



Krause Fund Research

Fall 2023

April 16, 2023

Stock Rating:

HOLD

Target Range: \$462.39-\$472.39 Current Price: \$451.29

Analysts

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Investment Thesis

We recommend a **HOLD** rating for Northrop Grumman Corporation, with a price range from \$462.39-\$472.39. NOC will experience growth due to its established market presence, revenue stability, and expectations for improved margins. However, the company faces risks from its reliance on government contracts, competitive pressures, and regulatory hurdles.

Drivers of Thesis

Mature growth company: Northrop Grumman holds a prominent 18.52% market share in the aerospace and defense industry, bolstered by a diverse portfolio and long-term government contracts, providing a foundation for stable revenue streams.

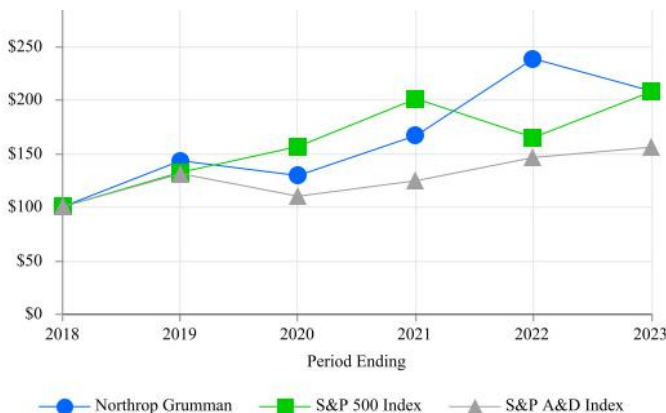
Profit margins: NOC's management set high expectations for long-term profit margins to reach a rate of 12%. This goal is backed by the stabilization macroeconomic factors that drove higher costs, ongoing implementation of cost management programs, and a shift to more international and production contracts as international demand grows.

Risks to Thesis

Vulnerability to Government Contracts: Northrop Grumman relies on government contracts for 82% of its revenue. This heavy reliance exposes it to risks stemming from fluctuations in government spending, budget constraints, and regulatory shifts.

Competitive Landscape: Competing firms constantly vie for market share through technological advancements, pricing strategies, and contract wins. NOC has struggled with maintaining competitive spending on R&D. In 2023, R&D expenses totaled \$1.2 billion, which represents 3.0% of sales—lower than the industry average of 4.20%.

5 Year Stock Performance vs. S&P 500 and S&P 500 A&D Companies



NORTHROP GRUMMAN

Company Information

Company: Northrop Grumman Corp.
Sector: Industrials
Industry: Aerospace & Defense
Exchange: NYSE: NOC

Financial Snapshot

Model Price Projections

DCF/EP: \$467.39
DDM: \$350.36
Relative Valuation: \$387.42 - \$424.80

Price Data

Current Price: \$451.29
52-Week Range: \$502.33 - \$545.76
YTD Performance: (2.20)%

Key Statistics

Shares Outstanding: 148 M
2023 EPS: \$13.57
2024E EPS: \$25.80
P/E: 33.23x
1Y Forward P/E: 17.21x
Dividend Yield: 1.6 %
Market Capitalization: 67.8 B
Beta: 0.59
WACC: 7.02 %
2023 Revenue: \$39.29 B

Ratios

Profit Margin: 5.23 %
ROE: 13.90 %
ROA: 4.42 %

Company Overview

Northrop Grumman Corp. (NYSE: NOC) is a leading global aerospace and defense technology company. It operates in the following segments: Aeronautics Systems, Defense Systems, Mission Systems, and Space Systems. Founded in 1939, the company provides a variety of innovative solutions for national security, civil government, commercial, and international customers.

Chart from [1]

Company Analysis

Company Overview:

Northrop Grumman is a leading global aerospace, defense, and security company. The majority of its business is with the U.S. government, principally the Department of Defense and intelligence community. In addition, the company delivers solutions to global and commercial customers.

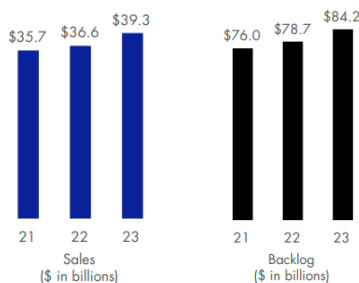
Since its founding in 1939, NOC has consistently developed innovative aircraft and weaponry, including long-range missiles, autonomous aircraft, navigation systems, satellites, and space structures. NOC has grown to a global corporation of over 101,000 employees and is headquartered in Falls Church, Virginia [2].

Revenue Analysis and Decomposition

Revenue Summary:

NOC's revenue in 2023 was \$39.29 billion. This was up 7.3% from 2022 revenue of \$36.6 billion, and up 10.2% from NOC's 2021 revenue of \$35.67 billion. These revenues can be analyzed both based on region of sales and business segment. Total revenues have grown steadily over the past ten years through a series of acquisitions and continuous product innovation. In addition, it is important to consider NOC's sales backlog, which has also seen steady growth in recent years and came in at \$84.2 billion. See the chart below.

Sales and Sales Backlogs 2021 -2023



Data from [3]

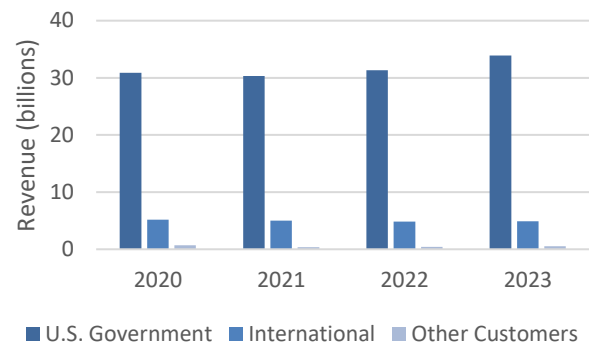
Geographic/Customer Revenue Segmentation:

The majority of NOC's revenues come from the U.S. government, but they also have a variety of

international and other corporate customers. In 2023, over 86% of revenues came from the U.S. government. Over the past four years, this number has consistently been over 80%. Due to this, we determined it would be more useful to base revenue forecasts on business segments as opposed to geography to better reflect anticipated strategic business decisions. The remainder of our revenue analysis and forecasts will be focused on business segments. See chart below for revenue by customer type.

Revenue by Business Segment

Data from [4]



Business Segments:

Total revenue is comprised of sales from the company's four different business segments: Aeronautics Systems, Defense Systems, Mission Systems, and Space Systems. Over the past ten years, NOC has frequently reconfigured the structure of their business segments, which explains a portion of 2023 revenues being attributed to Intersegment Eliminations. See chart below.

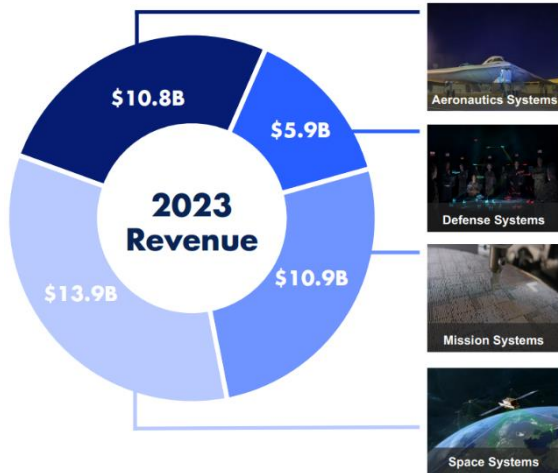
Revenue by Business Segment

(\$M)	4Q22	4Q23	▲%	2022	2023	▲%
Aeronautics Systems	\$2,757	\$2,910	6%	\$10,531	\$10,786	2%
Defense Systems	1,657	1,645	(1)%	5,579	5,862	5%
Mission Systems	2,927	3,063	5%	10,396	10,895	5%
Space Systems	3,278	3,602	10%	12,275	13,946	14%
Intersegment Eliminations	(586)	(582)		(2,179)	(2,199)	
Total	\$10,033	\$10,638	6%	\$36,602	\$39,290	7%

Data from [3]

In 2023, the NOC's Space Systems segment generated the largest portion of their revenues, comprising 33.6% of NOC's total revenue. See chart on the following page for all revenue segments.

Revenue by Business Segment 2023
(excluding Intersegment Eliminations)



Data from [4]

Aeronautics Systems:

The aeronautics segment is involved in the design, development, production, integration, sustainment, and modernization of advanced aircraft systems for the U.S. Air Force, the U.S. navy, other U.S. government agencies, and international customers. Recent innovation in this segment has been centered around the development of unmanned aerial vehicles (UAVs). This segment has been consistently one of the best performing for NOC and employes over 20,500 employees. It generates 26% of NOC’s total revenue in 2023 and has seen notable growth in all but two of the last ten years [1].

Defense Systems:

The defense systems segment includes integrated battle management systems, weapons systems and aircraft, and mission systems sustainment and modernization. Customers of this segment include various branches of the U.S. government including defense, intelligence, and civilian agencies. This segment employes 21,300 employees in all 50 states and 23 countries. This business segment is NOC’s smallest, accounting for 14.1% of the company’s revenue in 2023 [4].

Mission Systems:

NOC’s mission systems sector offers advanced mission solutions and multifunction systems, primarily for the U.S. defense and intelligence community, and international customers. This segment offers differentiated battle management and cyber solutions that deliver timely, mission-enabling information and situational awareness to protect the U.S. and its global

allies. Employing over 20,000 employees in over 50 states and 20 countries, this segment generated 26.3% of NOC’s total revenues in 2023 [4].

Space Systems:

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Revenue Growth Projections:

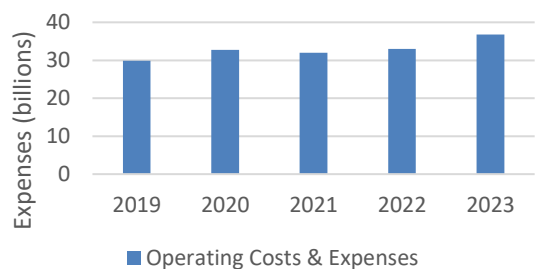
Generating 33.6% of NOC’s total revenue in 2023, the space systems segment delivers various end-to-end mission solutions and designs, develops, produces, and operates space, missile defense, launch and strategic missile systems. Customers of this segment include national security organizations, civil government, commercial, and international customers. The space systems segment accounts for the largest portion of NOC’s total revenue and employes over 31,000 employees across 48 states and at several locations overseas [4].

Expense Analysis

Expense Summary:

Northrop Grumman’s expenses include cost of product sales, cost of service sales, depreciation & amortization (D&A), and general & administrative expenses (G&A). These expenses are the most significant for NOC, accounting for 93.5% of sales in 2023. This amount has remained consistent over the past five years. See chart below [1].

Operating Expenses 2019-2023



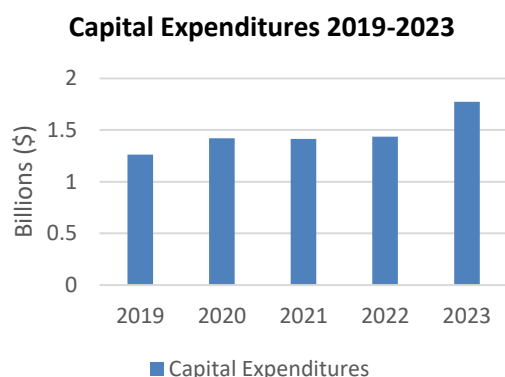
Data from [1]

In the aerospace and defense industry, the average net profit margin is 4.96% [5]. NOC's profit margin of 5.97% was slightly higher than the industry average in 2023. Over the past five years, their net profit margin has fluctuated between 6.64% and 19.64%, consistently higher than the industry average.

Capital Expenditures:

As December 2023, Northrop Grumman had capital expenditures of \$1.78 billion, which they expect to fund using cash on hand. This is notably higher than their capital expenditures in 2022 and 2021, which were \$1.44 billion and \$1.42 billion, respectively. Much of this increase can be attributed to a sizable increase in investment in the Space Systems segment, which makes up 45% of NOC's 2023 capital expenditures.

When compared to industry averages, NOC has consistently spent more on capital expenditures than their peers. As of 2023 Q4, NOC spent \$803 million on capital expenditures compared to the industry average of \$171 million. This is due to various factors, but a significant portion can be attributed to NOC winning a number of contracts, including one with the U.S. Department of Defense for the development of their B-21 bomber fleet and another with the Navy to fund expansion of their rocket motor energetics facilities [6].



Data from [1]

Capital Structure

Capital Summary:

NOC has had consistently decreasing debt-to-equity ratios for the past several years. In 2019, the ratio was 1.57 but decreased to 0.94 by 2023. In our model, we have forecasted the capital structure to hover around 1 for the next few years before gradually decreasing to 0.66. This is driven by expectations of significant

growth in the Space Systems segment which will require NOC to raise additional funding and will affect the capital structure. We expect this will cause an increase in both debt and equity investments but expect the increase in equity to outpace that of debt due to the continuing high interest rate environment. This will cause NOC to gradually become less levered and the debt-to-equity ratio will decrease.

In January 2024, Fitch assigned a credit rating of BBB+ to NOC with a stable debt outlook [7]. This was an upgrade to their previous rating and likely corresponds to NOC paying down over \$1 billion of LT debt from 2022 to 2023. NOC's credit rating is consistent with ratings of its peers as well. See chart below.

Industry Debt Rating Comparison

Data from [7]

Ticker	Credit Rating
NOC	BBB+
BA	BBB-
LHX	BBB+
RTX	BBB+
LMT	A-

NOC had \$70 million in the current portion of their long-term debt and had \$3 billion in cash and cash equivalents at 2023 YE. Historically, NOC has held \$2 billion to \$5 billion in cash and cash equivalents, further suggesting that they are well positioned to cover their debt obligations should they face a higher current debt obligation in future years. See the debt schedule below for fixed-rate notes and their corresponding maturity dates and amounts as of December 31, 2023.

Fixed-Rate Notes Maturity Schedule Data from [1]

Fixed-rate notes and debentures, maturing in	Interest Rate	Amount (\$ in millions)
2023	3.25%	-
2025	2.93%	1,500
2026	7.75%-7.88%	527
2027	3.20%	750
2028	3.25%	2,000
2030	4.40%	750
2031	7.75%	466
2033	4.70%	1,000
2040	5.05%-5.15%	800
2043	4.75%	950
2045	3.85%	600
2047	4.03%	2,250
2050	5.25%	1,000
2053	4.95%	1,000
Other	Various	332
Debt Issuance Costs		(69)
Total long-term debt		13,856
Less: current portion		70
Long-term debt, net of current portion		13,786

Data from [1]

Payout Policy:

Northrop Grumman regularly pays dividends and steadily increases the amount paid per share as a part of their commitment to shareholders. In FY 2023, NOC paid a dividend of \$7.34 per share, which was a 7.5% increase from the dividend paid out in 2022 [1].

As a result of continued increases in dividends, our model adjusts 2024E and future years' dividends to reflect the slow but steady growth. The growth of dividends was calculated using the previous year's percentages of EPS to model future years because the growth of dividends will continue as it has in the past. Our model predicts a dividend of \$11.15 per share within 5 years, and a dividend of \$12.38 per share by 2033E—the end of the forecast period. NOC's continued efforts to increase dividends solidify it as a leader in the semiconductor industry. The strong dividend payment makes TXN a great choice for investors looking for high dividend-paying equity within the aerospace and defense industry.

S.W.O.T Analysis

Strengths:

One of Northrop Grumman's greatest strengths is their strong performance entering into new markets. Since its inception as an aeronautics company in 1939, NOC has continuously excelled in entering new markets, such as the missile defense market and privately developed rocket launch market [8]. This has successfully diversified their revenue streams, limiting the economic cycles risks they face. In addition, NOC has very strong financial performance with a growing sales backlog that indicates a strong stream of future revenues. With over \$84 billion in backlog at 2023 YE, NOC has various large-scale projects that will be generating revenues years to come. Also worth noting are NOC's strong and consistent cash flows. In 2023, their cash flows totaled \$2.1 billion, and over the past three years their cash flows have consistently been between \$1.4 billion and \$2.8 billion. This provides NOC with the flexibility needed to cover an influx of capital expenditures or debt maturing on an annual basis, and it is one of their strengths as a company.

Weaknesses:

In terms of weaknesses, NOC has not been able to adapt well to the recent entrance of competitors into their current markets. Their R&D expenditures are below those of the leading companies in the aerospace and defense industry. In 2023, R&D expenses totaled \$1.2

billion, which represents 3.0% of sales—lower than the industry average of 4.20% [9]. While they were once known for their rapid innovation, NOC is now considered more of a mature firm in this industry with most of its research and development only occurring because of government contracted work. Additionally, NOC tends to exceed budgets on most of their new projects such as the B-21 Raider project. The development of this strategic bomber cost \$1.56 billion alone, which was significantly over budget and led to a Q4 2023 loss of \$1.45 per share. Finally, NOC has poor inventory management. Days in inventory is much higher than their industry competitors, costing them time and resources. This can hinder long-term growth of the company and is one weakness to improve upon.

Opportunities:

Northrop Grumman faces several opportunities that could greatly contribute to their long-term growth outlook. Increased use of big data analytics, artificial intelligence (AI), and machine learning (ML) are all opportunities for NOC to pursue. They are already pursuing several of these things in their Defense Systems segment, working with Palantir USG, Inc. to modernize the Army's automatic target recognition and geolocation through AI and ML [10]. Another opportunity for NOC are decreasing shipping costs which are set to persist through 2024 [11]. Because of the lower demand for shipping, NOC can get the necessary materials for their projects at a much cheaper cost and likely much more quickly. This will improve margins for all new projects and expansion efforts that NOC is undertaking in 2024, including the B-21 Raider project and rocket motor energetics facility. In addition to lower shipping rates, lower interest rates are another opportunity for NOC to capitalize upon. With interest rates set to decrease in late 2024, it will be cheaper for them to take on debt, resulting in lower interest payments for the debt taken on to fund future initiatives.

Threats:

There are a variety of threats facing Northrop Grumman, including rising input prices and increasing pay demands. Over the past year, input prices for common defense products and services have increased dramatically: industrial chemicals have increased by 10.0%, transportation and warehousing by 17.8%, and energy by 25.9% [11]. This ultimately cuts into the U.S. Department of Defense's purchasing power, leading to less contracts and grants offered to companies like NOC. For contracts that NOC does still manage to earn, the

company will likely see lower margins. This is because most contracts in the defense industry are firm-fixed-price (FFP) contracts, so NOC will receive a set price regardless of the inflation of input prices. This is one other threat the company must be mindful of when launching new products and signing new contracts in 2024 and beyond. Additionally, an ever-present threat to NOC is the highly regulated industry they operate in. NOC must innovate and approach projects with caution in order to avoid the threat of litigation.

Industry Analysis

Aerospace & Defense Industry:

The U.S. aerospace and defense market is dominated by a handful of key players. In the defense market, there are several companies, known as the “Big Five,” that compete for various contracts on defense programs, such as fighter jets, naval vessels, and missile and satellite systems [13]. The Big Five, listed in order of estimated 2023 revenues, are Lockheed Martin, Raytheon Technologies, Northrop Grumman, General Dynamics, and Boeing. In terms of the commercial aerospace market, this is dominated by two companies—Boeing and Airbus. Behind this duopoly are many small and medium-sized companies that compete for smaller contracts, each offering highly engineered parts, such as jet engines, fuselages, and electronic control systems. For the remainder of this report, we will focus on the defense market, as this is where NOC operates.

Industry Trends and Growth Projections:

The defense market is closely tied to both the U.S. Department of Defense (DoD) spending and the geopolitical climate. The 2024 DoD budget proposes a meager 1% increase defense spending, resulting in fewer contracts and, thus, less revenue for key players in this industry [14]. It is important to note that this budget has yet to be passed by congress as of March 7, 2024. Following congressional debate, there may be a slight increase or decrease to the proposed budget, potentially altering the defense industry outlook. Despite the modest defense budget proposal, geopolitical tensions are surmounting, which will undoubtedly drive growth in the defense market. We expect defense spending growth to be sustained for several years as the Russia-Ukraine war persists and

tensions heighten with the Israel-Gaza conflict. Israel ranks 7th as one of the U.S. biggest arms exports between 2015 and 2019 [13]. The continuation of conflicts in the Middle East will sustain steady growth in the defense market.

In addition, China has recently issued threats to Taiwan, further intensifying the geopolitical climate. As a result, we expect this to prompt reconsiderations of the 2024 defense budget and ultimately lead to increased spending beyond President Biden’s proposed 1% increase. From 2023-2025, the Center for Financial Research and Analysis forecasts 5%-6% annual growth in U.S. defense spending—well above the 10-year average annual growth of 1% because of the heightened global climate and emphasis on military technology development.

The space sub-industry is another critical component of the aerospace and defense industry that has seen rapid growth in recent years. McKinsey & Company estimates that by 2035, the space industry will be worth \$1.8 trillion with pressing needs for satellites, launchers, and broadcast services, among others [12]. This suggests ample room for growth, particularly for NOC and its competitors that have rapidly innovating space segments.

Industry Comparison and Competition:

Northrop Grumman’s competitors are primarily the other four companies that are part of the Big Five: Lockheed Martin (LMT), Raytheon Technologies (RTX), General Dynamics (GD), and Boeing (BA). However, there are also numerous smaller companies, such as L3 Harris Technologies (LHX) and Textron Inc. (TXT), that boast much smaller market caps but still contribute critical technologies to the industry. The majority of the larger competitors have several segments, each focusing on specific types of defenses from missiles to aircraft to software systems. See the chart below for a comparison of industry player and key metrics.

Key A&D Industry Players

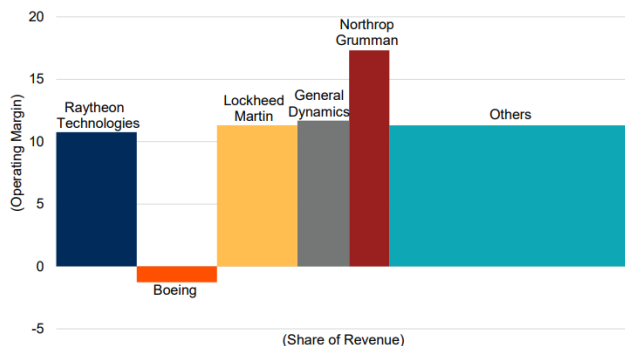
Company	Symbol	Sales (\$m)	MV (\$m)	EV (\$m)
Boeing Company	BA-US	77,794	127,262	165,423
RTX Corporation	RTX-US	68,920	122,440	163,087
Lockheed Martin Corporation	LMT-US	67,571	103,170	120,364
General Dynamics Corporation	GD-US	42,272	73,240	82,885
Northrop Grumman Corp.	NOC-US	39,290	67,242	80,181
Honeywell International Inc.	HON-US	36,662	127,657	141,575
L3Harris Technologies Inc	LHX-US	19,419	39,369	53,242
Leidos Holdings, Inc.	LDOS-US	14,396	15,423	19,753
Textron Inc.	TXT-US	13,683	16,874	19,061
Huntington Ingalls Industries, Inc.	HII-US	11,454	10,540	12,834

Data from [1]

Despite the similar financial profiles of many of these companies, firms are differentiated by their respective technological capability and expertise. Companies in this industry typically specialize in certain segments, such as aircraft or missile guidance systems, allowing them to develop a niche and win business. Northrop Grumman, for instance, specializes in space systems and aeronautics systems while Boeing specializes in commercial airplanes and defense. As seen in the chart above, Boeing, RTX, and Lockheed Martin lead in terms of sales volume and market value with General Dynamics and Northrop Grumman following close behind.

It is also important to consider profit margins when looking at key players in this industry. The graph below depicts the operating margins for the Big Five and others in the industry.

Profit-Pool Map of the A&D Industry (for the year 2022)



Source: S&P Global Market Intelligence.

Chart from [13]

As shown above, Northrop Grumman’s operating margins of over 16% far exceed those of their competitors that average just over 10%. This suggests that while NOC may not have the highest sales or largest market capitalization, they are most efficient in terms of operations.

Economic Analysis

Porter’s Five Forces Analysis

Degree of Competition: Medium

Due to the generally low competing number of firms in both the aerospace market and defense market, we rank competition as medium. There are typically only 2-4 companies competing to win DoD and commercial

contracts. Also, as mentioned previously, each of the major players in this space specialize in a specific segment (i.e. satellite projects, missile systems, etc.), which also serves to limit competition.

Bargaining Power of Customers: Medium

The U.S. Department of Defense is the primary customer in the defense market. With its large size and sole customer status, the industry’s bargaining power is limited. The Pentagon usually determines contracts, so declining defense budgets are a headwind facing companies in the industry. However, long-term contracts and extensive backlogs of work can help mitigate the risk of small defense budgets.

Bargaining Power of Suppliers: Low

Suppliers providing much of the hardware for aerospace and defense company’s projects operate in a condensed market. For instance, there are only two engine options for most aircraft, giving suppliers significant bargaining power. However, the supplier base of avionics (aviation electronic controls equipment) and other software used in these projects is much less condensed, providing more bargaining power to aerospace and defense companies.

Threat of Substitutes: Low

For defense, nearly all disruptive technologies are developed within the industry, allowing us to conclude that the threat of substitutes is low. This is because new developments are almost always made as a result of government R&D funding directed towards established defense companies. As for the aerospace market, there likely will not be any new technologies in the near future that displace aircraft transporting people and cargo across the globe, again suggesting a low threat of substitutes.

Threat of New Entrants or New Entry: Low

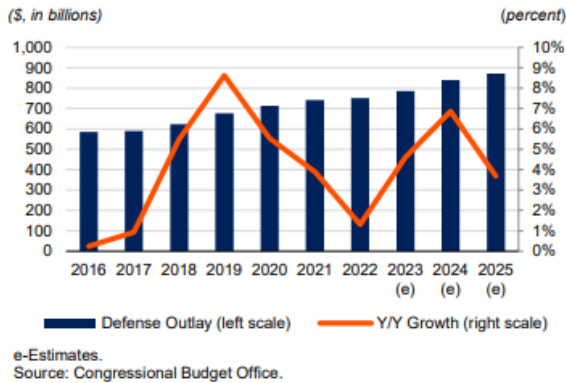
Due to the regulations, capital intensity, and long lead times, the aerospace and defense industry has very high barriers to entry. Designing aircraft takes 8 to 10 years and requires a lengthy approval process. New entrants would have to absorb years of losses, which means they would likely not be price competitive. This would undermine their ability to win any contracts, further evidence of the low threat of new entrants to this industry [13].

U.S. Defense Spending:

U.S. Department of Defense (DoD) spending is a critical

economic indicator, particularly for companies in the aerospace and defense industry. Defense outlays represent money spent by the government, which can differ from budgeted amounts due to a variety of factors such as timing and the political climate. Defense spending has grown steadily over the past 7 years and continued growth is expected in 2024 and 2025. The congressional budget office estimates the budget to grow from approximately \$750 million in 2022 to almost \$900 million by 2025. See the graph below.

U.S. Defense Spending (Outlays)



Graph from [13]

Under the estimates above, that is an expected growth rate of 7% in 2024 and 4% in 2025. It is critical to note that these growth rate forecasts vary significantly from the proposed defense budget increase of 1%. This highlights a common discrepancy between proposed political budgets and actual defense spending, which historically tends to exceed approved annual budgets. Regardless of the defense spending budgets, much of revenues in the next 3-5 years will be driven by sales backlogs which remain high throughout the industry.

Global Metals Price Index:

Metals are an essential input for aerospace and defense companies due to their unique combination of strength, durability, and lightweight properties. Metals like aluminum, titanium, steel, and copper and the backbone of many aerospace and defense company projects. Companies in this industry rely on these metals for structural components, armor and protection, engines, avionics, fuel systems, and fasteners and fittings. Because of this, the metal price index and future forecasts are a critical economic indicator. The Global Metals Price Index is a composite measure that tracks the prices of key metals traded on international markets. See the graph below.

Global Metals Price Index (2015-2023)

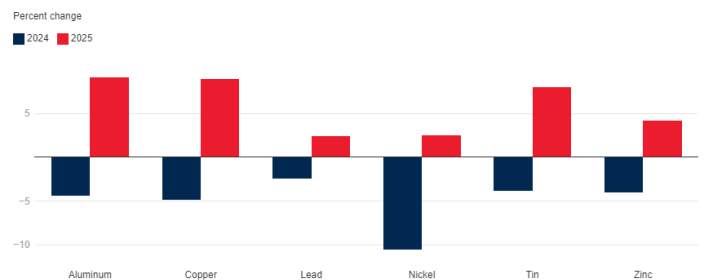


*Data through October.

Graph from [13]

As seen in the graph above, the price of metals increased significantly in 2020 and has remained high in following years. In terms of future forecasts, metals prices are expected to fall by 5% in 2024 before stabilizing in 2025 with price increases ranging from 2% for lead to 9% for aluminum [15]. The price outlook is subject to several risks including a slowdown in China's economic activity where a significant portion of metals and mining activity occurs. See the graph below.

Change in Base Metal Prices



Graph from [15]

Interest Rates:

Interest rates, particularly the Federal Funds Rate, are a significant indicator of economic activity. Changes in interest rates can have significant implications for the cost of capital, government spending, financing terms, and investor sentiment in the aerospace and defense industry. These companies often require significant capital investments for research and development, manufacturing facilities, and large-scale projects such as aircraft production. When interest rates are low, borrowing costs are lower, making it cheaper for aerospace and defense companies to finance their operations and investments. Conversely, higher interest rates increase the cost of borrowing, potentially leading to higher financing costs and impacting profitability. This can significantly deter

aerospace and defense companies from taking on new projects and launching expansion efforts. The federal funds rate fell significantly in 2020 due to the pandemic and remained very low—nearly reaching 0%—before rapidly increasing throughout 2022 to its current level of 5.33%. See graph below.

Federal Funds Effective Rate



Graph from [16]

Because of persisting high interest rates, companies are hesitant to take on debt. However, the Fed is expected to lower interest rates in late 2024 should inflation begin to cool. This sets a strong outlook for the remainder of the year and into 2025. The lower interest rate environment expected within the next year will serve to lower the cost of debt, spurring businesses to invest in new projects.

Inflation:

Inflation, the rate at which the general level of prices for goods and services rises over time, can have significant impacts on the aerospace and defense industry. The current inflation rate of 3.5% is notably higher than the targeted inflation rate of 2% [17]. This means that the various raw materials, components, and labor that aerospace and defense companies rely on cost more in today's environment, squeezing profit margins. Companies in most industries often look to pass these inflated input costs on to their customers. However, with the U.S. government being the primary customer of A&D companies, they often do not have this luxury. The government often signs long-term contracts with A&D companies that are firm-fixed price (FFP), meaning that the company will receive a set amount from the government upon completion of the project, regardless of inflated input costs. This can be a significant economic headwind for companies in this industry. According to JP Morgan economic research, inflation is set to remain relatively high at around 3% throughout the remainder of 2024 before reaching targeted levels in late 2025 [18]. This is a challenge that companies in this industry must face when signing new contracts with customers and carrying out backlogged projects from previous years.

Geopolitical Climate:

The current geopolitical environment is a major economic indicator for aerospace and defense companies, as it influences government policies, defense spending, international trade relations, and regional stability. The U.S. policy when it comes to geopolitical issues is to compete responsibly with rival superpowers as it pursues its own interests [19]. As geopolitical tensions rise with China, Russia, and in the Middle East, the U.S. will poise itself to protect itself and defend its allies. This will prompt increases in defense spending and the modernization of old military equipment, leading to greater contracts with defense companies. The Russia-Ukraine war continues to pose a significant geopolitical threat in 2024 and tension continues to heighten with the Israel-Gaza conflict. This will likely result in increased military and defense budgets through 2024 and beyond, depending on the length of each conflict. Additionally, China's increased military presence in the South China Sea and with Taiwan are heightening tensions with the U.S. This too could prompt an increase in defense contracts and weaponry development, leading to an increase in sales for aerospace and defense companies.

Valuation Analysis

Revenue:

Projections for NOC's future revenue growth are strong, with estimations implying a FWD 3 year CAGR of 5.05%. These growth estimations are backed by NOC's ability to diversify establish a strong presence in new markets such as the missile defense and privately developed rocket launch markets [1].

Our revenue projections are closely in line with expectations. In our model, we forecast that NOC will grow at a FWD 3 year CAGR of 4.74%. We used a slightly more conservative growth rate due to the uncertainty of future geopolitical dynamics and the difficulty of forecasting demand changes due to competitors' activity. Recent poor budgeting costs have also supported our decision to use a lower growth rate. For example, the B-21 Raider project went \$1.5 billion over budget in the fourth quarter of 2023.

Cost of Revenue:

In our model, we forecasted the cost of revenue by separating it into two categories: cost of products and cost of services. Looking at historical data, we

determined that, on average, cost of product sales accounted for approximately 60.31% of total sales over the past five years, while the cost of services averaged 18.03%. In our model, we held these averages constant until 2028 where both cost of product and service sales decrease by .25% as a percentage of sales each year due to initiatives by NOC to improve margins.

SG&A:

There is little guidance available from NOC management on selling general and administrative expenses. Therefore, we projected SG&A expenses as a percentage of revenue, which historically averaged around 9.98% over the past five years.

Cost of Equity:

We determined Northrop Grumman's cost of equity by using the Capital Asset Pricing Model. First, we took the 5 year average Beta which gave us a Beta of .59. For the risk-free rate, we used the yield on a 10-year treasury bond which was 4.5%. For the Equity risk premium, we used Damodaran's trailing 12-month cash yield to get 4.60%. With these assumptions, our cost of equity came out to 7.21%.

Cost of Debt:

We computed a after tax cost of debt of 6.05% for NOC. We started by looking at a 10-year corporate bond issued by Northrop Grumman, which stood at 7.75%. We then used NOC's marginal tax rate of 22% to arrive at our final cost of debt. We then calculated a implied default premium of 3.25% by subtracting the risk-free rate of 4.5% from the pre-tax cost of debt of 7.75%.

Weighted Average Cost of Capital:

We used our previously noted cost of equity of 7.21% and cost of debt of 6.05% to calculate the overall cost of capital. To determine the weights of both debt and equity, we estimated market values. To find the market value of common equity, we multiplied NOC's total shares outstanding by the current stock price. To find the market value of debt we found the sum of long-term debt, the current portion of long-term debt. With these calculated costs and weights, we found an overall WACC of 7.02%.

Valuation Models

Discounted Cash Flow & Economic Profit Analysis:

(Projection period 2023-2030)

The discounted cash flow analysis (DCF) and economic profit (EP) models are both intrinsic valuation methods that determine an implied share price for a company based off their ability to generate cash flows. For Northrop Grumman, a 10-year projection period was used to forecast free cash flows for both the DCF and EP models. In the DCF model, the cash flows were discounted back to the present by the WACC of 7.02%. NOC's free cash flow was derived from the net operating profit less adjusted taxes (NOPLAT) and subtracting the change in invested capital from each projected year. The EP model was created by forecasting NOC's future economic profit and then discounting these numbers also by the WACC. To find each projection period's economic profit, the beginning invested capital was multiplied by the difference between the return on invested capital (ROIC) and WACC. To find the implied share price through this method, the final values were summed and then the last fiscal year ending's (2023) investment capital was added. We made non-operating adjustments for both models to determine the value of equity. The equity value was divided by the number of shares outstanding (150) to yield an implied share price of \$467.39 for both models.

Dividend Discount Model Analysis:

(Projection period 2023-2030)

We created the Dividend Discount Model by forecasting our projection for what NOC will be able to pay its shareholders each year. We calculated EPS for each projected period by dividing our projected net income by our projected number of outstanding shares. Our growth in our EPS was derived from our assumptions from revenue growth and expenses. We projected that NOC would be able to maintain a 7% dividend payout ratio per year, based off the average of their dividends paid within the last 5 years. After we found the continuing value, we then discounted the dividends back to the present value using our cost of equity of 7.21%. The implied share price from this method was much lower than any other valuation method used. Because of this, we felt it would be necessary to exclude the dividend discount model from our final target price for NOC, so our valuation is not skewed.

Relative Valuation Analysis:

For the relative valuation model, we used companies

within the aerospace and defense industry who compete with NOC. These companies are Lockheed Martin (LMT), L3Harris Technologies Inc (LHX), Boeing Company (BA), RTX Corporation (RTX), and General Dynamics (GD). We used four different metrics for this valuation model, which include: P/E (EPS24), P/E (EPS25), PEG (EPS24), and PEG (EPS25). Our P/E model determined the implied share price to be \$424.80 for 2024 and \$389.11 for 2025. The PEG model determined the implied share price to be 421.45 for 2024 and 387.80 for 2025.

Sensitivity Analysis

Beta vs. Risk Free Rate:

The variables BETA and RFR are important components of the WACC. As the RFR and BETA decline, and the stock becomes less volatile, the intrinsic value of NOC stock prices increases. Increasing or decreasing the BETA or RFR by small amounts affects the stock price by a large amount. An example of this can be seen when decreasing the RFR by .1%. A .1% decrease to the RFR increased the share price from \$467.39 to \$478.24. A .1 decrease to Beta also has a similar effect, bringing share price from \$467.39 to \$520.93.

		Beta						
		0.29	0.39	0.49	0.59	0.69	0.79	0.89
Risk Free Rate	\$467.39	727.19	635.28	561.59	501.21	450.85	408.22	371.68
	4.20%	705.33	617.91	547.46	489.50	440.99	399.81	364.42
	4.40%	684.58	601.34	533.92	478.24	431.47	391.67	357.38
	4.50%	664.86	585.50	520.93	467.39	422.29	383.78	350.54
	4.60%	646.10	570.36	508.46	456.94	413.41	376.15	343.91
	4.70%	628.23	555.87	496.47	446.86	404.82	368.75	337.47
	4.80%	611.19	541.98	484.94	437.14	396.52	361.57	331.21

WACC vs. CV Growth of NOPLAT:

In the DCF and EP models, WACC and CV growth are both factors that have a significant impact on valuation. Since all cash flows are discounted by the WACC, a slight change will have a large impact. For example, as the WACC increases by .1%, the share price decreases from \$467.39 to \$454.55. We can also see that as the CV growth rate increases by .1%, share price increases from \$467.39 to \$475.44.

		WACC						
		6.72%	6.82%	6.92%	7.02%	7.12%	7.22%	7.32%
CV Growth of NOPLAT	467.39	482.47	469.44	456.97	445.24	433.58	422.59	412.04
	2.20%	490.79	477.31	464.43	452.31	440.28	428.95	418.08
	2.40%	499.49	485.54	472.21	459.69	447.26	435.58	424.37
	2.50%	508.61	494.14	480.34	467.39	454.55	442.48	430.93
	2.60%	518.17	503.16	488.85	475.44	462.16	449.69	437.76
	2.70%	528.20	512.61	497.77	483.87	470.12	457.22	444.88
	2.80%	538.75	522.53	507.11	492.69	478.44	465.08	452.32

Revenue Growth vs. Cost of Product Sales as a % of Sales:

Cost of product sales as a percentage of sales represents how much it costs to produce and sell goods relative to overall revenue. A 1% decrease causes the share price to rise from \$481.70 to \$. When looking at the impact of revenue growth we see that decreasing growth by 1% decreases share price from \$467.39 to \$465.24.

		Revenue Growth % 2028-2033						
		1.05%	2.05%	3.05%	4.05%	5.05%	6.05%	7.05%
Cost of Product Sales (%)	483.53	603.86	616.68	630.11	644.17	658.88	674.27	690.37
	56.02%	552.63	564.71	577.37	590.62	604.49	619.00	634.18
	57.02%	501.39	512.74	524.63	537.07	550.10	563.73	577.98
	58.02%	450.15	460.77	471.89	483.53	495.71	508.46	521.79
	59.02%	398.92	408.80	419.15	429.98	441.32	453.19	465.60
	60.02%	347.68	356.83	366.41	376.44	386.93	397.92	409.40
	61.02%	296.44	304.86	313.67	322.89	332.54	342.64	353.21
	62.02%							

Marginal Tax Rate vs. Pre-tax Cost of Debt:

Both the marginal tax rate and the pre-tax cost of debt are used to calculate the cost of debt and WACC, which largely impact valuation. The sensitivity table shows that as the marginal tax rate increases by 1%, share price falls from \$467.39 to \$459.25. As the pre-tax cost of debt increases by 1%, share price slightly falls from \$467.39 to \$467.05.

		Marginal Tax Rate						
		19.00%	20.00%	21.00%	22.00%	23.00%	24.00%	25.00%
Pre-tax Cost of Debt	467.39	492.68	484.63	476.54	468.41	460.23	452.00	443.74
	0.49%	492.30	484.27	476.19	468.07	459.90	451.69	443.44
	1.49%	491.92	483.90	475.84	467.73	459.58	451.38	443.14
	2.49%	491.54	483.53	475.48	467.39	459.25	451.07	442.84
	3.49%	491.16	483.17	475.13	467.05	458.93	450.76	442.54
	4.49%	491.16	483.17	475.13	467.05	458.93	450.76	442.54
	5.49%	490.40	482.43	474.42	466.37	458.27	450.13	441.95

Normal Cash % vs. CV ROIC:

The Normal Cash % is used when calculating invested capital for NOC and the cost of equity is used within the WACC calculation. Both variables had smaller effects on the implied share price. If we would have chosen the dividend discount model as opposed to the DCF model for our valuation method, the cost of equity would have had a larger effect because it is used to discount the payments in the DDM. The stock price range acquired from this table is \$382.85 - \$640.06.

		Normal Cash %						
		0.50%	1.00%	1.50%	2.00%	2.50%	3.00%	3.50%
CV ROIC	#####	382.85	381.47	380.10	378.72	377.35	375.97	374.59
	1.00%	407.05	405.67	404.30	402.92	401.55	400.17	398.79
	1.50%	436.07	434.70	433.32	431.94	430.57	429.19	427.82
	2.00%	471.52	470.14	468.77	467.39	466.01	464.64	463.26
	2.50%	515.78	514.41	513.03	511.66	510.28	508.90	507.53
	3.00%	572.63	571.26	569.88	568.51	567.13	565.75	564.38
	3.50%	648.32	646.94	645.57	644.19	642.81	641.44	640.06

Cost of Service Sales as a % of Sales vs. General and Administrative Expenses as a % of Sales:

Both cost of service sales and general and administrative expenses as a percentage of sales represents how much their cost relative to overall sales. Increasing the cost of services sales percentage by 1% decreases share price from \$467.39 to \$412.30. Increasing the general and administrative percentage by 1% decreases share price from \$467.39 to \$412.30.

		Cost of Service Sales (% Sales)						
		15.03%	16.03%	17.03%	18.03%	19.03%	20.03%	21.03%
General & administrative	467.39							
	6.98%	797.90	742.82	687.73	632.65	577.56	522.47	467.39
	7.98%	742.82	687.73	632.65	577.56	522.47	467.39	412.30
	8.98%	687.73	632.65	577.56	522.47	467.39	412.30	357.22
	9.98%	632.65	577.56	522.47	467.39	412.30	357.22	302.13
	10.98%	577.56	522.47	467.39	412.30	357.22	302.13	247.05
	11.98%	522.47	467.39	412.30	357.22	302.13	247.05	191.96
	12.98%	467.39	412.30	357.22	302.13	247.05	191.96	136.88

Conclusion

We designated NOC as a hold rating due to its long-term government contracts and revenue stability. We did not rate NOC as a buy because they lag behind the industry average in R&D, and they are in a vulnerable position with over 80% of revenues coming from one customer—the U.S. government. For these reasons, we rated NOC a hold.

Important Disclaimer

This report was created by students enrolled in the Applied Equity Valuation class at the University of Iowa. The report was originally created to offer an internal investment recommendation for the University of Iowa Krause Fund and its advisory board. The report also provides potential employers and other interested parties an example of the students' skills, knowledge, and abilities. Members of the Krause Fund are not registered investment advisors, brokers or officially licensed financial professionals. The investment advice contained in this report does not represent an offer or solicitation to buy or sell any of the securities mentioned. Unless otherwise noted, facts and figures included in this report are from publicly available sources. This report is not a complete compilation of data, and its accuracy is not guaranteed. From time to time, the University of Iowa, its faculty, staff, students, or the Krause Fund may hold a financial interest in the companies mentioned in this report.

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Northrop Grumman Corp
Income Statement

Fiscal Years Ending Dec. 31	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
Total sales	35,667	36,602	39,290	40,796	42,865	45,141	47,677	49,438	51,271	53,178	55,162	57,227	59,376
Operating costs and expenses													
Cost of product sales	21,070	21,419	24,888	24,604	25,852	27,224	28,754	29,693	30,665	31,673	32,716	33,798	34,919
Cost of service sales	6,090	6,367	6,513	7,356	7,729	8,139	8,596	8,790	8,988	9,189	9,394	9,603	9,815
Depreciation and Amortization	1,239	1,342	1,338	1,622	1,595	1,583	1,582	1,593	1,613	1,640	1,676	1,717	1,765
General & administrative expenses	3,597	3,873	4,014	4,071	4,278	4,505	4,758	4,934	5,117	5,307	5,505	5,711	5,926
Total operating costs and expenses	31,996	33,001	36,753	37,654	39,454	41,451	43,690	45,009	46,382	47,809	49,291	50,829	52,425
Gain on sale of business	1,980	-	-	-	-	-	-	-	-	-	-	-	-
Operating income (loss)	5,651	3,601	2,537	3,143	3,411	3,690	3,986	4,429	4,889	5,368	5,871	6,397	6,952
Interest expense	556	506	545	483	648	732	730	775	856	888	930	975	1,023
Non-operating FAS pension benefit	(1,469)	(1,505)	(530)	(1,100)	(1,100)	(1,100)	(1,100)	(1,100)	(1,100)	(1,100)	(1,100)	(1,100)	(1,100)
Mark-to-market pension & OPB benefit (expense)	(2,355)	(1,232)	422	(66)	(66)	(66)	(66)	(66)	(66)	(66)	(66)	(66)	(66)
Other Nonoperating Income (Expense)	(19)	(4)	(246)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
Earnings (loss) before income taxes	8,938	5,836	2,346	3,926	4,029	4,224	4,523	4,920	5,298	5,747	6,207	6,689	7,195
Federal and foreign income tax expense	1,933	940	290	864	886	929	995	1,082	1,166	1,264	1,365	1,472	1,583
Net earnings (loss)	7,005	4,896	2,056	3,062	3,143	3,294	3,528	3,838	4,133	4,483	4,841	5,217	5,612
Weighted average shares outstanding - basic	160	154	151	153	152	152	152	152	152	152	152	152	152
Year end shares outstanding	156	153	150	152	151	151	151	151	151	151	151	151	151
Net earnings (loss) per share - basic	43.70	31.61	13.57	20.08	20.71	21.66	23.22	25.24	27.19	29.49	31.85	34.32	36.92
Cash dividends declared per common share	6.16	6.76	7.34	6.35	6.25	6.56	7.78	9.07	8.79	9.57	10.48	11.47	12.33

Northrop Grumman Corp
Historical Cash Flow Statement

<i>Fiscal Years Ending Dec. 31</i>	2019	2020	2021	2022	2023
Operating activities					
Net earnings (loss)	2,248	3,189	7,005	4,896	2,056
Depreciation & amortization	1,018	1,267	1,239	1,342	1,338
Mark-to-market pension & OPB expense (benefit)	1,800	1,034	(2,355)	(1,232)	422
Non-cash lease expense	247	-	-	-	-
Stock-based compensation	127	90	94	99	87
Excess tax benefits from stock-based compensation	-	-	-	-	-
Deferred income taxes	(509)	210	603	(321)	(988)
Gain on sale of business	-	-	(1,980)	-	-
Net periodic pension & OPB income	-	-	(1,091)	(1,193)	(308)
Pension & OPB contributions	-	-	(141)	(136)	(139)
<i>Changes in assets and liabilities:</i>					
Accounts receivable, net	122	(285)	(10)	(44)	-
Unbilled receivables, net	(335)	160	(414)	(646)	54
Inventoried costs, net	(135)	18	(52)	(205)	(220)
Prepaid expenses and other assets	(78)	(147)	66	2	161
Prepaid expenses	-	-	-	-	(86)
Prepaid expenses & other assets	(78)	(147)	66	2	247
Accounts payable and other liabilities	617	719	376	572	519
Accounts payable & accruals	-	-	-	-	-
Accounts payable & other liabilities	617	719	376	572	519
Income taxes payable, net	(63)	(238)	215	(279)	(658)
Retiree benefits	(703)	(1,678)	-	-	-
Other, net	(59)	(34)	12	46	1,551
Other assets & liabilities, net	(59)	(34)	12	46	-
Other increase (decrease) in operating activities, net	-	-	-	-	-
Other Noncash Income (Expense)	-	-	-	-	(8)
B-21 charge	-	-	-	-	1,559
Net cash flows from operating activities	4,297	4,305	3,567	2,901	3,875
Investing activities					
Acquisition of Orbital ATK, net of cash acquired	-	-	-	-	-
Divestiture of IT services business	-	-	3,400	-	-
Capital expenditures	(1,264)	(1,420)	(1,415)	(1,435)	(1,775)
Proceeds from sale of equipment to a customer	-	205	84	155	-
Proceeds from sale of investments	-	-	-	-	197
Other investing activities, net	57	4	(11)	39	(4)
Net cash flows from investing activities	(1,207)	(1,211)	2,058	(1,241)	(1,582)
Financing activities					
Common stock repurchases	(744)	(490)	(3,705)	(1,504)	(1,500)
Net proceeds from issuance of long-term debt	-	2,239	-	-	-
Payments of long-term debt	(500)	(1,027)	(2,236)	-	(1,050)
Net proceeds from (payments to) credit facilities	(31)	(78)	-	-	1,995
Net borrowings on (repayments of) commercial paper	(198)	-	-	-	-
Cash dividends paid	(880)	(953)	(983)	(1,052)	(1,116)
Payments of employee taxes withheld from share-based awards	(65)	(66)	(34)	(50)	(52)
Net proceeds from credit facilities	-	-	-	-	-
Other, net	(6)	(57)	(44)	(7)	(38)
Net cash flows from financing activities	(2,424)	(432)	(7,002)	(2,613)	(1,761)
Increase (decrease) in cash & cash equivalents	666	2,662	(1,377)	(953)	532
Cash & cash equivalents, beginning of year	1,579	2,245	4,907	3,530	2,577
Cash & cash equivalents, end of year	2,245	4,907	3,530	2,577	3,109
Interest	-	-	-	-	-
Income tax payments, net of refunds received	-	-	-	-	-

Northrop Grumman Corp
Forecasted Cash Flow Statement

Fiscal Years Ending Dec. 31	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
Operating Activities:										
Net Income	3,062	3,143	3,294	3,528	3,838	4,133	4,483	4,841	5,217	5,612
Adjustments										
Add: Depreciation and Amortization	1,622	1,595	1,583	1,582	1,593	1,613	1,640	1,676	1,717	1,765
Change in deferred tax assets	(669)	(687)	(720)	(771)	(839)	(903)	(980)	(1,058)	(1,141)	(1,227)
Change in deferred tax liability	109	149	164	183	127	132	138	143	149	155
Change in assets and liabilities:										
Accounts Receivable	(56)	(77)	(84)	(94)	(65)	(68)	(71)	(73)	(76)	(80)
Unbilled receivables	(218)	(300)	(330)	(367)	(255)	(266)	(276)	(288)	(299)	(311)
Inventory	(43)	(58)	(64)	(72)	(50)	(52)	(54)	(56)	(58)	(61)
Prepaid Expenses & other current assets	(90)	(123)	(136)	(151)	(105)	(109)	(114)	(118)	(123)	(128)
Operating lease right-of-use-assets	30	14	0	(12)	(22)	(31)	(39)	(47)	(53)	(59)
Trade Accounts Payable	81	111	122	136	95	98	102	107	111	115
Accrued Employee Compensation	86	119	130	145	101	105	109	114	118	123
Advance payments & billings in excess of costs incurred	161	221	243	271	188	196	203	212	220	229
Other current liabilities	130	178	196	219	152	158	164	171	178	185
Cash Provided from operating activities	4,206	4,285	4,400	4,597	4,757	5,006	5,307	5,623	5,961	6,320
Investing Activities:										
Capital expenditures	(1,462)	(1,520)	(1,581)	(1,644)	(1,710)	(1,779)	(1,850)	(1,924)	(2,001)	(2,081)
Goodwill	-	-	-	-	-	-	-	-	-	-
Change in Intangible assets	79	79	79	68	0	0	0	0	0	0
Change in other non-current assets	(97)	(133)	(146)	(163)	(113)	(118)	(123)	(128)	(133)	(138)
Cash used in investing activities	(1,480)	(1,574)	(1,648)	(1,739)	(1,823)	(1,896)	(1,972)	(2,051)	(2,133)	(2,219)
Financing Activities:										
Operating lease liabilities	(194)	(13)	(0)	11	21	30	37	44	51	56
Change in long-term debt	4,733	893	976	1,067	1,050	1,144	1,218	1,292	1,367	1,444
Change in pension & other post-retirement liabilities	(129)	(129)	(129)	(129)	(129)	(129)	(129)	(129)	(129)	(129)
Change in other non-current liabilities										
Common stock	43	43	43	43	43	43	43	43	43	43
Dividends paid	(968)	(949)	(997)	(1,182)	(1,379)	(1,335)	(1,454)	(1,593)	(1,744)	(1,875)
Common stock repurchases	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Cash used in financing activities	3,483	(157)	(110)	(192)	(396)	(250)	(287)	(344)	(414)	(462)
Net increase (decrease) in cash & cash equivalents										
Cash & cash equivalents at beginning of period	3,109	9,318	11,872	14,513	17,179	19,717	22,577	25,625	28,853	32,266
Cash & cash equivalents at end of period	9,318	11,872	14,513	17,179	19,717	22,577	25,625	28,853	32,266	35,905

Northrop Grumman Corp
Common Size Income Statement

Fiscal Years Ending Dec. 31	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
Total sales	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Operating costs and expenses													
Cost of product sales	59.07%	58.52%	63.34%	60.31%	60.31%	60.31%	60.31%	60.06%	59.81%	59.56%	59.31%	59.06%	58.81%
Cost of service sales	17.07%	17.40%	16.58%	18.03%	18.03%	18.03%	18.03%	17.78%	17.53%	17.28%	17.03%	16.78%	16.53%
Depreciation & Amortization	3.47%	3.67%	3.41%	3.98%	3.72%	3.51%	3.32%	3.22%	3.15%	3.08%	3.04%	3.00%	2.97%
General & administrative expenses	10.08%	10.58%	10.22%	9.98%	9.98%	9.98%	9.98%	9.98%	9.98%	9.98%	9.98%	9.98%	9.98%
Total operating costs and expenses	89.71%	90.16%	93.54%	93.54%	93.54%	93.54%	93.54%	93.54%	93.54%	93.54%	93.54%	93.54%	93.54%
Gain on sale of business	5.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Operating income (loss)	15.84%	9.84%	6.46%	7.70%	7.96%	8.17%	8.36%	8.96%	9.53%	10.10%	10.64%	11.18%	11.71%
Interest expense	1.56%	1.38%	1.39%	1.18%	1.51%	1.62%	1.53%	1.57%	1.67%	1.67%	1.69%	1.70%	1.72%
Non-operating FAS pension benefit	-4.12%	-4.11%	-1.35%	-2.70%	-2.57%	-2.44%	-2.31%	-2.23%	-2.15%	-2.07%	-1.99%	-1.92%	-1.85%
Mark-to-market pension & OPB benefit (expense)	-6.60%	-3.37%	1.07%	-0.16%	-0.15%	-0.15%	-0.14%	-0.13%	-0.13%	-0.12%	-0.12%	-0.12%	-0.11%
Other income (expense), net	-0.05%	-0.01%	-0.63%	-0.24%	-0.23%	-0.22%	-0.21%	-0.20%	-0.19%	-0.19%	-0.18%	-0.17%	-0.17%
Earnings (loss) before income taxes	25.06%	15.94%	5.97%	9.62%	9.40%	9.36%	9.49%	9.95%	10.33%	10.81%	11.25%	11.69%	12.12%
Tax Rate													
Federal and foreign income tax expense	5.42%	2.57%	0.74%	2.12%	2.07%	2.06%	2.09%	2.19%	2.27%	2.38%	2.48%	2.57%	2.67%
Net earnings (loss)	19.64%	13.38%	5.23%	7.51%	7.33%	7.30%	7.40%	7.76%	8.06%	8.43%	8.78%	9.12%	9.45%

Northrop Grumman Corp
Common Size Balance Sheet

Fiscal Years Ending Dec. 31	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
% of Sales													
Assets													
Cash & cash equivalents	13.76%	9.64%	6.56%	7.62%	21.74%	26.30%	30.44%	34.75%	38.46%	42.46%	46.45%	50.42%	54.34%
Accounts receivable, net	4.11%	4.13%	3.70%	3.70%	3.70%	3.70%	3.70%	3.70%	3.70%	3.70%	3.70%	3.70%	3.70%
Unbilled receivables, net	15.40%	16.35%	14.49%	14.49%	14.49%	14.49%	14.49%	14.49%	14.49%	14.49%	14.49%	14.49%	14.49%
Inventoried costs, net	2.27%	2.67%	2.82%	2.82%	2.82%	2.82%	2.82%	2.82%	2.82%	2.82%	2.82%	2.82%	2.82%
Prepaid expenses & other current assets	3.16%	3.93%	5.96%	5.96%	5.96%	5.96%	5.96%	5.96%	5.96%	5.96%	5.96%	5.96%	5.96%
Total current assets	34.84%	34.12%	34.88%	34.88%	34.88%	34.88%	34.88%	34.88%	34.88%	34.88%	34.88%	34.88%	34.88%
Property, plant & equipment, net	22.13%	24.04%	24.57%	23.27%	21.97%	20.86%	19.88%	19.41%	19.04%	18.75%	18.52%	18.35%	18.22%
Operating lease right-of-use assets	4.64%	4.95%	4.63%	4.38%	4.14%	3.93%	3.74%	3.66%	3.59%	3.53%	3.49%	3.46%	3.43%
Goodwill	49.11%	47.86%	44.58%	42.94%	40.87%	38.81%	36.74%	35.43%	34.17%	32.94%	31.76%	30.61%	29.50%
Intangible assets, net	1.62%	1.05%	0.78%	0.55%	0.34%	0.15%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Deferred tax assets	0.56%	0.44%	2.60%	4.14%	5.54%	6.86%	8.11%	9.52%	10.94%	12.39%	13.87%	15.36%	16.87%
Other non-current assets	6.48%	7.09%	6.43%	6.43%	6.43%	6.43%	6.43%	6.43%	6.43%	6.43%	6.43%	6.43%	6.43%
Total assets	119.38%	119.54%	118.46%	131.52%	133.95%	136.15%	137.91%	141.30%	145.16%	149.20%	153.34%	157.55%	161.89%
Liabilities													
Trade accounts payable	6.16%	7.07%	5.37%	5.37%	5.37%	5.37%	5.37%	5.37%	5.37%	5.37%	5.37%	5.37%	5.37%
Accrued employee compensation	5.59%	5.62%	5.73%	5.73%	5.73%	5.73%	5.73%	5.73%	5.73%	5.73%	5.73%	5.73%	5.73%
Advance payments & billings in excess of costs incurred	8.48%	9.86%	10.67%	10.67%	10.67%	10.67%	10.67%	10.67%	10.67%	10.67%	10.67%	10.67%	10.67%
Other current liabilities	6.49%	9.11%	8.62%	8.62%	8.62%	8.62%	8.62%	8.62%	8.62%	8.62%	8.62%	8.62%	8.62%
Total current liabilities	26.72%	31.66%	30.39%	30.39%	30.39%	30.39%	30.39%	30.39%	30.39%	30.39%	30.39%	30.39%	30.39%
Long-term debt, net of current portion	35.82%	32.25%	35.09%	45.39%	45.29%	45.16%	45.00%	45.52%	46.13%	46.76%	47.42%	48.10%	48.79%
Pension & other post-retirement benefit plan liabilities	9.17%	3.25%	3.28%	2.85%	2.41%	2.00%	1.62%	1.30%	1.01%	0.73%	0.47%	0.23%	0.00%
Operating lease liabilities	4.46%	4.98%	4.82%	4.16%	3.93%	3.73%	3.56%	3.47%	3.41%	3.35%	3.31%	3.28%	3.26%
Other non-current liabilities	5.60%	5.57%	7.23%	7.23%	7.23%	7.23%	7.23%	7.23%	7.23%	7.23%	7.23%	7.23%	7.23%
Total liabilities	83.14%	77.71%	80.81%	90.02%	89.24%	88.52%	87.80%	87.92%	88.16%	88.47%	88.83%	89.23%	89.67%
Shareholders' equity													
Common stock	0.44%	0.42%	0.38%	0.47%	0.55%	0.61%	0.67%	0.73%	0.79%	0.84%	0.89%	0.93%	0.97%
Retained earnings	36.20%	41.83%	37.60%	41.34%	44.46%	47.30%	49.70%	52.90%	56.46%	60.13%	63.85%	67.62%	71.46%
Accumulated other comprehensive income (loss)	-0.40%	-0.42%	-0.33%	-0.31%	-0.30%	-0.28%	-0.27%	-0.26%	-0.25%	-0.24%	-0.23%	-0.22%	-0.22%
Total shareholders' equity	36.24%	41.83%	37.66%	41.50%	44.71%	47.63%	50.11%	53.38%	57.00%	60.73%	64.51%	68.32%	72.22%
% of Total Assets													
Cash & cash equivalents	8.29%	5.89%	6.68%	17.37%	20.68%	23.61%	26.13%	28.23%	30.34%	32.30%	34.11%	35.79%	37.35%
Accounts receivable, net	3.45%	3.45%	3.12%	2.81%	2.76%	2.72%	2.68%	2.62%	2.55%	2.48%	2.41%	2.35%	2.29%
Unbilled receivables, net	12.90%	13.67%	12.23%	11.02%	10.82%	10.64%	10.51%	10.25%	9.98%	9.71%	9.45%	9.20%	8.95%
Inventoried costs, net	1.90%	2.24%	2.38%	2.15%	2.11%	2.07%	2.05%	2.00%	1.94%	1.89%	1.84%	1.79%	1.74%
Prepaid expenses & other current assets	2.64%	3.29%	5.03%	4.53%	4.45%	4.38%	4.32%	4.22%	4.10%	3.99%	3.89%	3.78%	3.68%
Total current assets	29.18%	28.54%	29.45%	37.87%	40.81%	43.42%	45.69%	47.32%	48.91%	50.38%	51.70%	52.90%	54.01%
Property, plant & equipment, net	19.21%	21.42%	23.49%	23.10%	22.92%	22.92%	23.07%	23.35%	23.76%	24.26%	24.87%	25.56%	26.33%
Operating lease right-of-use assets	4.03%	4.41%	4.42%	4.35%	4.32%	4.32%	4.34%	4.40%	4.47%	4.57%	4.68%	4.81%	4.96%
Goodwill	42.63%	42.63%	42.63%	42.63%	42.63%	42.63%	42.63%	42.63%	42.63%	42.63%	42.63%	42.63%	42.63%
Intangible assets, net	1.41%	0.93%	0.74%	0.55%	0.36%	0.17%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Deferred tax assets	0.49%	0.39%	2.48%	4.11%	5.78%	7.54%	9.41%	11.45%	13.65%	16.04%	18.61%	21.39%	24.38%
Other non-current assets	5.62%	6.31%	6.15%	6.38%	6.70%	7.06%	7.46%	7.73%	8.02%	8.32%	8.63%	8.95%	9.29%
Total assets	103.63%	106.49%	113.28%	130.58%	139.74%	149.58%	160.02%	170.01%	181.14%	193.09%	205.85%	219.43%	233.94%
Liabilities													
Trade accounts payable	5.35%	6.30%	5.14%	5.33%	5.60%	5.90%	6.23%	6.46%	6.70%	6.95%	7.21%	7.48%	7.76%
Accrued employee compensation	4.85%	5.01%	5.48%	5.69%	5.98%	6.29%	6.65%	6.89%	7.15%	7.41%	7.69%	7.98%	8.28%
Advance payments & billings in excess of costs incurred	7.36%	8.78%	10.20%	10.60%	11.13%	11.72%	12.38%	12.84%	13.32%	13.81%	14.33%	14.86%	15.42%
Other current liabilities	5.63%	8.11%	8.25%	8.56%	9.00%	9.47%	10.01%	10.38%	10.76%	11.16%	11.58%	12.01%	12.46%
Total current liabilities	23.19%	28.20%	29.06%	30.18%	31.71%	33.39%	35.27%	36.57%	37.93%	39.34%	40.80%	42.33%	43.92%
Long-term debt, net of current portion	31.10%	28.73%	33.55%	45.07%	47.24%	49.62%	52.22%	54.77%	57.56%	60.52%	63.66%	66.99%	70.51%
Pension & other post-retirement benefit plan liabilities	7.96%	2.89%	3.14%	2.83%	2.51%	2.20%	1.88%	1.57%	1.26%	0.94%	0.63%	0.31%	0.00%
Operating lease liabilities	3.87%	4.44%	4.60%	4.13%	4.10%	4.10%	4.13%	4.18%	4.25%	4.34%	4.45%	4.57%	4.71%
Other non-current liabilities	4.86%	4.96%	6.91%	7.17%	7.54%	7.94%	8.38%	8.69%	9.02%	9.35%	9.70%	10.06%	10.44%
Total liabilities	72.17%	69.22%	77.27%	89.38%	93.10%	97.25%	101.88%	105.78%	110.01%	114.49%	119.25%	124.27%	129.58%
Shareholders' equity													
Common stock	0.38%	0.37%	0.37%	0.47%	0.57%	0.68%	0.78%	0.88%	0.99%	1.09%	1.19%	1.30%	1.40%
Retained earnings	31.43%	37.27%	35.95%	41.04%	46.38%	51.97%	57.67%	63.65%	70.46%	77.82%	85.72%	94.17%	103.27%
Accumulated other comprehensive income (loss)	-0.35%	-0.37%	-0.31%	-0.31%	-0.31%	-0.31%	-0.31%	-0.31%	-0.31%	-0.31%	-0.31%	-0.31%	-0.31%
Total shareholders' equity	31.46%	37.27%	36.01%	41.20%	46.64%	52.33%	58.14%	64.22%	71.13%	78.60%	86.61%	95.16%	104.36%

Northrop Grumman Corp
Value Driver Estimation

Fiscal Years Ending Dec. 31	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
NOPLAT:													
Revenue	35,667	36,602	39,290	40,796	42,865	45,141	47,677	49,438	51,271	53,178	55,162	57,227	59,376
Operating expenses:													
Cost of product sales	21,070	21,419	24,888	24,604	25,852	27,224	28,754	29,693	30,665	31,673	32,716	33,798	34,919
Cost of service sales	6,090	6,367	6,513	7,356	7,729	8,139	8,596	8,790	8,988	9,189	9,394	9,603	9,815
Depreciation & amortization	1,239	1,342	1,338	1,622	1,595	1,583	1,582	1,593	1,613	1,640	1,676	1,717	1,765
General & administrative expenses	3,597	3,873	4,014	4,071	4,278	4,505	4,758	4,934	5,117	5,307	5,505	5,711	5,926
Total operating expenses	31,996	33,001	36,753	37,654	39,454	41,451	43,690	45,009	46,382	47,809	49,291	50,829	52,425
Operating lease implied interest	100	109	110	108	107	107	108	109	111	114	116	120	123
EBIT	3,771	3,710	2,647	3,251	3,518	3,797	4,094	4,538	5,000	5,482	5,987	6,517	7,075
Less adjusted taxes:													
Tax provision	1,933	940	290	864	886	929	995	1,082	1,166	1,264	1,365	1,472	1,583
Tax on other income	(4)	(1)	(54)	(22)	(22)	(22)	(22)	(22)	(22)	(22)	(22)	(22)	(22)
Tax gain on sale	436	-	-	-	-	-	-	-	-	-	-	-	-
Tax shield on operating lease	22	24	24	24	24	24	24	24	24	25	26	26	27
Tax shield on interest expense	122	111	120	106	143	161	161	170	188	195	205	215	225
Tax shield on Non-operating FAS pension benefits	(518)	(271)	93	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
Tax shield on Mark-to-market pension & OPB benefit	(518)	(271)	93	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
Total adjusted taxes	610	534	674	987	1,045	1,107	1,172	1,270	1,371	1,477	1,588	1,705	1,828
Change in deferred tax:													
Net change in deferred tax	(490)	490	-	-	-	-	-	-	-	-	-	-	-
NOPLAT	2,671	3,666	1,973	2,264	2,473	2,690	2,922	3,268	3,628	4,004	4,398	4,812	5,247
Invested capital													
Operating assets:													
Normal cash	2,366	2,428	2,606	2,706	2,844	2,995	3,163	3,280	3,401	3,528	3,659	3,796	3,939
Receivables, net	1,501	1,467	1,511	1,510	1,586	1,671	1,764	1,830	1,897	1,968	2,041	2,118	2,197
Unbilled receivables, net	5,140	5,492	5,983	5,911	6,211	6,541	6,908	7,163	7,429	7,705	7,993	8,292	8,603
Prepaid expenses & other current assets	1,126	1,439	2,341	2,431	2,554	2,690	2,841	2,946	3,055	3,168	3,287	3,410	3,538
Total current assets	10,133	10,826	12,441	12,558	13,195	13,895	14,676	15,218	15,782	16,369	16,980	17,616	18,278
Operating liabilities:													
Trade Accounts Payable	2,197	2,587	2,110	2,191	2,302	2,424	2,560	2,655	2,753	2,856	2,962	3,073	3,189
Accrued employee compensation	1,993	2,057	2,251	2,337	2,456	2,586	2,731	2,832	2,937	3,047	3,160	3,279	3,402
Advance payments & billings in excess of costs incurred	3,026	3,609	4,193	4,354	4,575	4,817	5,088	5,276	5,472	5,675	5,887	6,107	6,337
Other current liabilities	2,314	3,334	3,388	3,518	3,696	3,892	4,111	4,263	4,421	4,586	4,757	4,935	5,120
Total current liabilities	9,530	11,587	11,942	12,400	13,029	13,720	14,491	15,026	15,584	16,163	16,766	17,394	18,047
Net Operating Working Capital	603	(761)	499	158	166	175	185	192	199	206	214	222	230
Net PP&E	7,894	8,800	9,653	9,492	9,417	9,416	9,478	9,595	9,761	9,970	10,218	10,501	10,817
Long term assets:													
Net Intangible assets	578	384	305	226	147	68	-	-	-	-	-	-	-
Operating lease right-of-use assets	1,655	1,811	1,818	1,788	1,774	1,773	1,785	1,807	1,838	1,878	1,924	1,978	2,037
Other assets	2,311	2,594	2,525	2,622	2,755	2,901	3,064	3,177	3,295	3,417	3,545	3,678	3,816
Total long term assets	4,544	4,789	4,648	4,636	4,675	4,742	4,849	4,984	5,133	5,295	5,469	5,655	5,853
Less long term liabilities:													
Other non-current liabilities	1,997	2,039	2,839	2,948	3,097	3,262	3,445	3,572	3,705	3,842	3,986	4,135	4,290
Total long term liabilities	1,997	2,039	2,839	2,948	3,097	3,262	3,445	3,572	3,705	3,842	3,986	4,135	4,290
Invested capital	11,044	10,789	11,961	11,339	11,162	11,071	11,067	11,199	11,388	11,629	11,916	12,244	12,610
Free Cash Flow (FCF):													
NOPLAT	2,671	3,666	1,973	2,264	2,473	2,690	2,922	3,268	3,628	4,004	4,398	4,812	5,247
Change in IC	775	(255)	1,172	(623)	(177)	(90)	(5)	132	190	241	287	328	366
FCF	1,896	3,921	801	2,887	2,650	2,781	2,927	3,136	3,439	3,764	4,112	4,484	4,881
Return on Invested Capital (ROIC):													
NOPLAT	2,671	3,666	1,973	2,264	2,473	2,690	2,922	3,268	3,628	4,004	4,398	4,812	5,247
Beginning IC	10,269	11,044	10,789	11,961	11,339	11,162	11,071	11,067	11,199	11,388	11,629	11,916	12,244
ROIC	26.01%	33.20%	18.29%	18.93%	21.81%	24.10%	26.39%	29.53%	32.40%	35.16%	37.82%	40.38%	42.85%
Economic Profit (EP):													
Beginning IC	10,269	11,044	10,789	11,961	11,339	11,162	11,071	11,067	11,199	11,388	11,629	11,916	12,244
x (ROIC - WACC)	18.99%	26.18%	11.27%	11.91%	14.79%	17.08%	19.37%	22.51%	25.38%	28.14%	30.80%	33.37%	35.84%
EP	1,951	2,891	1,216	1,425	1,677	1,907	2,145	2,492	2,842	3,205	3,582	3,976	4,388

Northrop Grumman Corp*Weighted Average Cost of Capital (WACC) Estimation***Cost of Equity:**

Risk-Free Rate	4.50%
Beta	0.59
Equity Risk Premium	4.60%
Cost of Equity	7.21%

ASSUMPTIONS:*U.S. 10 Year Treasury Yield**5y average**5y average***Cost of Debt:**

Risk-Free Rate	4.50%
Implied Default Premium	3.25%
Pre-Tax Cost of Debt	7.75%
Marginal Tax Rate	22.00%
After-Tax Cost of Debt	6.05%

*10y Treasury Yield**YTM on Company's 10 Year Corporate Bond**10y average***Market Value of Common Equity:**

Total Shares Outstanding	151.00
Current Stock Price	\$456.11
MV of Equity	68,873

MV Weights

83.25%

Market Value of Debt:

Current Portion of LTD	70
Long-Term Debt	13,786
PV of Operating Leases	-
MV of Total Debt	13,856.00

16.75%

82,728.61**Market Value of the Firm**

100.00%

Estimated WACC

7.02%

Northrop Grumman Corp

Discounted Cash Flow (DCF) and Economic Profit (EP) Valuation Models

Key Inputs:

CV Growth of NOPLAT	2.50%
CV Year ROIC	42.85%
WACC	7.02%
Cost of Equity	7.21%

Fiscal Years Ending Dec. 31	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
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DCF Model:

Free Cash Flow (FCF)	2,887	2,650	2,781	2,927	3,136	3,439	3,764	4,112	4,484	4,881
Continuing Value (CV)										109,353
PV of FCF	2,698	2,314	2,269	2,231	2,234	2,289	2,341	2,390	2,435	59,390

Value of Operating Assets:	80,590
Non-Operating Adjustments	8,502 Excess Cash
	- PV Operating Lease
	(1,161) Pension Obligations
	(70) Current Portion LT Debt
	(18,519) LT Debt
	(51) ESOP

Value of Equity	69,291
Shares Outstanding	150
Intrinsic Value of Last FYE	\$ 461.94
Implied Price as of Today	\$ 467.39

EP Model:

Economic Profit (EP)	1,425	1,677	1,907	2,145	2,492	2,842	3,205	3,582	3,976	4,388
Continuing Value (CV)										97,109
PV of EP	1,331	1,465	1,556	1,635	1,775	1,892	1,994	2,082	2,159	52,740

Total PV of EP	68,629
Invested Capital (last FYE)	11,961
Value of Operating Assets:	80,590
Non-Operating Adjustments	8,502 Excess Cash
	- PV Operating Lease
	(1,161) Pension Obligations
	(70) Current Portion LT Debt
	(18,519) LT Debt
	(51) ESOP

Value of Equity	69,291
Shares Outstanding	150
Intrinsic Value of Last FYE	461.94
Implied Price as of Today	\$ 467.39

Northrop Grumman Corp

Dividend Discount Model (DDM) or Fundamental P/E Valuation Model

Fiscal Years Ending	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
EPS	\$ 13.57	\$ 20.08	\$ 20.71	\$ 21.66	\$ 23.22	\$ 25.24	\$ 27.19	\$ 29.49	\$ 31.85	\$ 34.32

Key Assumptions

CV growth of EPS	2.50%
CV Year ROE	13.09%
Cost of Equity	7.21%

Future Cash Flows

P/E Multiple (CV Year)											17.16
EPS (CV Year)											\$ 34.32
Future Stock Price											\$ 589.03
Dividends Per Share	6.35	6.25	6.56	7.78	9.07	8.79	9.57	10.48	11.47		549.40
Discounted Cash Flows	5.92	5.44	5.32	5.89	6.40	5.78	5.88	6.00	6.13		293.51

Intrinsic Value as of Last FYE	\$ 346.27
Implied Price as of Today	\$ 350.36

Northrop Grumman Corp*Relative Valuation Models*

Ticker	Company	Price	EPS		P/E 24	P/E 25	Est. 5yr EPS gr.	PEG 24	PEG 25
			2024E	2025E					
LMT	Lockheed Martin	\$454.87	\$26.01	\$27.63	17.49	16.46	100.1	0.17	0.16
LHX	L3Harris Technologies Inc	\$213.10	\$8.68	\$10.77	24.55	19.79	118.6	0.21	0.17
RTX	RTX Corporation	\$97.53	\$4.18	\$4.98	23.33	19.58	121.7	0.19	0.16
GD	General Dyanmics	\$282.49	\$14.67	\$14.62	19.26	19.32	110.8	0.17	0.17
			Average		21.16	18.79		0.19	0.17

NOC Northrop Grumman Corp \$456.11 \$20.08 \$20.71 22.7 22.0 112.2 0.20 0.20

Implied Relative Value:

P/E (EPS24) \$ 424.80

P/E (EPS25) \$ 389.11

PEG (EPS24) \$ 421.04

PEG (EPS25) \$ 387.42

Northrop Grumman Corp

Key Management Ratios

Fiscal Years Ending Dec. 31	2021	2022	2023	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E
Liquidity Ratios:													
Current Ratio													
Current Ratio (Current Assets/Current Liabilities)	1.60	1.30	1.08	1.15	1.64	1.80	1.95	2.07	2.20	2.34	2.47	2.61	2.74
Quick Ratio ((Cash + Accounts Receivable)/Current Liabilities)	1.52	1.22	0.99	1.05	1.55	1.71	1.85	1.98	2.11	2.24	2.38	2.52	2.65
Cash Ratio (Cash/Current Liabilities)	0.51	0.37	0.22	0.26	0.75	0.91	1.06	1.19	1.31	1.45	1.59	1.72	1.86
Asset-Management Ratios:													
Days sales Turnover (Accounts Receivable/Revenue) * 365	8.30	9.75	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30
Total Asset Turnover (Net Sales/Total Assets)	0.84	0.84	0.84	0.76	0.75	0.73	0.73	0.71	0.69	0.67	0.65	0.63	0.62
Accounts Receivable Turnover (Net Sales/Accounts Receivable)	23.76	24.95	26.00	28.06	28.39	28.46	28.54	28.02	28.02	28.03	28.03	28.03	28.04
Financial Leverage Ratios:													
Debt-to-Equity Ratio (Total Liabilities/Total Equity)	0.99	0.84	0.94	1.10	1.10	0.97	0.93	0.93	0.87	0.83	0.79	0.75	0.72
Debt-to-Assets Ratio (Total Liabilities/Total Assets)	0.30	0.29	0.30	0.35	0.37	0.34	0.34	0.35	0.34	0.34	0.33	0.33	0.32
Debt-to-Capital (Total Debt/(Total Debt + Total Equity))	0.50	0.46	0.48	0.52	0.52	0.49	0.48	0.48	0.47	0.45	0.44	0.43	0.42
Profitability Ratios:													
Return on Equity (NI/Beg TSE)	54.19%	31.97%	13.90%	18.09%	16.40%	15.32%	14.77%	14.54%	14.14%	13.88%	13.60%	13.34%	13.09%
Return on Assets (NI/Total Assets)	16.45%	11.19%	4.42%	5.71%	5.47%	5.36%	5.37%	5.49%	5.55%	5.65%	5.72%	5.79%	5.84%
Profit Margin (Net Profit/Net Sales)	19.64%	13.38%	5.23%	7.51%	7.33%	7.30%	7.40%	7.76%	8.06%	8.43%	8.78%	9.12%	9.45%
Payout Policy Ratios:													
Dividend Payout Ratio (Total Dividends/EPS)	14.10%	21.39%	54.09%	31.63%	30.18%	30.28%	33.51%	35.94%	32.31%	32.44%	32.90%	33.42%	33.40%
Payout Ratio (Dividends/Net Sales)	0.07%	0.05%	0.13%	0.07%	0.07%	0.08%	0.08%	0.09%	0.08%	0.08%	0.08%	0.08%	0.08%

Northrop Grumman Corp

Sensitivity Tables

		Beta							
		\$467.39	0.29	0.39	0.49	0.59	0.69	0.79	0.89
Risk Free Rate	4.20%	727.19	635.28	561.59	501.21	450.85	408.22	371.68	
	4.30%	705.33	617.91	547.46	489.50	440.99	399.81	364.42	
	4.40%	684.58	601.34	533.92	478.24	431.47	391.67	357.38	
	4.50%	664.86	585.50	520.93	467.39	422.29	383.78	350.54	
	4.60%	646.10	570.36	508.46	456.94	413.41	376.15	343.91	
	4.70%	628.23	555.87	496.47	446.86	404.82	368.75	337.47	
	4.80%	611.19	541.98	484.94	437.14	396.52	361.57	331.21	

		Marginal Tax Rate							
		467.39	19.00%	20.00%	21.00%	22.00%	23.00%	24.00%	25.00%
Pre-tax Cost of Debt	0.49%	492.68	484.63	476.54	468.41	460.23	452.00	443.74	
	1.49%	492.30	484.27	476.19	468.07	459.90	451.69	443.44	
	2.49%	491.92	483.90	475.84	467.73	459.58	451.38	443.14	
	3.49%	491.54	483.53	475.48	467.39	459.25	451.07	442.84	
	4.49%	491.16	483.17	475.13	467.05	458.93	450.76	442.54	
	4.49%	491.16	483.17	475.13	467.05	458.93	450.76	442.54	
	6.49%	490.40	482.43	474.42	466.37	458.27	450.13	441.95	

		WACC							
		467.39	6.72%	6.82%	6.92%	7.02%	7.12%	7.22%	7.32%
CV Growth of NOPLAT	2.20%	482.47	469.44	456.97	445.24	433.58	422.59	412.04	
	2.30%	490.79	477.31	464.43	452.31	440.28	428.95	418.08	
	2.40%	499.49	485.54	472.21	459.69	447.26	435.58	424.37	
	2.50%	508.61	494.14	480.34	467.39	454.55	442.48	430.93	
	2.60%	518.17	503.16	488.85	475.44	462.16	449.69	437.76	
	2.70%	528.20	512.61	497.77	483.87	470.12	457.22	444.88	
	2.80%	538.75	522.53	507.11	492.69	478.44	465.08	452.32	

		Normal Cash %							
		\$467.39	0.50%	1.00%	1.50%	2.00%	2.50%	3.00%	3.50%
CV ROIC	1.00%	382.85	381.47	380.10	378.72	377.35	375.97	374.59	
	1.50%	407.05	405.67	404.30	402.92	401.55	400.17	398.79	
	2.00%	436.07	434.70	433.32	431.94	430.57	429.19	427.82	
	2.50%	471.52	470.14	468.77	467.39	466.01	464.64	463.26	
	3.00%	515.78	514.41	513.03	511.66	510.28	508.90	507.53	
	3.50%	572.63	571.26	569.88	568.51	567.13	565.75	564.38	
	4.00%	648.32	646.94	645.57	644.19	642.81	641.44	640.06	

		Revenue Growth % 2028-2033							
		467.39	2.60%	2.70%	2.80%	2.90%	3.00%	3.10%	3.20%
Cost of Product Sales (%)	57.31%	624.91	627.48	630.06	632.65	635.25	637.86	640.49	
	58.31%	570.27	572.69	575.12	577.56	580.01	582.48	584.95	
	59.31%	515.62	517.90	520.18	522.47	524.78	527.10	529.42	
	60.31%	460.98	463.10	465.24	467.39	469.55	471.71	473.89	
	61.31%	406.33	408.31	410.30	412.30	414.31	416.33	418.36	
	62.31%	351.69	353.52	355.37	357.22	359.08	360.95	362.83	
	63.31%	297.04	298.73	300.43	302.13	303.85	305.57	307.30	

		Cost of Service Sales (% Sales)							
		467.39	15.03%	16.03%	17.03%	18.03%	19.03%	20.03%	21.03%
General & administrati	6.98%	797.90	742.82	687.73	632.65	577.56	522.47	467.39	
	7.98%	742.82	687.73	632.65	577.56	522.47	467.39	412.30	
	8.98%	687.73	632.65	577.56	522.47	467.39	412.30	357.22	
	9.98%	632.65	577.56	522.47	467.39	412.30	357.22	302.13	
	10.98%	577.56	522.47	467.39	412.30	357.22	302.13	247.05	
	11.98%	522.47	467.39	412.30	357.22	302.13	247.05	191.96	
	12.98%	467.39	412.30	357.22	302.13	247.05	191.96	136.88	

Northrop Grumman Corp*Valuation of Options Granted under ESOP*

Current Stock Price	\$456.11
Risk Free Rate	4.50%
Current Dividend Yield	1.56%
Annualized St. Dev. of Stock Returns	40.00%

Range of Outstanding Options	Number of Shares	Average Exercise Price	Average Remaining Life (yrs)	B-S Option Price	Value of Options Granted
Range 1	0.50	417.00	1.20	\$ 102.26	\$ 51
Range 2					
Range 3					
Range 4					
Range 5					
Total	0.50	\$ 417.00	1.20	\$ 108.12	\$ 51