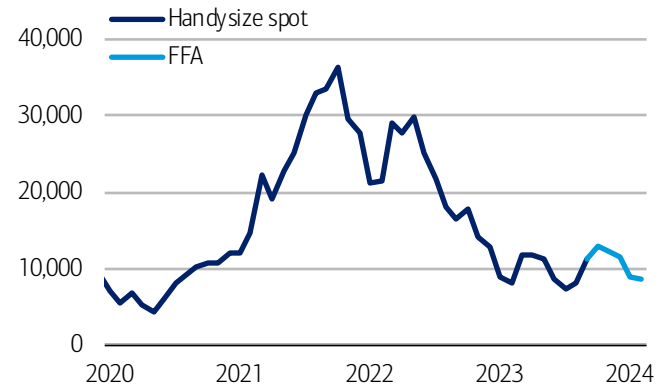


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 89: Handysize - Freight Forward Agreement, 2020-23

Handy forward curves point to recovery in October



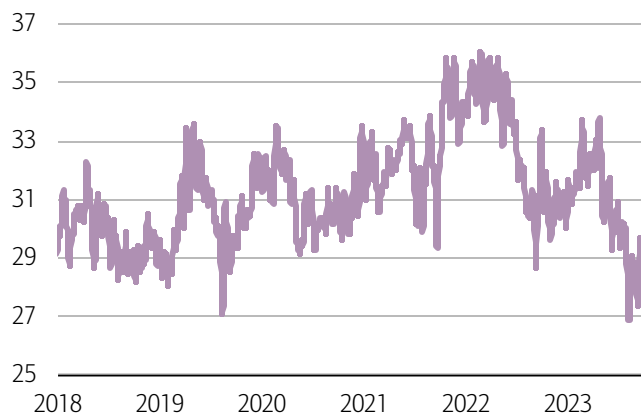
Source: Bloomberg

BofA GLOBAL RESEARCH

Vessel values & port congestion

Exhibit 90: Daily dry bulk fleet at port (anchor or berth) (%) 2018-23

~30% of dry bulk fleet at port

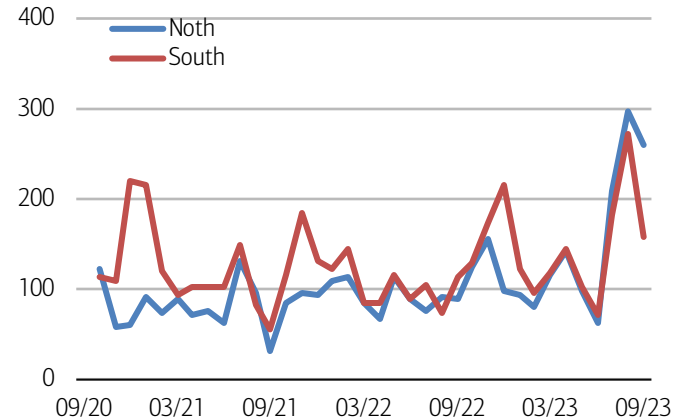


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 91: Panama Canal bulker waiting time (hours), 2020-23

Bulk vessel congestion building with average 6-12 day wait time



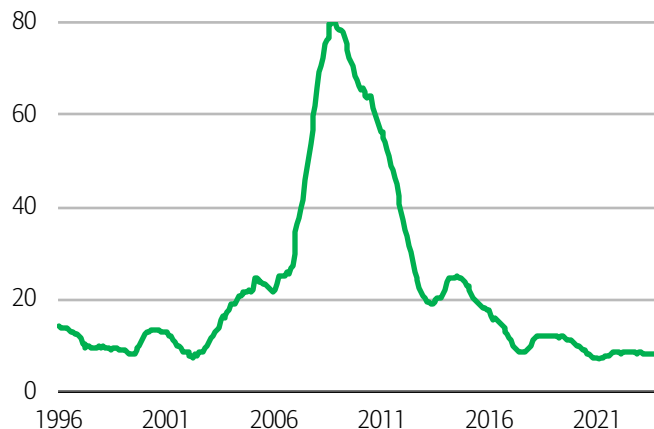
Source: Panama Canal Authority Note: Sept. data up to 16th daily average.

BofA GLOBAL RESEARCH

Vessel supply

Exhibit 92: Dry bulk orderbook to fleet (%), 1996-2023

Orderbook to fleet down to around 8.0%

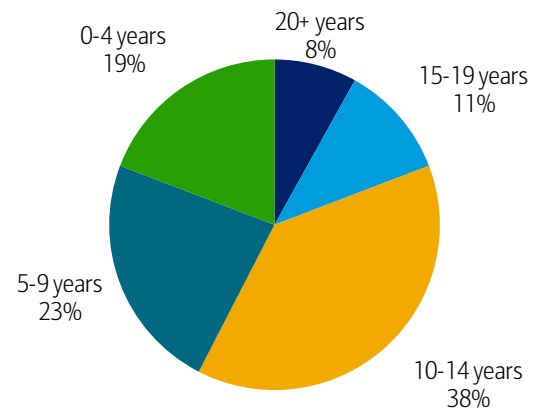


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 93: Dry bulk vessel age distribution, 2023

19% of fleet is older than 15 years

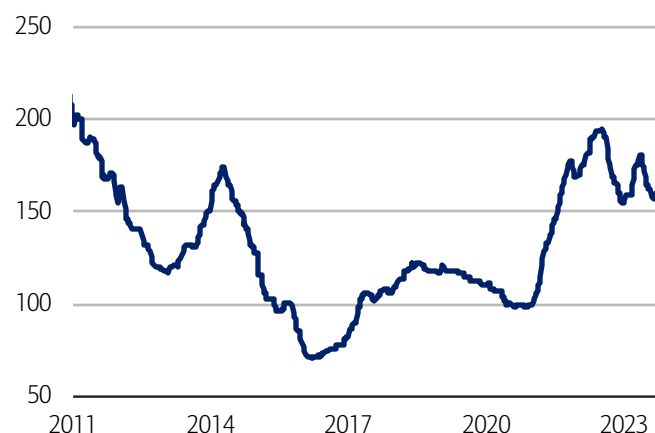


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 94: Bulk carrier secondhand vessel price index, 2010-23

Secondhand vessel prices started to come down again in August/September

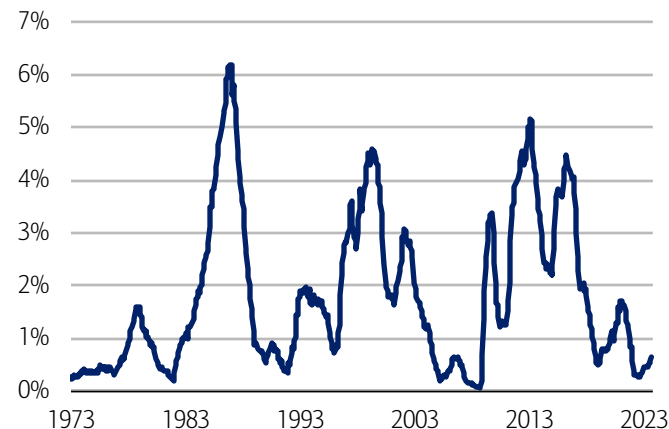


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 95: Bulkcarrier scrap rate (%) – 1973-2023

Scrapping rate down to around 0.65% of fleet

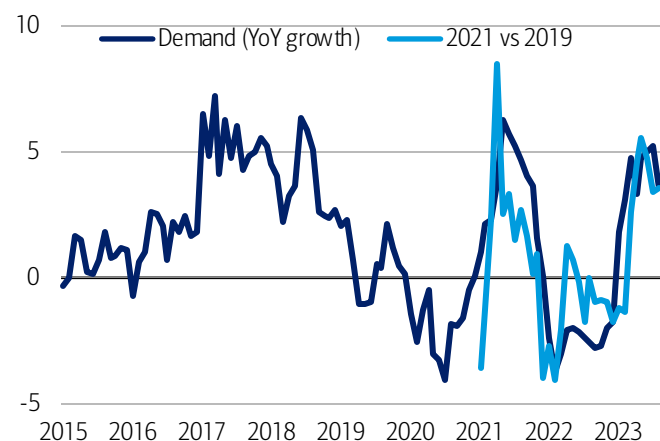


Source: Clarksons

BofA GLOBAL RESEARCH

Dry bulk demand reads**Exhibit 96: Dry bulk demand growth (% YoY), 2015-23**

Dry bulk demand above 2019 levels since May 2023

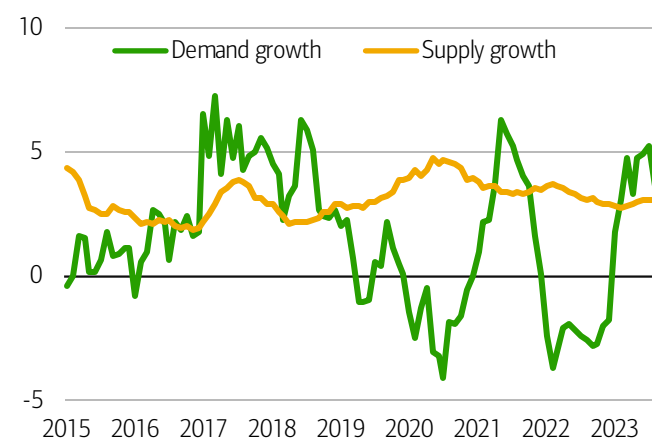


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 97: Bulk monthly demand & supply growth (% YoY), 2015-23

Bulk demand growth rebound vs supply growth of +3.0% YoY



Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 98: Iron ore demand growth (% YoY), 2015-23

Iron ore demand trending at above 2019 levels since May 2023

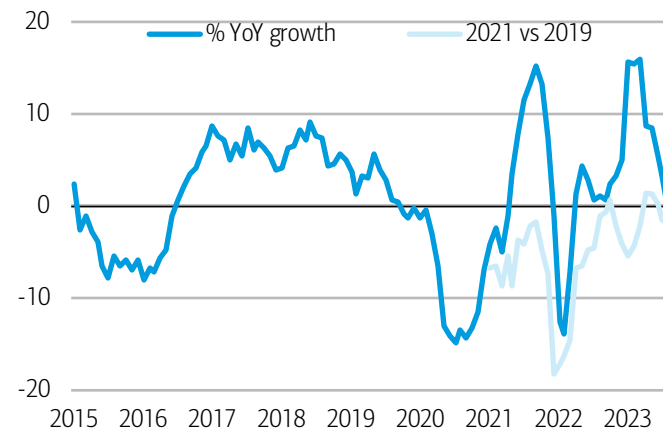


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 99: Coal demand growth (% YoY), 2015-23

Coal demand growth trending in-line with 2019 levels

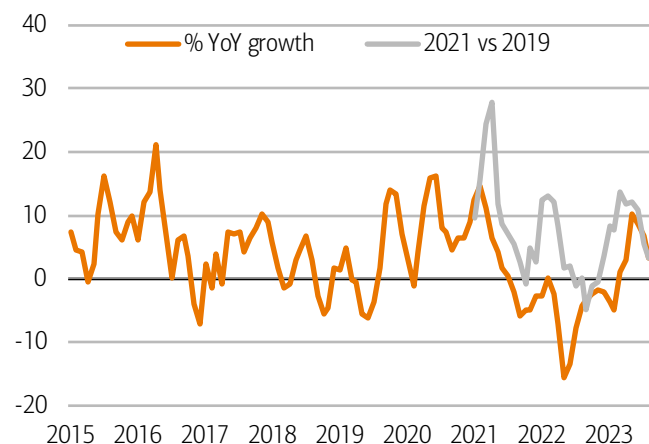


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 100: Grain demand growth (% YoY), 2015-23

Grain demand at above 2019 levels since May 2023



Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 101: Minor bulk demand growth (% YoY), 2015-23

Minor bulk demand growth trending slightly above 2019 levels

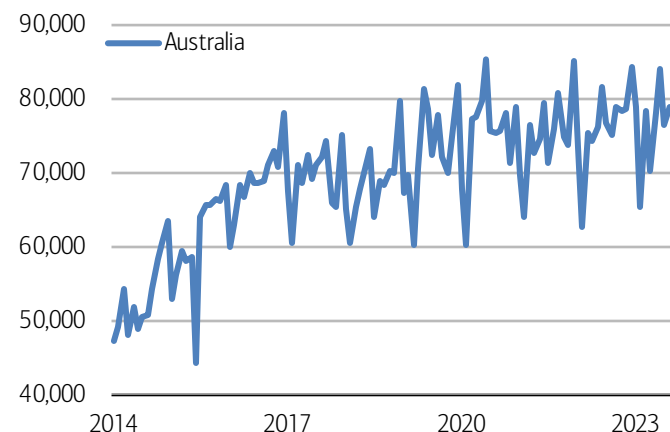


Source: Clarksons

BofA GLOBAL RESEARCH

Exhibit 102: Australia iron ore monthly shipments (bn tn), 2014-23

Australian iron ore exports recovering off cyclone disruptions

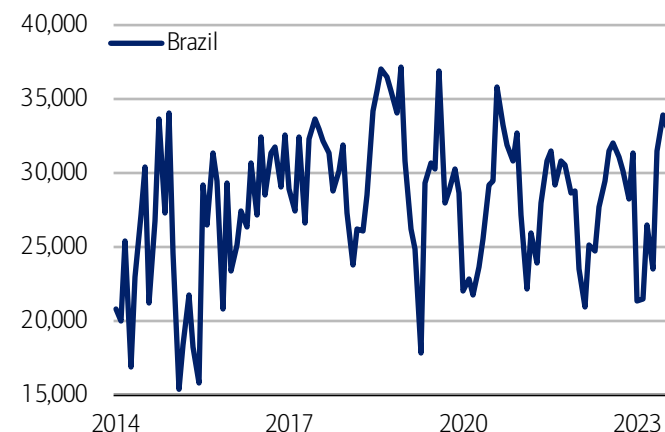


Source: Marcura

BofA GLOBAL RESEARCH

Exhibit 103: Brazil iron ore monthly shipments (bn tn), 2014-23

Brazil iron ore exports relatively stable



Source: Marcura

BofA GLOBAL RESEARCH

Exhibit 104: Indonesian coal monthly shipments (bn tn), 2014-23

Indonesian exports under some pressure

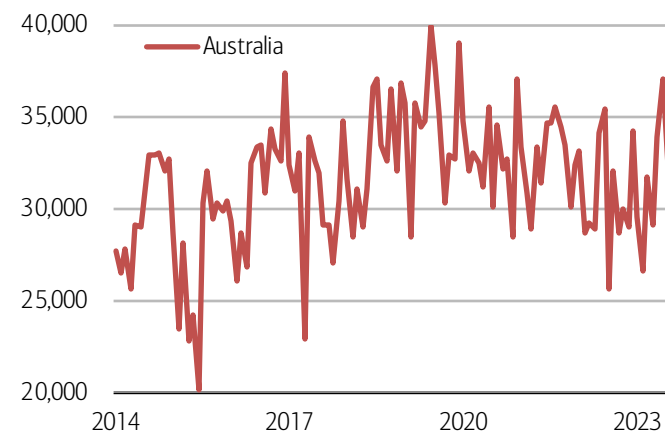


Source: Marcura

BofA GLOBAL RESEARCH

Exhibit 105: Australian coal monthly shipments (bn tn), 2014-23

Aussie coal shipments came down a little in August



Source: Marcura

BofA GLOBAL RESEARCH

Dry bulk demand & supply

Exhibit 106: Dry bulk shipping demand & supply growth (% YoY), 2016-25E

Dry bulk demand/supply outlook

Dry Bulk	2016	2017	2018	2019	2020	2021	2022	2023E	2024E	2025E
Demand	2.3%	3.9%	3.4%	0.7%	0.0%	3.5%	-1.8%	2.5%	2.3%	2.0%
Fleet Growth	2.3%	3.1%	2.7%	3.0%	4.1%	3.9%	2.9%	2.3%	0.9%	1.0%
Demand / Supply Balance	0.0%	0.8%	0.7%	-2.2%	-4.1%	-0.4%	-4.7%	0.2%	1.4%	1.0%
Dry Bulk Fleet, Dwt mn	2016	2017	2018	2019	2020	2021	2022	2023E	2024E	2025E
Fleet, beginning	780	798	823	845	879	916	949	976	999	1,009
New delivery	47	38	28	41	49	38	32	34	26	23
Demolition	(29)	(15)	(4)	(8)	(15)	(5)	(4)	(11)	(17)	(13)
Others	(0)	1	(1)	0	3	-	-	-	-	-
Fleet, Ending, Dwt mn	798	823	845	879	916	949	976	999	1,009	1,019
Growth	2.3%	3.1%	2.7%	4.0%	4.2%	3.6%	2.9%	2.3%	0.9%	1.0%
Adjustment factor				-1.0%	-0.1%	0.3%	0.0%	0.0%	0.0%	0.0%
Adjusted fleet growth				3.0%	4.1%	3.9%	2.9%	2.3%	0.9%	1.0%
Gross delivery rate	6.1%	4.8%	3.4%	4.9%	5.6%	4.2%	3.3%	3.4%	2.6%	2.3%
Scrapping Rate	3.7%	1.8%	0.5%	0.9%	1.8%	0.6%	0.4%	1.1%	1.7%	1.3%

Source: BofA Global Research, Clarksons

BofA GLOBAL RESEARCH

Disclaimer

Selected Bank of America ("BAC") transaction data are used to inform the macroeconomic views expressed in this report and should be considered in the context of other economic indicators and publicly available information. In certain instances, the data may provide directional and/or predictive value. The data used are not comprehensive; they are based on aggregated and anonymized selections of BAC data and may reflect a degree of selection bias and limitations on the data available.

Methodology explained

Readers should be aware that although the BAC datasets utilized in our analysis represent a significant number of data points, they nevertheless present a degree of selection bias, including but not limited to income levels and geographies. In addition, the data is limited to debit and credit cards and does not include other payment methods such as cash or checks.

Data regarding merchants who receive payments are identified and classified by the Merchant Categorization Code (MCC) defined by financial services companies. The data are mapped using proprietary methods from the MCCs to the North American Industry Classification System (NAICS), which is also used by the Census Bureau, in order to classify spending data by subsector. Spending data August also be classified by other proprietary methods not using MCCs.

BAC data used in this report include spending from active US households (HHs) only. Spending from corporate cards are excluded.

Our methodology for calculating the growth rates for daily data: we calculate the %y/y growth rate and the 4-year % change by matching calendar days (Jan 1 2023 is matched to Jan 1 2022, and Jan 1, 2019, respectively). The % change is calculated based on the 7-day moving average of spending levels.

Unless otherwise noted, the monthly subsector data are adjusted to control for seasonality and other factors.

Disclosures

Important Disclosures

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 ^{R1}
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

^{R1} 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.

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; 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; 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 (DFS); 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 or 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.

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.

