

Northrop Grumman

The best portfolio in the business – reiterate Buy and \$615 PO

Reiterate Rating: BUY | PO: 615.00 USD | Price: 450.00 USD

Worries over B-21 and Sentinel programs overdone

Excluding B-21 and pension charges, Northrop Grumman (NYSE: NOC) strongly exceeded consensus and EPS estimates on topline and EPS (see 4Q23 results). This was lost amongst investors, but we think worries on the B-21 program and newfound concerns regarding Sentinel/GBSD cost overruns are largely overdone. In our view, there are few negative catalysts ahead to justify NOC's increasingly weak multiple. We reiterate our Buy and \$615 PO.

B-21 high supplier costs, Sentinel costs up on construction

On B-21, while the extent of the charge was above expectations, the prospect of a charge was well telegraphed over the last 12 months. Additionally, as the first LRIP lot was awarded in 4Q23, we see the program continuing along on schedule, further indicating that these charges are supplier cost and timing related. We think the B-21 return on investment will exceed investor expectations. On Sentinel, the company clarified that cost overruns have been on military construction and procurement phases, while progress continues on track at NOC and its suppliers on the EMD phase of the program. To be clear, program cost growth is not necessarily bad for NOC. The EMD phase is cost-plus, that is to say, more cost can translate to more plus on a cost-plus program or, at a minimum, a pass through.

Record backlog of \$84bn supporting long term targets

NOC reached a record backlog of \$84bn at the end of 2023. Additionally, each segment finished the quarter with a book-to-bill ratio above 1.0x, reflecting the still robust demand environment. We expect this backlog to translate into solid topline growth of mid- to high-single digits through the outyears.

Shareholder friendly capital deployment persists

NOC continues to boast strong FCF which it deploys generously to shareholders (125% in 2023). The Board also recently increased its share repurchase authorization by \$2.5bn to \$3.6bn. NOC anticipates at least \$2bn in buybacks through 2024, including an accelerated share repurchase expected soon given NOC's strong liquidity position coming into 2024. In the absence of any capital-intensive projects and/or attractive M&A opportunities, we view buybacks as the most sensible application of capital.

Estimates (Dec) (US\$)	2022A	2023A	2024E	2025E	2026E
EPS	25.54	23.29	24.70	27.75	30.20
GAAP EPS	31.47	13.53	24.71	27.75	30.20
EPS Change (YoY)	-0.3%	-8.8%	6.1%	12.3%	8.8%
Consensus EPS (Bloomberg)			24.61	27.59	29.38
DPS	6.69	7.34	8.05	8.86	9.75
Valuation (Dec)					
P/E	17.6x	19.3x	18.2x	16.2x	14.9x
GAAP P/E	14.3x	33.3x	18.2x	16.2x	14.9x
Dividend Yield	1.5%	1.6%	1.8%	2.0%	2.2%
EV / EBITDA*	17.6x	22.4x	14.8x	13.5x	12.9x
Free Cash Flow Yield*	2.2%	3.1%	3.6%	4.8%	5.8%
* For full definitions of <i>IQ</i> method SM measures, see page 6.					

BofA Securities does and seeks to do business with issuers covered in its research reports. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision.

Refer to important disclosures on page 7 to 9. Analyst Certification on page 5. Price
Objective Basis/Risk on page 5.

Timestamp: 20 February 2024 03:00AM EST

20 February 2024

Equity

Previous	Current
8.08	8.05

Ronald J. Epstein

Research Analyst BofAS +1 646 855 5695

r.epstein@bofa.com Mariana Perez Mora

Research Analyst BofAS +1 646 855 5696 mariana.perezmora@bofa.com

Andre Madrid

Research Analyst BofAS +1 646 725 3107 andre.madrid@bofa.com

Jordan Lyonnais

Research Analyst BofAS +1 646 855 5204 jordan.lyonnais@bofa.com

Samantha Stiroh Research Analyst

BofAS +1 646 855 5725 samantha.stiroh@bofa.com

Stock Data

Price	450.00 USD
Price Objective	615.00 USD
Date Established	28-Jul-2023
Investment Opinion	B-1-7
52-Week Range	414.56 USD - 496.89 USD
Mrkt Val (mn) / Shares Out (mn)	67,516 USD / 150.0
Free Float	90.5%
Average Daily Value (mn)	492.70 USD
BofA Ticker / Exchange	NOC / NYS
Bloomberg / Reuters	NOC US / NOC.N
ROE (2024E)	24.3%
Net Dbt to Eqty (Dec-2023A)	72.2%
ESGMeter™	High

ESGMeter is not indicative of a company's future stock price performance and is not an investment recommendation or rating. ESGMeter is independent of BofA Global Research's equity investment rating, volatility risk rating, income rating, and price objective for that company. For full details, refer to "BofA ESGMeter Methodology".

GBSD – Ground Based Strategic Deterrent

EMD – Engineering and Manufacturing Development

iQprofile[™] Northrop Grumman

iQmethod [™] – Bus Performance*					
(US\$ Millions)	2022A	2023A	2024E	2025E	20261
Return on Capital Employed	9.3%	6.7%	10.5%	11.6%	12.3%
Return on Equity	28.1%	23.5%	24.3%	25.5%	25.4%
Operating Margin	9.8%	6.5%	10.7%	11.0%	10.9%
Free Cash Flow	1,466	2,100	2,431	3,216	3,912
<i>iQ</i> method [™] – Quality of Earnings*					
(US\$ Millions)	2022A	2023A	2024E	2025E	2026
Cash Realization Ratio	0.7x	1.1x	1.2x	1.2x	1.3x
Asset Replacement Ratio	1.1x	1.3x	1.2x	1.1x	1.0>
Tax Rate	16.1%	12.4%	17.0%	17.0%	17.0%
Net Debt-to-Equity Ratio	60.3%	72.2%	75.5%	69.6%	61.4%
Interest Cover	7.1x	4.7x	6.7x	7.2x	7.6x
Income Statement Data (Dec)					
(US\$ Millions)	2022A	2023A	2024E	2025E	2026
Sales	36,602	39,290	41,148	43,992	47,203
% Change	2.6%	7.3%	4.7%	6.9%	7.3%
Gross Profit	7,474	6,551	6,861	7,335	7,870
% Change	2.8%	-12.3%	4.7%	6.9%	7.3%
EBITDA	4,943	3,875	5,881	6,416	6,761
% Change	-28.3%	-21.6%	51.8%	9.1%	5.4%
Net Interest & Other Income	2,235	(191)	15	15	36
Net Income (Adjusted)	3,974	3,540	3,658	4,027	4,296
% Change	-3.6%	-10.9%	3.3%	10.1%	6.7%
Free Cash Flow Data (Dec)					
(US\$ Millions)	2022A	2023A	2024E	2025E	2026
Net Income from Cont Operations (GAAP)	4,896	2,056	3,658	4,027	4,296
Depreciation & Amortization	1,342	1,338	1,488	1,579	1,621
Change in Working Capital	(554)	(152)	(31)	139	270
Deferred Taxation Charge	NA	NA	NA	NA	NA
Other Adjustments, Net	(2,783)	633	(874)	(725)	(574)
Capital Expenditure	(1,435)	(1,775)	(1,811)	(1,804)	(1,699)
Free Cash Flow	1,466	2,100	2,431	3,216	3,912
% Change	-31.9%	43.2%	15.7%	32.3%	21.6%
Share / Issue Repurchase	(1,504)	(1,500)	(2,090)	(1,777)	(1,881)
Cost of Dividends Paid	(1,052)	(1,116)	(1,192)	(1,286)	(1,387)
Change in Debt	0	(1,050)	0	(1,500)	(530)
Balance Sheet Data (Dec)	20224	20224	20245	2025E	2026
(US\$ Millions) Cash & Equivalents	2022A 2,577	2023A 3,109	2024E 2,258	1,911	2026 l 2,025
Trade Receivables	7,494	5,109 7,147	6,764	6,930	7,113
Other Current Assets	2,417	3,450	2,912	2,977	2,942
Property, Plant & Equipment	8,800	9,653	10,051	10,334	10,455
Other Non-Current Assets	22,467	23,185	23,649	23,952	24,089
Total Assets	43,755	46,544	45,634	46,103	46,624
Short-Term Debt	0	0	0	0	40,024
Other Current Liabilities	11,587	11,942	10,990	11,360	11,777
Long-Term Debt	11,805	13,786	13,786	13,286	12,756
Long Territocot		6,021	5,591	5,121	4,611
-	5 ()5				
Other Non-Current Liabilities	5,051 28 443				
Other Non-Current Liabilities Total Liabilities	28,443	31,749	30,367	29,767	29,144
Other Non-Current Liabilities					

Company Sector

Defense Electronics

Company Description

Northrop Grumman Corp (NOC) is a global defense company headquartered in Falls Church, VA. It provides products, systems, and solutions in information and services, aerospace and electronics. The company is aligned into four primary businesses, namely, Aerospace Systems, Innovation Systems, Mission Systems, and Technology Services.

Investment Rationale

Northrop Grumman is a pure-play defense contractor with high-quality earnings and solid free cash flow generation. Management's investment in internal R&D has paid off with the \$80bn contract win for the Long Range Strike Bomber (B-21). With strong execution, solid balance sheet, increasing dividend and consistent share repurchase, we expect NOC to outperform the market.

		k			

Average Daily Volume 1,094,890

Quarterly Earnings Estimates

	2023	2024
Q1	5.50A	6.04E
Q2	5.34A	5.90E
Q3	6.18A	5.95E
∩4	6.284	6.82F



Defense and Mission seeing outsized growth

Similar to other primes that have reported thus far (LMT, GD), NOC continues to see strong sales and backlog growth across its Defense and Mission Systems segments. We do not believe NOC gets enough attention relative to peers for its exposure to strong legacy munitions and missile work, much of which was acquired through the Orbital ATK acquisition in 2018. In both Defense and Mission Systems, the company's restricted portfolio is a meaningful driver of growth.

Defense: weapons systems to grow faster than average

NOC's Defense Systems business sales decreased 1% Y/Y, however margins expanded ~130bps due to higher net EAC adjustments. Much of the sales decline was due to the timing of material receipts associated with the Integrated Air and Missile Defense Battle Command System (IBCS). However, GMLRS and HACM systems continue to remain in high demand. We expect these weapons systems to see continual upside for the foreseeable future as the geopolitical environment necessitates a bolstering of defense stockpiles, especially among international customers.

Aeronautics: LRIP charge overshadows robust topline

While much of the attention has been focused on the B-21 charge, we highlight that in terms of sales, Aeronautics Systems performed nicely in the year, returning to sales growth earlier than anticipated. We expect high-single digit growth through the outyears as declining volumes on Autonomous Systems are more than offset by ramping B-21 and continued F-35 sales.

Returns on B-21 are still very promising

On one hand, charges are not a good thing. However, on the other hand, we think investors need to consider them in light of the program specifics. That is to say, on B-21, how much risk has NOC actually taken? How much investment, in a commercial sense, has NOC actually made? We would argue, up until this charge, not a lot. Most, if not all, of the risk is born by the DoD. That is how defense contracts work. So, from that perspective, an additional investment of \$1.7bn when compared to owning the franchise for one of the most important programs in the US arsenal does not seem like too high of a price to pay.

Space: continues to be fastest growing segment

NOC's Space Systems continues to be the fastest growing segment in the company's portfolio. Sales increased 10% Y/Y driven by higher restricted program volumes and the ramp-up of development programs. Operating margins decreased primarily as a result of an unfavorable EAC adjustment on the HALO program due to cost growth. Given recent emphasis on the Space Defense Agency's (SDA) Proliferated Warfighter Space Architecture (PWSA) (read our note here), we see opportunities for NOC to capture additional work on both the Transport and Tracking layers of the program.

15% FCF CAGR through 2026; opps for cap deployment?

Management highlighted a 15% CAGR in free cash flow from 2023 to 2026. Growth is expected to be driven by operation performance, higher CAS recoveries, lower cash tax payments, and lower CapEx starting in 2025. With the considerable strength seen in cash flow, we would not be surprised to see NOC undergo strategic capital deployment initiatives, including further dividend increases and share repurchases. We currently expect a 23% CAGR in FCF over that same time period.

Reiterate 2024 guidance; 4-5% rev. and profit growth

Last quarter, NOC provided a high-level outlook for 2024, expecting 4-5% revenue and profit growth, capex in line with 2023, and free cash flow in the range of \$2.25-\$2.65bn. This quarter, management reiterated the topline expectations and provided additional color as to segment performance. Compared to 2023, NOC is expecting a significant increase in Aeronautics Systems margins, largely due to the B-21 charge taken in 4Q23. At Defense Systems, Mission Systems, and Space Systems operating margins are



expected to be fairly stable Y/Y. Additionally, the easing of macroeconomic headwinds and the implementation of productivity and cost savings initiatives should help expand margins.

Reiterate Buy rating and \$615 PO, raise EPS estimates

We reiterate our Buy rating and PO of \$615 given NOC's strong position on developing programs, robust backlog, and macro-environment creating further demand tailwinds. We derive our PO of \$615 based on a DCF analysis that reflects a 3.5% Y/Y growth rate for 2029-2033e (vs. prior \$5%), a 2.7% long term growth rate and a 7.8% discount rate (vs. prior 7.7% on heightened concern around challenged programs like B-21).

We are raising our EPS estimates on higher non-service pension benefits through the outyears. We now expect EPS of \$24.70 (vs. prior \$23.80) in 2024, \$27.75 (vs. prior \$26.95) in 2025, and \$30.20 (vs. prior \$28.80) in 2026.



Price objective basis & risk

Northrop Grumman (NOC)

We derive our PO of \$615 based on a DCF analysis that reflects a 3.5% Y/Y growth rate for 2025-2030e, a 2.7% long term growth rate and a 7.8% discount rate. The US Defense Budget Authorization has grown at a 1.8% CAGR in constant dollars since post World War II. Considering the most profitable production phase of the B-21 Raider program starts in about ten years and the GBSD will enter production at the end of this decade, we expect NOC's next terminal growth rate could exceed the historical growth rate of US defense spending.

Downside risks to our PO are that execution risk on defense programs could result in cost overruns and margin contractions, and unexpected cancellations to programs in both commercial and military could materially impact NOC.

Analyst Certification

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

US - Aerospace and Defense Coverage Cluster

Investment rating	Company	BofA Ticker	Bloomberg symbol	Analyst
BUY				
	AerCap Holdings N.V.	AER	AER US	Ronald J. Epstein
	Air Lease Corporation	AL	AL US	Ronald J. Epstein
	Booz Allen Hamilton	BAH	BAH US	Mariana Perez Mora
	BWX Technologies, Inc.	BWXT	BWXT US	Ronald J. Epstein
	CACI International	CACI	CACI US	Mariana Perez Mora
	Cadre Holdings Inc	CDRE	CDRE US	Ronald J. Epstein
	Crane Co.	CR	CR US	Ronald J. Epstein
	Embraer	ERJ	ERJ US	Ronald J. Epstein
	General Dynamics	GD	GD US	Ronald J. Epstein
	HEICO Corporation	HEI	HEIUS	Ronald J. Epstein
	Howmet Aerospace Inc.	HWM	HWM US	Ronald J. Epstein
	KBR	KBR	KBR US	Mariana Perez Mora
	Leidos Holdings	LDOS	LDOS US	Mariana Perez Mora
	Leonardo DRS, Inc.	DRS	DRS US	Ronald J. Epstein
	Northrop Grumman	NOC	NOC US	Ronald J. Epstein
	Palantir Technologies	PLTR	PLTR US	Mariana Perez Mora
	Parsons Corporation	PSN	PSN US	Mariana Perez Mora
	RBC Bearings Inc	RBC	RBC US	Ronald J. Epstein
	Rocket Lab	RKLB	RKLB US	Ronald J. Epstein
	Teledyne Technologies Inc	TDY	TDY US	Ronald J. Epstein
	TransDigm Group Inc.	TDG	TDG US	Ronald J. Epstein
	Triumph Group	TGI	TGI US	Ronald J. Epstein
NEUTRAL				
	Albany International	AIN	AIN US	Ronald J. Epstein
	Boeing	ВА	BA US	Ronald J. Epstein
	Garmin	GRMN	GRMN US	Ronald J. Epstein
	Hexcel Corporation	HXL	HXL US	Ronald J. Epstein
	L3Harris	LHX	LHX US	Ronald J. Epstein
	Lockheed Martin	LMT	LMT US	Ronald J. Epstein
	RTX Corp	RTX	RTX US	Ronald J. Epstein
	Textron	TXT	TXT US	Ronald J. Epstein
UNDERPERFORM				
	Bombardier	BDRBF	BDRBF US	Ronald J. Epstein
	Bombardier Inc.	YBBD B	BBD/B CN	Ronald J. Epstein
	CAE Inc.	YCAE	CAE CN	Ronald J. Epstein
	CAE Inc.	CAE	CAE US	Ronald J. Epstein
				,



US - Aerospace and Defense Coverage Cluster

Investment rating	Company	BofA Ticker	Bloomberg symbol	Analyst
	Huntington Ingalls Industries	HII	HII US	Ronald J. Epstein
	Mercury Systems	MRCY	MRCY US	Ronald J. Epstein
	Spirit AeroSys-A	SPR	SPR US	Ronald J. Epstein

*IQ*method[™] Measures Definitions

Business Performance	Numerator	Denominator
Return On Capital Employed	NOPAT = (EBIT + Interest Income) \times (1 $-$ Tax Rate) + Goodwill Amortization	Total Assets — Current Liabilities + ST Debt + Accumulated Goodwill Amortization
Return On Equity	Net Income	Shareholders' Equity
Operating Margin	Operating Profit	Sales
Earnings Growth	Expected 5 Year CAGR From Latest Actual	N/A
Free Cash Flow	Cash Flow From Operations — Total Capex	N/A
Quality of Earnings	Numerator	Denominator
Cash Realization Ratio	Cash Flow From Operations	Net Income
Asset Replacement Ratio	Capex	Depreciation
Tax Rate	Tax Charge	Pre-Tax Income
Net Debt-To-Equity Ratio	Net Debt = Total Debt - Cash & Equivalents	Total Equity
Interest Cover	EBIT	Interest Expense
Valuation Toolkit	Numerator	Denominator
Price / Earnings Ratio	Current Share Price	Diluted Earnings Per Share (Basis As Specified)
Price / Book Value	Current Share Price	Shareholders' Equity / Current Basic Shares
Dividend Yield	Annualised Declared Cash Dividend	Current Share Price
Free Cash Flow Yield	Cash Flow From Operations – Total Capex	Market Cap = Current Share Price × Current Basic Shares
Enterprise Value / Sales	EV = Current Share Price × Current Shares + Minority Equity + Net Debt +	Sales
·	Other LT Liabilities	
EV / EBITDA	Enterprise Value	Basic EBIT + Depreciation + Amortization

Manethod suis the set of BofA Global Research standard measures that serve to maintain global consistency under three broad headings: Business Performance, Quality of Earnings, and validations. The key features of iQmethod are: A consistently structured, detailed, and transparent methodology. Guidelines to maximize the effectiveness of the comparative valuation process, and to identify some common pitfalls.

Ratachase is our real-time global research database that is sourced directly from our equity analysts' earnings models and includes forecasted as well as historical data for income statements, balance sheets, and cash flow statements for companies covered by BofA Global Research.

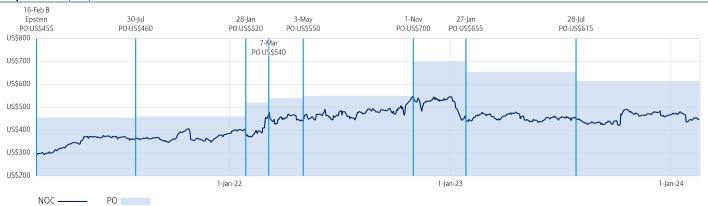
Morofile*, **Morethod*** are service marks of Bank of America Corporation. **Modatabase** is a registered service mark of Bank of America Corporation.



Disclosures

Important Disclosures

Northrop Grumman (NOC) Price Chart



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

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

Equity Investment Rating Distribution: Aerospace/Defense Electronics Group (as of 31 Dec 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships R1	Count	Percent
Buy	31	62.00%	Buy	23	74.19%
Hold	11	22.00%	Hold	9	81.82%
Sell	8	16.00%	Sell	6	75.00%

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

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

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

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

Investment rating Total return expectation (within 12-month period of date of initial rating) Ratings dispersion guidelines for coverage cluster^{R2}

Buy	≥ 10%	≤ /0%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

R2Ratings dispersions may vary from time to time where BofA Global Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

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

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

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

BofAS or an affiliate was a manager of a public offering of securities of this issuer within the last 12 months: Northrop Grumman.

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

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

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

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

BofAS or an affiliate expects to receive or intends to seek compensation for investment banking services from this issuer or an affiliate of the issuer within the next three months: Northrop

BofAS together with its affiliates beneficially owns one percent or more of the common stock of this issuer. If this report was issued on or after the 9th day of the month, it reflects the



ownership position on the last day of the previous month. Reports issued before the 9th day of a month reflect the ownership position at the end of the second month preceding the date of the report: Northrop Grumman.

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

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

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 Prudential Regulation Authority (PRA); BofASE (France): BofA Securities Europe SA is authorized by the Autorité de Contrôle Prudential Regulation Authority (PRA); BofASE (France): BofA Securities Europe SA is authorized by the Autorité de Contrôle Prudential Regulation Authority (PRA); BofASE (France): BofA Securities Europe SA is authorized by the Autorité de Contrôle Prudential Regulation Authority (PRA); BofASE (France): BofA Securities Europe SA is authorized by the Autorité de Contrôle Prudential Regulation Authority (PRA); BofASE (France): BofA Securities Europe SA is authorized by the Autorité de Contrôle Prudential Regulation Authority (PRA); BofASE (France): BofA Securities Europe SA is authorized by the Autorité de Contrôle Prudential Regulation Authority (PRA); BofASE (France): BofASE (Fr 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.bofaml.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 (Hong Kong): Merrill (Hong Kong): Merr (Asia Pacific) Limited, regulated by the Hong Kong Securities and Futures Commission (HKSFC); Merrill Lynch (Singapore): Merrill Lynch (Singapore) Pte Ltd, regulated by the Monetary Authority of Singapore (MAS); Merrill Lynch (Canada): Merrill Lynch (Canada): Merrill Lynch (Canada): Merrill Lynch (Mexico): Merrill Ly 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): Merrill Lynch (Israel): Merrill Lynch (Israel) (Israel): Merrill Lynch (Israel): Merr 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 HKSFC; 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 wi

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 in any securities referred to herein.

BofA ESGMeter Methodology:

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

Copyright and General Information:

Copyright 2024 Bank of America Corporation. All rights reserved. iQdatabase® is a registered service mark of Bank of America Corporation. This information is prepared for the use of BofA Securities clients and may not be redistributed, retransmitted or disclosed, in whole or in part, or in any form or manner, without the express written consent of BofA Securities. BofA Global Research information is distributed simultaneously to internal and client websites and other portals by BofA Securities and is not publicly-available material. Any unauthorized use or disclosure is prohibited. Receipt and review of this information constitutes your agreement not to redistribute, retransmit, or disclose to others the contents, opinions, conclusion, or information contained herein (including any investment recommendations, estimates or price targets) without first obtaining express permission from an authorized officer of BofA Securities. Materials prepared by BofA Global Research personnel are based on public information. Facts and views presented in this material have not been reviewed by, and may not reflect information known to, professionals in other business areas of BofA Securities, including investment banking personnel. BofA Securities has established information barriers between BofA Global Research and certain business groups. As a result, BofA Securities does not disclose certain client relationships with, or compensation received from, such issuers. To the extent this material barrier 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 conn

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

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

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

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

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

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

In some cases, an issuer may be classified as Restricted or may be Under Review or Extended Review. In each case, investors should consider any investment opinion relating to such issuer (or its security and/or financial instruments) to be suspended or withdrawn and should not rely on the analyses and investment opinion(s) pertaining to such issuer (or its securities and/or financial instruments) nor should the analyses or opinion(s) be considered a solicitation of any kind. Sales persons and financial advisors affiliated with BofAS or any of its affiliates may not solicit purchases of securities or financial instruments that are Restricted or Under Review and may only solicit securities under Extended Review in accordance with firm policies. Neither BofA Securities nor any officer or employee of BofA Securities accepts any liability whatsoever for any direct, indirect or consequential damages or losses arising from any use of this information.

