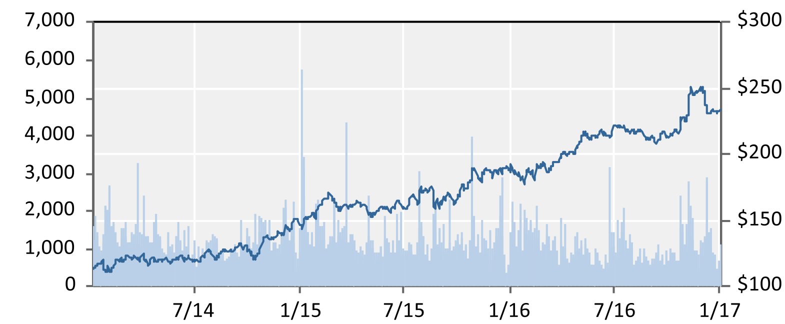
Analyst: Brian Lee

Recommendation	**NEUTRAL**
Target (today's value)	$230.00
Current Price	$228.21
52 week range	$175.00 - $253.80

Aerospace / Defense

Northrop Grumman Corporation



Source: FactSet Prices

Share Data	
Ticker:	NOC
Market Cap. (Billion):	$41.4
Inside Ownership	0.7%
Inst. Ownership	82.1%
Beta	0.88
Dividend Yield	1.5%
Payout Ratio	29.0%
Cons. Long-Term Growth Rate	8.3%

	'14	'15	'16E	'17E	'18E
Sales (billions)					
Year	$24.0	$23.5	$24.0	$24.7	$25.4
Gr %	-2.8%	-1.9%	2.2%	2.6%	3.0%
Cons	-	-	$24.5	$25.0	$26.5
EPS					
Year	$9.91	$10.51	$11.65	$12.72	$13.66
Gr %	16.6%	6.0%	10.9%	9.2%	7.4%
Cons	-	-	$12.19	$12.11	$13.47

Ratio	'14	'15	'16E	'17E	'18E
ROE (%)	23.2%	31.2%	31.2%	37.8%	34.9%
Industry	32.2%	40.7%	40.7%	51.3%	93.8%
NPM (%)	8.6%	8.5%	8.5%	8.8%	8.5%
Industry	7.2%	6.9%	6.9%	6.9%	7.7%
A. T/O	0.97	0.93	0.91	0.92	0.95
ROA (%)	7.6%	7.8%	7.8%	7.8%	8.7%
Industry	6.3%	6.1%	6.1%	6.2%	6.7%
A/E	2.58	2.63	2.97	4.00	4.02

Valuation	'15	'16E	'17E	'18E
P/E	27.9	23.9	22.4	19.8
Industry	20.8	24.1	19.3	18.0
P/S	1.1	1.3	1.5	1.7
P/B	2.4	4.1	6.2	7.0
P/CF	10.8	12.1	16.7	17.0
EV/EBITDA	7.1	8.6	10.8	12.9

Performance	Stock	Industry
1 Month	-6.4%	-0.2%
3 Month	9.2%	10.8%
YTD	1.0%	1.3%
52-week	24.4%	27.0%
3-year	106.8%	21.5%

Summary: I recommend a neutral rating with a target of $230. Although NOC grown significantly in the past two years after winning the B-21 contract, the stock is expensive compared to the market and its peers. Any reversion of the stock could produce a buying opportunity to purchase a good company with consistent growth. The stock is fairly priced if not a bit undervalued based on relative and DCF analysis.

Key Drivers:

- Increase in the Department of Defense spending will positively affect Northrop Grumman's sales.
- Growth in Unmanned aircraft for the use of both surveillance and combat could increase Northrop Grumman's sales.
- Winning the B-21 Raider contract has provided Northrop Grumman with a consistent form of revenue for years to come.
- The Election of President Trump is expected to have a positive impact on Northrop Grumman's sales as Trump supports increasing defense spending.

Valuation: Using a 3-stage discounted cash flow model, it appears that that Northrop Grumman is undervalued at its current price. When using a relative valuation approach it too appeared that NOC was overvalued when compared to its peers in the aerospace /defense industry. Through a combination of the approaches I determined a value of $230 for NOC.

Risks: Threats to the business include Department of Defense budget cuts, B-21 Raider contract getting delayed by Congress, a slowdown in the growth of unmanned vehicles for defense, and a potential worker shortage as the aging workforce begins to retire.

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Company Overview

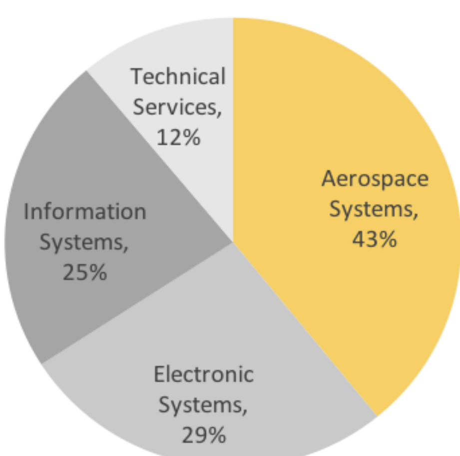
Headquartered in Falls Church, Virginia, Northrop Grumman Corporation (NOC) is a leading global security company providing innovative systems, products and solutions in autonomous systems, cyber, C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance), strike, and logistics and modernization to government and commercial customers worldwide.

The majority of the Northrop Grumman's business is from the U.S. government (typically exceeding 80% of sales.) NOC realigned from four to three segments on January 1, 2016. The four business segments of Northrop Grumman are:

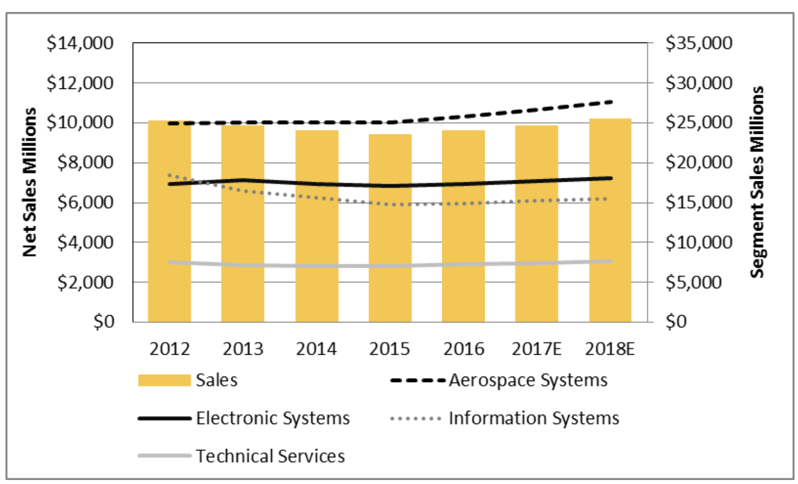
- Aerospace Systems: Headquartered in Redondo Beach, California, Aerospace Systems is responsible for developing unmanned systems, military aircraft systems, space systems, and strategic programs & technology. The customers of aerospace systems, primarily U.S. government agencies, use these systems to perform missions such as surveillance and battle management. This segment is responsible for creating some of the more iconic aircraft in the U.S. arsenal, the B-2 Spirit bomber, and helped to develop the F-35 Lightning II alongside Lockheed Martin. Aerospace Systems had a CAGR of -0.7% over the past 7 years, but is recently rising.
- Electronic Systems: Headquartered in Linthicum, Maryland, Electronic Systems develops systems for use by global military, commercial and civil customers. This segment develops radar systems, targeting systems, airborne fire control systems, and intelligence systems. Electronic Systems had a CAGR of -1.9% over the past 7 years.
- Information Systems: Headquartered in McLean, Virginia, Information Systems focuses on developing cyber security, air and missile defense, intelligence processing, civil security, and health technology and government support systems. Information Systems had a CAGR of -6.1% over the past 7 years.
- Technical Services: Headquartered in Herndon, Virginia, Technical Services is split into two separate parts: Integrated Logistics & Modernization and Mission Solutions & Readiness. Integrated Logistics & Modernization is responsible for providing support and modernization of weapon systems and aircraft. Mission Solutions and Readiness provides a wide array of realistic training for military and civil purposes. Technical Services had a CAGR of 0.4% over the past 7 years.

NOC realigned the four business segments into three to align better with customer needs on 01/01/2016. The three segments are: aerospace systems, mission systems, and technology services.

Figures 1 and 2: Business segments, year-end 2015 (left) and revenue history since 2012



Source: Company Reports 10-K



Source: Company Reports

Business/Industry Drivers

Though several factors may contribute to Northrop Grumman's future success, the following are the most important business drivers:

1) U.S. Government Defense Spending
2) Growth in Unmanned Systems
3) B-21 Raider Contract
4) Competition

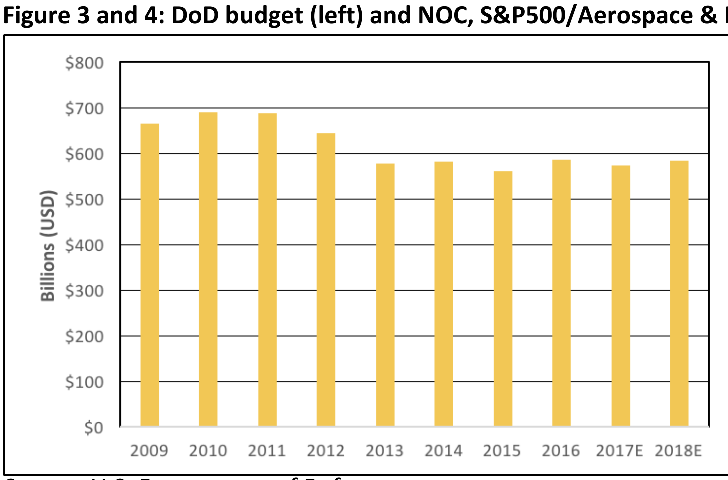
<u>U.S. Government Defense Spending</u>

Global conflict looks to keep defense spending high.

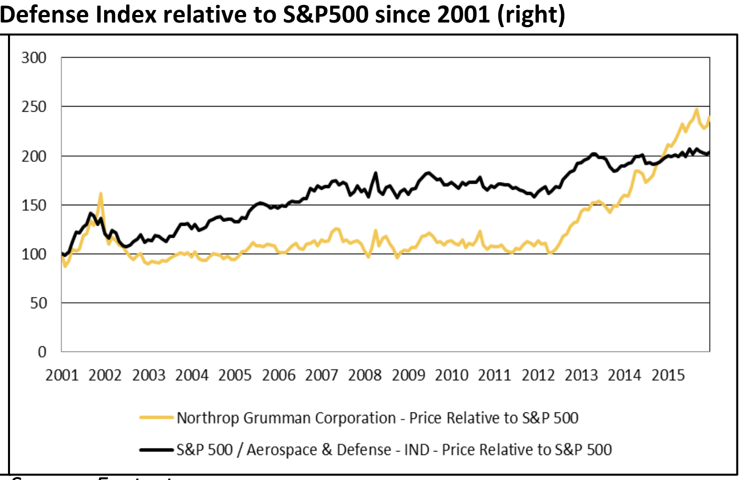
The U.S. Government, more specifically the Department of Defense (DoD), accounted for 83% - 86% of sales from 2013 - 2015. Republican Donald Trump won the election against Democrat Hillary Clinton and became the 45th President of the United States of America. President Trump had campaigned on an aggressive strategy to combat ISIS, and had called for more soldiers on the ground, more ships in ocean, and more fighter aircraft in the air. Trump's views on a stronger military resulted in NOC's share price rising 5.41% the day after the election. Trump's unconventional Twitter habits have caused declines in both Boeing's (BA) and Lockheed Martin's (LMT) share prices. Trump "tweeted" that he intends to reduce funding to both BA and LMT; Trump's tweets have also had an effect on the other defense companies all of which have seen a reversion to just above pre-election levels. Trump's pick for Secretary of Defense, James Mattis, is a board member for General Dynamics (GD), a competitor to NOC. Mattis has been a supporter of drone usage in combat and stronger presence in the Middle East.

Northrop Grumman has outperformed the S&P 500 since 2001, which can be attributed to the heightened global terror threat that is keeping defense spending high. The events of 9/11 caused significant increases to the defense budget, the growth of ISIS, and a nuclear North Korea in recent years is keeping defense spending high. The recently awarded B-21 Raider contract can explain the outperformance by NOC compared to the S&P / Aerospace & Defense Index in 2015. Modernization of the U.S. aircraft and military systems along with the growing demand for unmanned systems should boost NOC's growth. Although, a looming budget crisis though could put a damper on defense spending growth as Trump has shown concern, through his tweets, that too much is being spent.

Figure 3 and 4: DoD budget (left) and NOC, S&P500/Aerospace & Defense Index relative to S&P500 since 2001 (right)



Source: U.S. Department of Defense



Source: Factset

Growth in UMS has helped fuel growth in the aerospace segment for NOC.

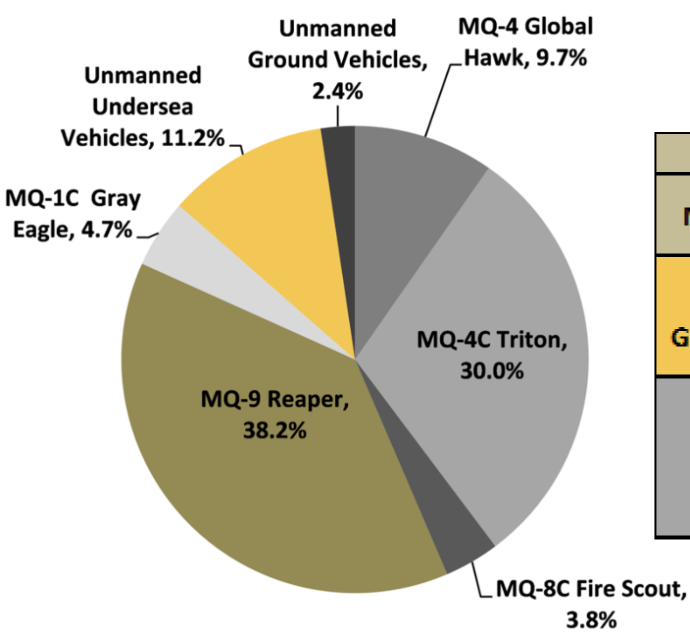
Growth in Unmanned Systems

Northrop Grumman's growth in the aerospace segment is mainly driven by the growth of unmanned systems (UMS), renamed autonomous systems in 2016. Global conflict has been hitting an all-time high with the rise of ISIS in the Middle East and the increasing threat of a nuclear-armed North Korea; with these threats, the Department of Defense and President Trump will want to maintain a strong military force. The trend for the modern military is to remove the soldiers from the battlefield and instead replace them with unmanned drones. Because of this, NOC has been investing heavily in R&D in order to sustain growth in the UMS segment. In 2014, NOC experienced a slight decrease in UMS, but in 2015 sales rose because of the Global Hawk program. In 2016, NOC was awarded two separate contracts from the U.S. Navy to produce MQ-4C Triton unmanned planes and MQ-8C Fire Scout unmanned helicopters.

Government Accountability Office estimates value the Triton project at $12.8 billion with $8.9 billion yet to be spent; the project is expected to be fully operational in 2023. The 2016 MQ-4C Triton deal is a modification contract worth $255.3 million and expected to be completed by 2020. In addition, the Navy also awarded NOC with more contracts worth $49.4 million and $95 million, so that total is $399.7 million, 3.8% of estimated aerospace system sales, from the Triton. The U.S. Navy has future plans to purchase 66 MQ-4C Tritons from NOC at a cost of $130 million for each drone. The MQ-8C Fire Scout deal is a worth $108.1 million and is for NOC to build an additional 10 Fire Scouts for the Navy which will increase the Navy's fleet to 29 MQ-8Cs. Although the cost per drone is a small number, it shows potential as the landscape of warfare moves towards autonomous means of combat.

The long-term nature of the Triton and Fire Scout contracts should allow NOC to have steady sales for coming years. In addition, if the Triton and Fire Scout have success with the Navy it opens up the possibility of NOC gaining contracts with other divisions of the military.

Figure 5 and 6: DoD spending on UMS/Drones FY17 (left) and cost per NOC drones and Competitor drones (right)



DoD Estimated Drone Spending Fiscal Year 2017		
Manufacturer	**Project Name**	**Spending in Millions**
Northrop Gruman Drones	MQ-4 Global Hawk	$ 305
	MQ-4C Triton	$ 944
	MQ-8C Fire Scout	$ 120
Competitor Drones	MQ-9 Reaper	$ 1,200
	MQ-1C Gray Eagle	$ 148
	Unmanned Undersea Vehicles	$ 352
	Unmanned Ground Vehicles	$ 74

Source: Center for the Study of Drones, Bard College

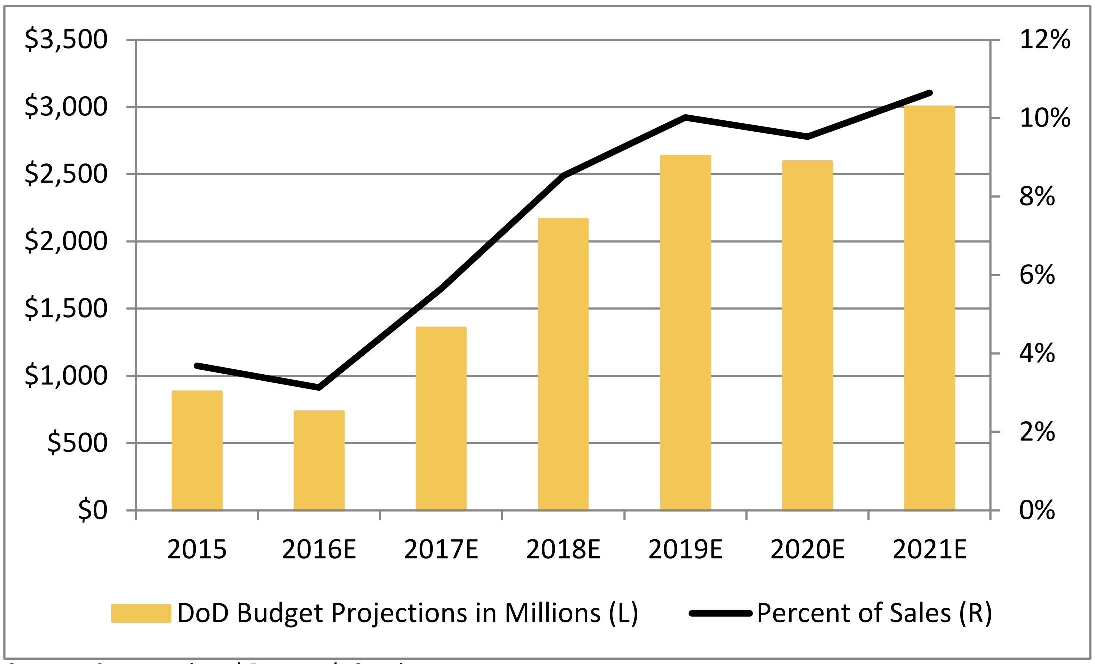
B-21 Raider Contract

NOC was awarded the B-21 contract; the largest single military aircraft contract since 2001.

Northrop Grumman was awarded the LRS-B (long range strike bomber) contract in October 2015; the contract is the largest contract for military aircraft since the JSF contract award to Lockheed Martin in 2001 for its F-35 Lightning II. Winning the contract was not easy as Lockheed and Boeing submitted a joint bid but were ultimately defeated as NOC won the contract. Lockheed and Boeing submitted a protest to the bid, but in February 2016 the decision to give NOC the contract was upheld. The LRS-B was recently named the B-21 Raider.

The project is expected to generate $55 billion over the lifetime of the program with each B-21 costing about $550 million to make. Due to security concerns, the actually cost of the project is still considered classified as DoD officials believe that releasing the cost of the contract could allow enemies to determine what technologies are being used. The B-21 is expected to be fully operational in 2025; this will make NOC a legitimate contender for new fighter contracts when the DoD starts to build the new sixth-generation fighters, expected to start in 2025.

Figure 7: Budget projections for B-21 Raider and percentage of NOC net sales



Source: Congressional Research Services

Competition

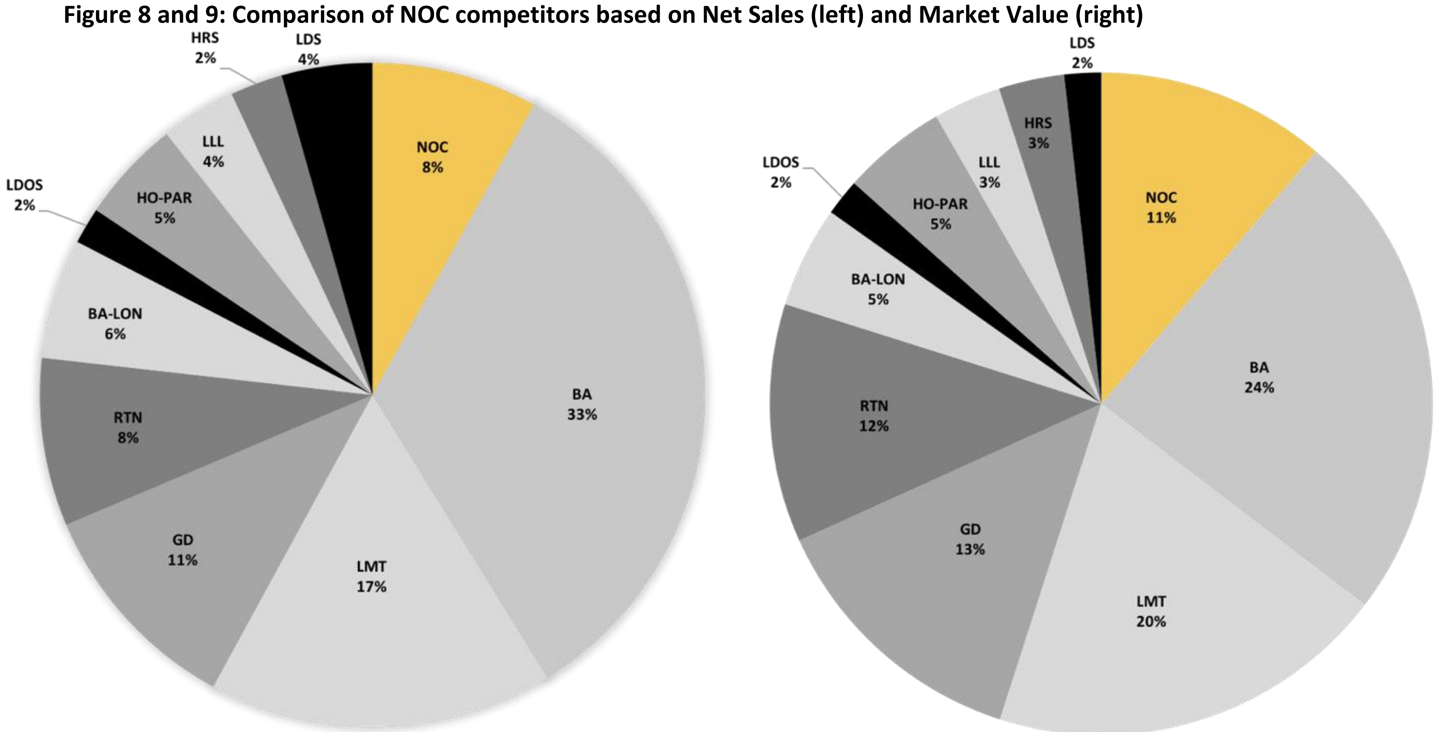
Northrop Grumman has few competitors, that compete fiercely, in its industry because of significant barriers to entry. The US Government limits who can manufacture defense equipment and vehicles.

Drone growth and B-21 contract give NOC advantage over its largest competitors.

Northrop Grumman's biggest competitors in the aerospace/defense industry are Boeing (BA) and Lockheed Martin (LMT). Most recently, NOC was awarded a contract to develop and manufacture the new B-21 bomber; winning a bid over the combined forces of Boeing and Lockheed Martin. The B-21 contract; the largest single military aircraft contract in 15 years, gives NOC an incredible competitive advantage over its competitors. NOC benefits from having a successful UMS segment and, in the fiscal year 2017, 49.4% of the Department of Defense's drone spending is on NOC drones.

The DoD budget has huge impact on defense heavy companies like NOC or LMT because the majority of sales come from defense contracts. Boeing is somewhat isolated from defense cuts because most Boeing's sales come from its commercial aircraft segment. Increasing global conflict means defense companies can expect sales to remain high, especially for unmanned aircraft as the trend is to have fewer soldiers on the ground and for coordinated drone strikes.

Figure 8 and 9: Comparison of NOC competitors based on Net Sales (left) and Market Value (right)



Source: Factset

Figure 10: Major Competitor Comparison (higher values are lighter and lower values are darker)

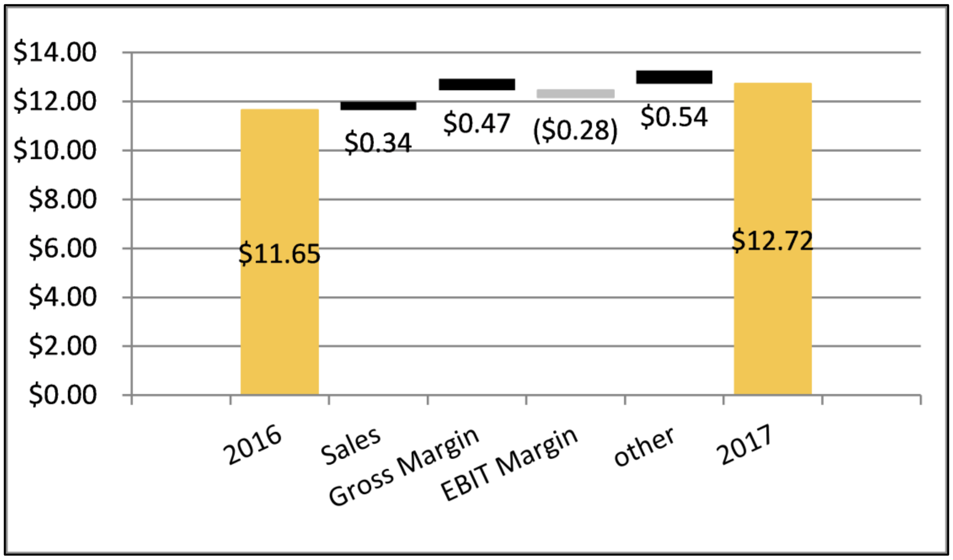
	Northrop Grumman	Boeing	General Dynamics	Lockheed Martin	BAE Systems	Raytheon Co	Thales	Harris
Ticker	NOC	BA	GD	LMT	BA-GB	RTN	HO-FR	HRS
Percent of Sales Defense	99.1%	23.6%	65.6%	80.2%	82.0%	98.9%	50.4%	43.5%
5-YR Sales CAGR	-7.5%	8.4%	-0.6%	0.1%	-4.5%	-1.6%	1.4%	4.7%
5-YR Avg EBITDA Margin	14.8%	9.8%	13.5%	12.2%	11.3%	14.5%	10.4%	21.8%
5-YR Avg Net Margin	8.1%	5.5%	6.6%	6.8%	4.9%	8.4%	4.5%	8.2%

Source: Factset

Financial Analysis

I anticipate EPS to grow to $12.72 from $11.65 in 2017, an increase of $1.07 or 9.2% from 2016. NOC won the contract to make the B-21 Raider which should increase sales that should boost EPS by $0.34. Newly elected President Trump and General Mattis, Trump's pick for Secretary of Defense, are likely to pursue greater defense spending which should increase sales and EPS. Gross margin continuing to grow (it has grown since 2013) should result in an increase of $0.47 per share; I expect the gross margin growth to be from NOC's segment realignment. I expect EBIT Margin to increase but this should result in a decrease in the earnings per share of $0.28, the decrease is a result of the SG&A growing at a faster rate than the gross margin. NOC has been continually repurchasing shares since 2003, with the assumption that this policy will continue, EPS should increase $0.54. Trump has promised that he would slash the corporate tax rate and if success it should increase the EPS as well.

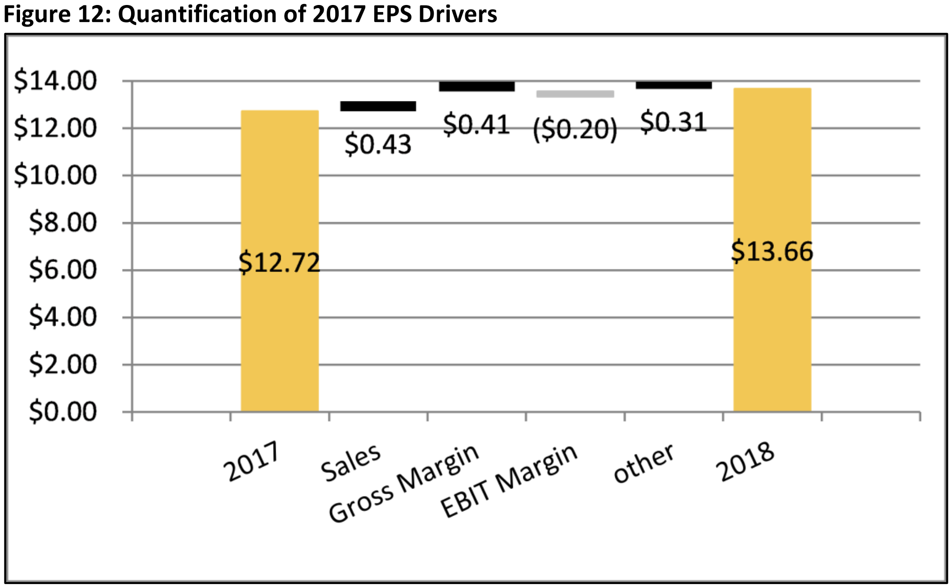
Figure 11: Quantification of 2016 EPS Drivers



Source: Company Reports, IMCP

My assumptions for 2018 indicate that EPS should increase from $12.72 to $13.66, an increase of $0.94 or 7.4%. Sales growth should account for $0.43 in EPS growth as sales are driven up by the B-21 funding. I expect gross margin increases to increase EPS by $0.41, but EBIT margin growth will shrink EPS again by $0.20. Share buybacks should drive up EPS by $0.31.

Figure 12: Quantification of 2017 EPS Drivers



Source: Company Reports, IMCP

I am initially less optimistic than the consensus in EPS but, after fiscal year 2016, I am more optimistic and assume higher growth in 2017 and 2018. Since my sales estimates are about the same as consensus, I am assuming higher margins. The B-21 contract should boost margins as it moves away from strictly development and design of the aircraft and NOC starts to manufacture and deliver the B-21.

Figure 13: EPS and Sales YoY growth estimates vs consensus

	2016E	2017E	2018E
EPS- Estimate	$11.65	$12.72	$13.66
YoY Growth	12%	9%	7%
EPS - Consensus	$11.72	$12.11	$13.46
YoY Growth	13%	3%	11%
Sales - Estimate	$24,042	$24,673	$25,423
YoY Growth	2%	3%	3%
Sales - Consensus	$24,027	$25,043	$26,552
YoY Growth	2%	4%	6%

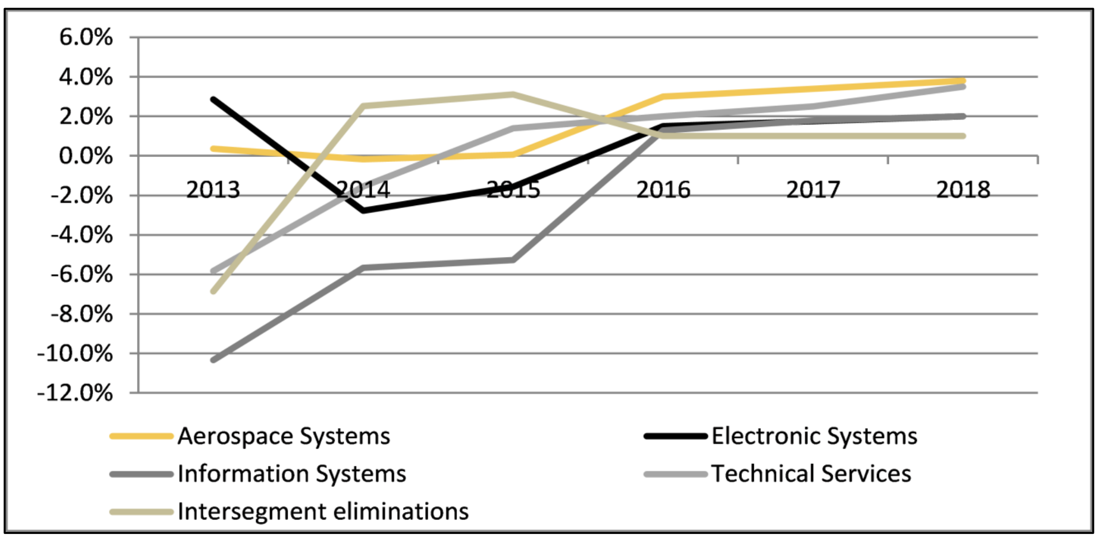
Source: Company Reports, IMCP

Revenues

Northrop Grumman had experienced significant revenue declines since 2010. With a 5-Year CAGR of -7.5%, NOC had the worst sales growth of its competitors. The Election of President Trump along with Republican control in both houses of Congress makes it likely that there would be a significant increase in defense spending. NOC winning the B-21 Raider contract was a huge gain for the company and I expect this to reverse the negative sales growth experienced in recent years. I expect the sales growth to be steady for the next couple of years as NOC begins developing and soon after manufacturing the new B-21. With a 6th generation of fighter aircraft expected to be released in 2025, NOC has created a team to start developing concepts to compete for contracts in the future.

I expect all four segments of Northrop to experience growth with the largest growth in the aerospace systems, NOC's largest segment. Technical services should grow almost as well as aerospace systems because technical services manage the modernization of older active-service aircraft. Electronic systems and information systems should grow at a steady rate as cyber warfare starts to increase in severity, and cyber security becomes a necessity.

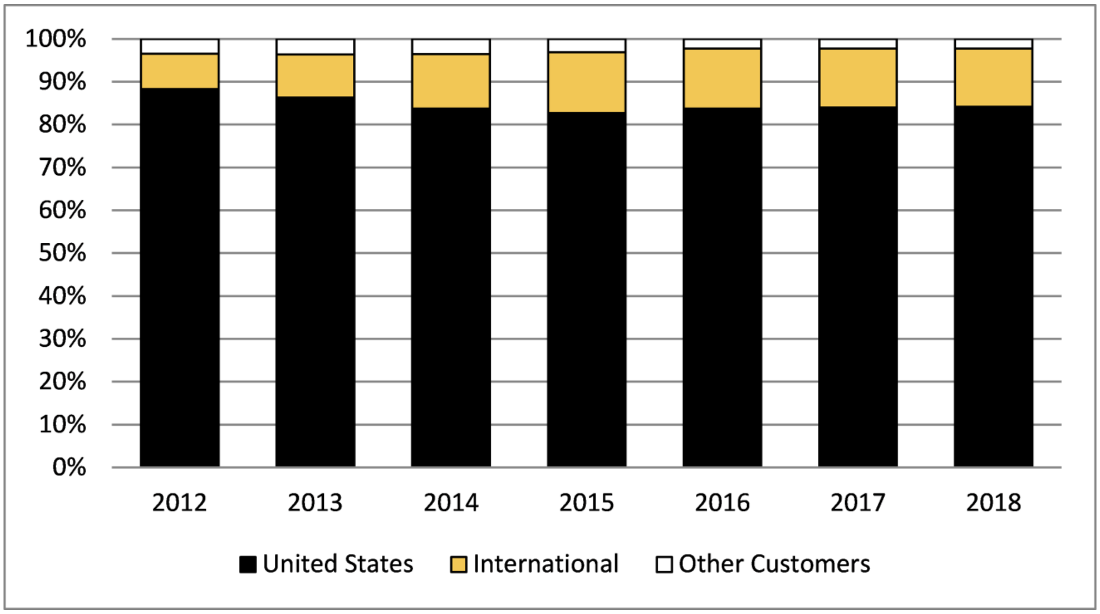
Figure 14: Segment sales growth



Source: Company Reports, IMCP

International sales have been steadily increasing in recent years, I expect this to continue but with a lower growth rate. Much of Northrop's sales come directly from the United States government (typically exceed 80% of overall sales.) Despite growing international sales the percentage of sales to the US government should increase at a greater rate making the overall percentage sales for international customers fall below 14%.

Figure 15: Segment sales as a percentage of total sales



Source: Company Reports, IMCP

<u>Operating Income and EBIT Margin</u>

I expect NOC to increase its gross margin for the next three years. The expected rise in gross margin from increased sales and efficiencies gained from realigning the segments from four to three. In years 2017 and 2018, I expect SG&A and R&D costs to increase more than 5.0% YoY. The increase in SG&A and R&D is expected because of the increased cost NOC is set to incur from the development of the B-21 Raider. The SG&A is required for NOC to complete and start production of the B-21. SG&A costs might also increase as the cost to hire new STEM graduates increases because of increasing competition with technology companies. Increased SG&A costs are the reason that I expect the EBIT margin to increase at a lower rate than the gross margin.

Figure 16: NOC Operating Income and EBIT Margin

	2014	2015	2016E	2017E	2018E
Sales	$23,979	$23,526	$24,042	$24,673	$25,423
Cost of goods sold	$18,378	$17,884	$18,248	$18,603	$19,067
Gross income	$5,601	$5,642	$5,794	$6,070	$6,356
Gross Margin	*23.4%*	24.0%	24.1%	24.6%	25.0%
Operating Expenses					
SG&A	$2,382	$2,551	$2,428	$2,566	$2,695
Growth	*5.4%*	*7.1%*	*-4.8%*	*5.7%*	*5.0%*
EBIT	$3,219	$3,091	$3,366	$3,504	$3,661
EBIT Margin	*13.4%*	*13.1%*	*14.0%*	*14.2%*	*14.4%*

Source: Company Reports, IMCP

Return on Equity

Northrop has traditionally had a higher ROE than the industry average, 20.2%. NOC has a 35% projected ROE in 2016 and I expect that ROE to slightly decrease in 2017 and 2018. I expect the ROA to increase in 2016 and the next two years; the increase in ROA is because of the expected EBIT margin increase in those years. With the cash balance increasing with FCF. I expect the leverage ratio to decrease even though the firm is buying over $1 billion in stock each year lower leverage is causing the ROE to decline. If NOC needs to raise funds to complete its contracts, the firm could issue debt that would raise the leverage ratio; however, it appears FCF is more than sufficient to fund growth.

Figure 17: DuPont ROE 2013 – 2018E

5-stage DuPont	2013	2014	2015	2016E	2017E	2018E
EBIT / sales	12.7%	13.4%	13.1%	14.0%	14.2%	14.4%
Sales / avg assets	0.93	0.91	0.92	0.95	0.93	0.93
EBT / EBIT	91.8%	91.2%	90.3%	90.7%	90.6%	90.6%
Net income /EBT	68.2%	70.4%	71.3%	72.3%	73.9%	73.9%
ROA	7.4%	7.8%	7.8%	8.7%	8.8%	9.0%
Avg assets / avg equity	2.63	2.97	4.00	4.02	3.63	3.48
ROE	19.4%	23.2%	31.2%	35.0%	32.0%	31.3%

Source: Company Reports, IMCP

Free Cash Flow

NOC has had volatile free cash flow for the past three years. I project this to settle down and FCF to rise slightly for the next three years. NOC has been using free cash flow to pay dividends and repurchase shares, repurchasing 59.2 million shares since 2012 (about 1/3 of shares). I expect the share repurchases to continue in 2017 and 2018; although, at a smaller $1.25 billion in shares per year. NOC has maintained negative net working capital, this is normal for the industry due to the large amount of long-term receivables.

I excluded cash from free cash flow because of the large unnecessary percentage of assets in cash. I expect the FCFF and FCFE for 2016 to decrease as NFAs increase after decreasing the year previous. In 2017 and 2018, I expect NOPAT and NFA to grow at a steady rate resulting in steady FCFF and FCFE growth.

NOC increased its long-term debt in 2013, I assume no new debt is needed partly because I expect they will reduce stock repurchases.

Figure 18: Free cash flow per share, 2013 – 2018E

Without cash and debt	2013	2014	2015	2016E	2017E	2018E
FCFF per share	$14.53	$4.15	$12.37	$10.88	$11.62	$12.12
Growth		-71.4%	198.1%	-12.1%	6.7%	4.3%
FCFE per share	$13.77	$3.20	$11.24	$9.69	$10.30	$10.70
Growth		-76.8%	251.4%	-13.8%	6.3%	3.9%

Source: Company Reports, IMCP

Figure 19: Free cash flows 2012 – 2018E

Free Cash Flow Without Cash & Debt	2012	2013	2014	2015	2016E	2017E	2018E
NOPAT	$2,119	$2,127	$2,268	$2,205	$2,433	$2,589	$2,705
Growth		0.4%	6.6%	-2.8%	10.4%	6.4%	4.5%
NWC*	(1,526)	(1,477)	(1,571)	(1,442)	(1,467)	(1,505)	(1,551)
Net fixed assets	18,151	16,893	18,388	18,120	18,517	19,003	19,581
Total net operating capital*	$16,625	$15,416	$16,817	$16,678	$17,051	$17,498	$18,030
Growth		-7.3%	9.1%	-0.8%	2.2%	2.6%	3.0%
- Change in NWC*		49	(94)	129	(25)	(38)	(46)
- Change in NFA		(1,258)	1,495	(268)	397	486	578
FCFF*		$3,336	$867	$2,344	$2,061	$2,141	$2,173
Growth			-74.0%	170.4%	-12.1%	3.9%	1.5%
- After-tax interest expense	141	175	199	215	226	243	255
FCFE**		$3,161	$668	$2,129	$1,835	$1,898	$1,918
Growth			-78.9%	218.7%	-13.8%	3.5%	1.0%
+ Net new debt/other cap		1,998	(3)	491	0	0	0
Sources of cash		$5,159	$665	$2,620	$1,835	$1,898	$1,918
Uses of cash							
Other expense		0	0	0	0	0	0
Increase cash and mkt sec		1,288	(1,287)	(1,544)	1,218	13	13
Dividends		545	563	603	621	640	660
Change in other equity		301	4,891	3,100	(0)	1,250	1,250
		$2,134	$4,167	$2,159	$1,840	$1,903	$1,923
Change in other liab		(3,025)	3,502	(461)	5	5	5
Total		$5,159	$665	$2,620	$1,835	$1,898	$1,918
* NWC excludes cash							
** No adjustment is made for debt							

Source: Company Reports, IMCP

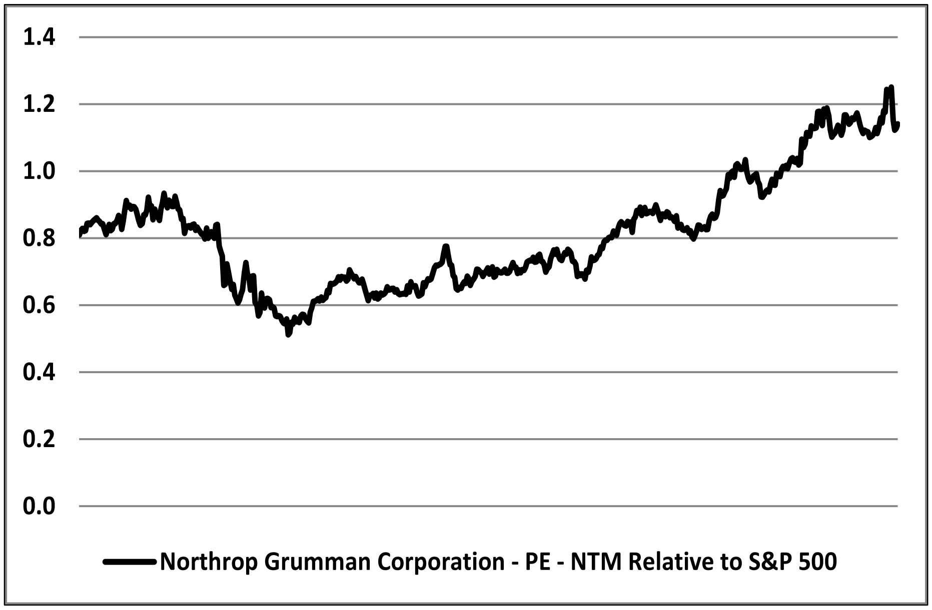
Valuation

NOC was valued using multiples and a 3-stage discounting cash flow model. Based on earnings multiples, the stock is expensive relative to other firms and is worth $240; however, due to winning some recent large contracts, this high valuation may be warranted. Relative valuation shows NOC to be slightly overvalued at $221 compared to its peers in the aerospace / defense industry. A detailed DCF analysis values NOC slightly higher, at $235; I give this value a bit more weight because it incorporates assumptions that reflect NOC's recently awarded contracts and higher P/E. Based on all of the analysis I value the stock at $230.

<u>Trading History</u>

NOC is currently trading near its 10 year high relative to the S&P 500. This is the result of recent award of large contracts and most analysts believe growth will pick up in the future. NOC's current NTM P/E is at 19.2 compared to its five-year average of 12.69. While I expect some regression towards that number in the future, I do not think that is likely to be the case in the near term.

Figure 20: NOC NTM P/E relative to S&P 500, trailing 10 years



Source: Factset

Assuming the company maintains a 19.2 NTM P/E at the end of 2017, it should trade at $262 by the end of the year.

- Price = P/E x EPS = 19.2 x $13.66 = $262

Discounting $262 back to today at a 9.3% cost of equity (explained in Discounted Cash Flow Section) yields a price of $240. Given NOC's strong recent growth relative to its competitors, I believe this is a low valuation; however, this could be because NOC is still in the early stages of delivering on its large contacts.

Relative Valuation

Northrop Grumman is currently trading at a P/E lower than that of its peers with a P/E TTM of 19.8 compared to an average of 22.8. The P/E NTM for NOC is 20.1 compared to the average of 18.8; investors are willing to pay more for NOC because it has better expected growth. NOC benefits from the B-21 contract and has relative safety from economic downturns because it has a consistent revenue source in the US government. NOC's P/B ratio is higher than the average of its comps; with the outliers LMT and BA removed. The higher P/B is because of the high ROE compared to comps. NOC has a ROE of 31.9% compared to the average of 29.4% for the comps; this ROE number does not include the outliers LMT and BA. The high ROE is a result of NOC increasing debt in recent years; Although NOC's debt to equity ratio is about the median versus the group (it has a wide range). NOC has a current P/CF of 13.8 which is lower than the average of 15.1. P/S for NOC is 1.74, above the average of 1.47 due to its slightly better margins.

Figure 21: NOC comparable companies

Ticker	Name	Current Price	Market Value	Price Change 1 day	1 Mo	3 Mo	6 Mo	52 Wk	YTD	Earnings Growth LTG	NTM	2014	2015	2016	2017	Pst 5yr	Beta	LT Debt/ Equity	S&P Rating	LTM Dividend Yield	Payout
NOC	NORTHROP GRUMMAN CORP	$232.58	$40,995	(0.0)	(6.8)	8.7	4.6	22.4	23.2	8.3	-1.1%	16.8%	6.6%	12.8%	3.2%	8.8%	0.57	110.8%	A	1.50%	29.0%
RTN	RAYTHEON CO	$142.00	$41,698	(1.0)	(5.0)	4.3	4.5	12.9	14.0	8.6	-4.9%	16.9%	-3.2%	10.5%	-0.7%	7.0%	0.59	51.0%	A	2.06%	38.3%
BA-GB	BAE SYSTEMS	$7.31	$23,213	(0.6)	(1.5)	12.9	12.9	17.0	18.4	6.3		-14.5%	0.0%	-16.9%	10.2%	0.0%	0.43			3.57%	
HO-FR	THALES	$97.17	$20,491	0.1	0.0	12.4	22.8	33.0	33.3	10.2		-24.7%	25.8%	10.7%	11.9%		0.55			1.53%	
GD	GENERAL DYNAMICS CORP	$172.66	$52,578	(0.3)	(1.5)	11.3	24.0	24.0	25.7	7.3	5.6%	11.4%	16.0%	7.8%	2.8%	5.9%	0.81	34.3%	A	1.76%	31.7%
LMT	LOCKHEED MARTIN CORP	$249.94	$73,227	(0.3)	(5.8)	4.3	0.7	13.7	15.1	8.6	-4.9%	17.0%	2.2%	6.6%	3.9%	9.0%	0.53	615.8%	A+	2.71%	51.8%
HRS	HARRIS CORP	$102.47	$12,735	(0.6)	(1.1)	11.9	22.8	17.2	17.9		107.9%	2.8%	10.9%	0.0%	1.8%		1.17	133.9%	B	2.01%	71.7%
BA	BOEING CO	$155.68	$96,080	(0.0)	3.4	18.2	19.9	6.3	7.7	11.1	38.6%	21.6%	-10.2%	-8.2%	31.9%	10.7%	1.13	470.3%	A-	2.80%	63.6%
Average			$45,127	(0.3)	(2.3)	10.5	14.0	18.3	19.4	8.6	23.5%	5.9%	6.0%	2.9%	8.1%	6.9%	0.72	236.0%		2.24%	47.7%
Median			$41,346	(0.3)	(1.5)	11.6	16.4	17.1	18.2	8.6	2.2%	14.1%	4.4%	7.2%	3.6%	7.9%	0.58	122.3%		2.04%	45.0%
SPX	S&P 500 INDEX	$2,239		(0.5)	1.8	3.3	6.7	8.5	9.5			8.7%	0.2%	3.4%	6.6%						

Ticker	Website	2015 ROE	P/B	P/E 2013	2014	2015	TTM	NTM	2016	2017E	2015 NPM	2015 P/S	OM	ROIC	EV/ EBIT	P/CF Current	P/CF 5-yr	Sales Growth NTM	STM	Pst 5yr	Book Equity
NOC	http://www.northropgrumman.com	31.9%	7.13	27.9	23.9	22.4	19.8	20.1	19.8	19.2	7.8%	1.74	12.8%	15.9%	13.1	13.8	9.3	3.9%	6.5%	-7.5%	$32.62
RTN	http://www.raytheon.com	18.9%	3.98	23.8	20.4	21.0	19.0	19.9	19.0	19.2	8.5%	1.79	12.6%	13.6%	14.2			4.3%	5.1%	-1.6%	$35.65
BA-GB	http://www.baesystems.com	59.2%	7.34	10.6	12.4	12.4			14.9	13.5	7.1%	0.88		16.0%	13.2	15.0	10.4			-4.5%	$1.00
HO-FR	http://www.thalesgroup.com	18.8%	4.36	22.0	29.2	23.2			20.9	18.7	5.8%	1.34	6.6%	14.3%	12.1	14.5	7.7			1.4%	$22.30
GD	http://www.generaldynamics.com	24.4%	4.65	24.6	22.1	19.0	18.4	17.4	17.6	17.2	8.8%	1.67	13.7%	20.5%	10.9	14.0	11.0	2.7%	2.3%	-0.6%	$37.16
LMT	http://www.lockheedmartin.com	144.5%	31.52	26.1	22.3	21.8	19.6	20.6	20.5	19.7	7.3%	1.59	11.2%	26.7%	15.2	15.4	10.7	-0.4%	4.5%	0.1%	$7.93
HRS	http://www.harris.com	23.2%	4.16	20.5	19.9	18.0	36.2	17.4	18.0	17.7	9.5%	1.71	18.4%	4.4%	10.8	17.7		-2.6%		4.7%	$24.60
BA	http://www.boeing.com	228.7%	46.13	22.0	18.1	20.2	23.7	17.1	22.0	16.7	5.0%	1.00	4.8%	32.5%	13.7	15.1	11.7	-2.6%	2.6%	8.4%	$3.38
Average		68.7%	13.66	22.2	21.0	19.7	22.8	18.8	19.1	17.7	7.5%	1.47	11.4%	18.0%	12.9	15.1	10.1	0.9%	4.2%	0.1%	
Median		28.1%	5.89	22.9	21.2	20.6	19.7	18.7	19.4	18.2	7.5%	1.63	12.6%	15.9%	13.2	15.0	10.6	1.1%	4.5%	-0.2%	
spx	S&P 500 INDEX			20.6	18.9	18.9			18.2	17.1											

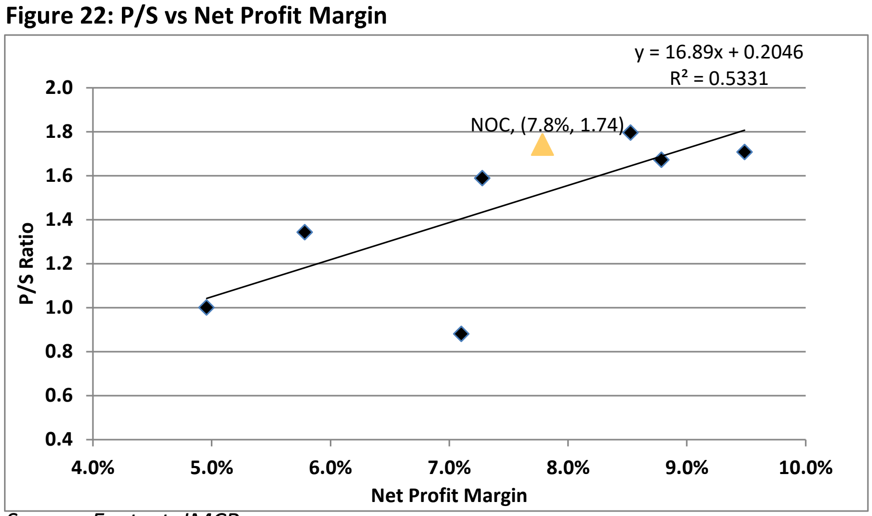
Source: Factset, IMCP

A more thorough analysis of P/S and net profit margin is shown in Figure 22. The calculated R^2 of the regression indicates that over 53% of sampled companies' P/S is explained by its net profit margins. NOC has the second highest P/S of its peers and the fourth highest net profit margin of this grouping. According to this measure NOC is slightly overvalued. Although, NOC can improve its net profit margin when the development of the B-21 is complete and starts manufacturing them.

- Estimated P/S = Estimated 2017 NPM (9.5%) x 16.89 + 0.2046 = 1.81
- Target Price = Estimated P/S (1.81) x 2017E Sales Per Share (133.83) = $242

Discounting back to the present at a 9.3% cost of equity leads to a target price of $221 using P/S.

Figure 22: P/S vs Net Profit Margin



Source: Factset, IMCP

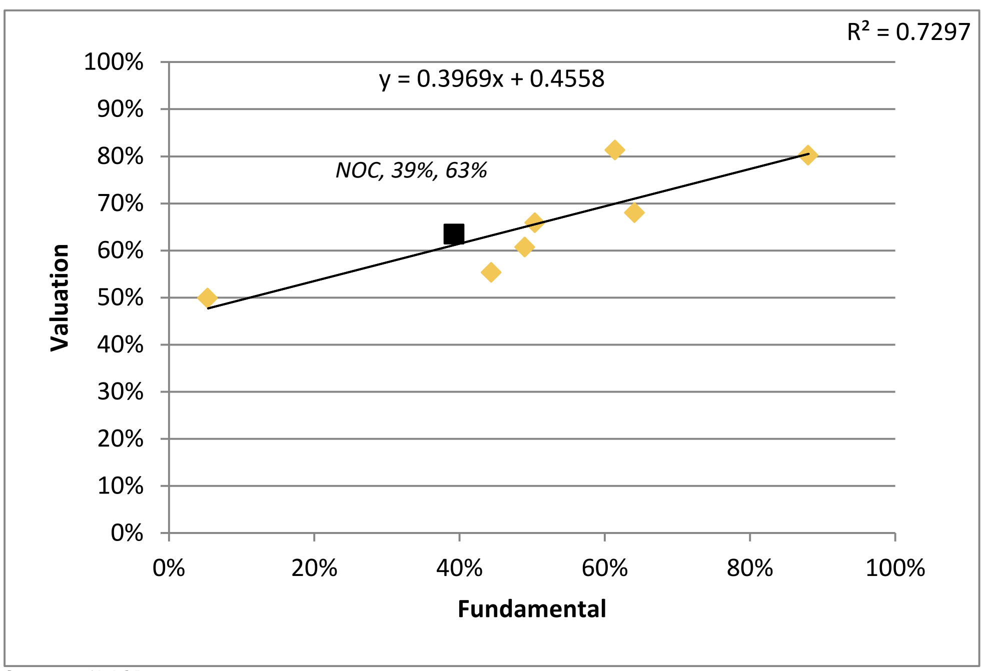
For a final comparison, I created a composite ranking of several valuation and fundamental metrics. Since the variables have different scales, each was converted to a percentile before calculating the composite score. A weighting of 50% past five years earning growth, 25% 2015 net profit margin, and 25% past 5 year sales growth for fundamentals was run against an equal weight of 33.3% each to P/B, P/S, P/CF for valuation. The regression line had an R^2 0.73. NOC was just above the line and that means NOC is slightly overvalued based on its fundamentals.

Figure 23: Composite valuation, % of range

		Fundamentals			Valuation				
	Weight	50.0%	25.0%	25.0%	33.3%	33.3%	33.3%		
Ticker	Name	Pst 5yr	2015 NPM	Pst 5yr	P/B	P/S	P/CF	Fund	Value
NOC	NORTHROP GRUMMAN CORP	82%	82%	-90%	15%	97%	78%	39%	63%
RTN	RAYTHEON CO	65%	90%	-19%	9%	100%	89%	50%	66%
BA-GB	BAE SYSTEMS	0%	75%	-53%	16%	49%	85%	5%	50%
HO-FR	THALES	50%	61%	17%	9%	75%	82%	44%	55%
GD	GENERAL DYNAMICS CORP	56%	93%	-7%	10%	93%	79%	49%	61%
LMT	LOCKHEED MARTIN CORP	84%	77%	2%	68%	88%	87%	61%	81%
HRS	HARRIS CORP	50%	100%	57%	9%	95%	100%	64%	68%
BA	BOEING CO	100%	52%	100%	100%	56%	85%	88%	80%

Source: IMCP

Figure 24: Composite relative valuation



Source: IMCP

Discounted Cash Flow Analysis (see appendix 6)

A three stage discounted cash flow model was also used to value NOC.

For the purpose of this analysis, the company's cost of equity was calculated to be 9.3% using the Capital Asset Pricing Model. The underlying assumptions used in calculating this rate are as follows:

- The risk free rate, as represented by the ten-year Treasury bond yield, is 2.60%.
- I calculated a beta of 0.91, this beta made sense because NOC is less risky than the market as it has a stable base of business so it should have a beta below 1.0.
- A long-term market rate of return of 10% was assumed, since historically, the market has generated an annual return of about 10%.

Given the above assumptions, the cost of equity is 9.3% = (2.6 + 0.91 (10.0 – 2.60)).

Stage One - The model's first stage simply discounts fiscal years 2017 and 2018 free cash flow to equity (FCFE). These per share cash flows are forecasted to be $10.30 and $10.70, respectively, without debt and cash. Discounting these cash flows, using the cost of equity calculated above, results in a value of $18.36 per share. Thus, stage one of this discounted cash flow analysis contributes $18.36 to value.

Stage Two - Stage two of the model focuses on fiscal years 2019 to 2023. During this period, FCFE is calculated based on revenue growth, NOPAT margin and capital growth assumptions. The resulting cash flows are then discounted using the company's 9.3% cost of equity. I assume 3.5% sales growth from 2019 through 2023. The ratio of NWC to sales will remain at 2018 levels, but NFA turnover will rise from 2.90 in 2016 to 3.47 in 2021 as a result of improvements in operations. Also, the NOPAT margin is expected remain the same from 2019 through 2023. Finally, after-tax interest is expected to drop to 3.5% growth per year from 2019 through 2023, because I assume that as interest rate are expected to rise NOC will pay off debt with FCF.

Figure 25: FCFE and discounted FCFE, 2017 – 2023

	2017	2018	2019	2020	2021	2022	2023
FCFE	$10.30	$10.70	$10.62	$10.99	$11.38	$11.78	$12.19
Discounted FCFE	$9.42	$8.95	$8.13	$7.69	$7.28	$6.90	$6.53

Source: IMCP

Added together these discounted cash flows total $36.53.

Stage Three – Net income for the years 2017 – 2023 is calculated based upon the same margin and growth assumptions used to determine FCFE in stage two. EPS is expected to grow from $12.72 in 2017 to $16.23 in 2023.

Figure 26: EPS estimates for 2017 – 2023

	2017	2018	2019	2020	2021	2022	2023
EPS	$12.72	$13.66	$14.14	$14.64	$15.15	$15.68	$16.23

Source: IMCP

Stage three of the model requires an assumption regarding the company's terminal price-to-earnings ratio. A P/E ratio of 19.2 is assumed at the end of NOC's terminal year, which is slightly below todays multiple. While this may be a high multiple at the end of 2023, one must consider what the market will price in today. A lower multiple may be better to calculate a fair value, but the stock will likely trade above this value due to its improving prospects. NOC's P/E over the last five years was only 12.69, but this is due to lower defense spending. P/E will increase greatly over the next few years because of the B-21 contract, increased need for drones, and a president who is likely to increase defense spending and keep it high. NOC deserves a higher P/E ratio than its peers because of the B-21 contract that should provide NOC with consistent sales.

Given the assumed terminal earnings per share of $16.23 and a price to earnings ratio of 19.2, a terminal value of $312 per share is calculated. Using the 9.3% cost of equity, this number is discounted back to a present value of $166.84.

Total Present Value – given the above assumptions and utilizing a three stage discounted cash flow model, an intrinsic value of $222 is calculated (18.36 + 36.53 + 166.84). Given NOC's current price of $235, this model indicates that the stock is slightly overvalued.

Scenario Analysis

Northrop Grumman is a stable company that, by the nature of its business, is not very hard to value. The US Government is the main source of NOC's sales and this means that sales should stay consistent for the company. Global conflict remains at an all-time high and NOC benefits from this conflict. I adjusted the DCF model for several scenarios.

Figure 27: Scenario Analysis

			Bull Case				
Expectations	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Beta	0.85						
Sales Growth	2.6%	3.0%	4.0%	4.5%	5.0%	5.0%	5.0%
Gross Margin	25.0%	25.5%					
EBIT Margin	14.5%	14.7%					
P/E	20.0						
					Value (P/E) beginning of 2017		$249.46
			Base Case				
Expectations	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Beta	0.91						
Sales Growth	2.6%	3.0%	3.5%	3.5%	3.5%	3.5%	3.5%
Gross Margin	24.6%	25.0%					
EBIT Margin	14.2%	14.4%					
P/E	19.2						
					Value (P/E) beginning of 2017		$ 221.73
			Bear Case				
Expectations	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Beta	1.00						
Sales Growth	2.6%	3.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Gross Margin	23.5%	23.0%					
EBIT Margin	13.8%	13.6%					
P/E	17.0						
					Value (P/E) beginning of 2017		$176.65

Source: IMCP

Bull Case – During the bull case, I anticipate similar sales growth for years 2017 and 2018 to the base case. For years 2019 through 2023, sales increase due to a variety of factors related to global security. An increase in global conflict would influence government officials to raise defense spending and NOC would benefit with new contracts supplying aircraft, unmanned vehicles, defense systems, and information systems. A Donald Trump presidency could usher in a bull case for NOC as he has been supportive of spending more on national defense, and has been supportive of using drones to monitor the US Mexico border. Beta would decrease during the bull scenario, as more long-term contracts would lessen NOC's risk to possible economic downturns. P/E would increase to 20.0 as investors see NOC as a good investment with increased sales. The increased sales would increase gross margins and EBIT margins as well.

Bear Case – During the bear case, I anticipate similar sales growth for years 2017 and 2018 to the base case. For years 2019 through 2023 sales growth decreases to 2%. A few factors could cause a bear case for NOC. The first cause of a bear case could be a long period of peace, which would reduce the need for defense spending. The second cause for a bear case would be concerns over the budget deficit, the US may reign in its spending which could drastically reduce its defense spending. I expected sales to still grow as NOC is providing the B-21 contract to replace the aircraft and I assume that even if the number of aircraft declines the government would not cancel the contract all together. Beta would increase to 1.00 as NOC becomes more risky with lowered sales growth. P/E would reduce to 17.0 to reflect investors' concerns over the reduced defense spending. The gross margin would decrease, as would the EBIT margin as NOC is losing sales.

Business Risks

Although I have many reasons to be optimistic about Northrop Grumman, there are several concerns that would explain why I feel the stock may be overpriced.

<u>Looming Budget Concerns:</u>

The US budget is a mess and many politicians are arguing for defense cuts. NOC has over 99% of its business related to defense, and with over 80% of its sales annually coming from the US government, NOC must be concerned about possible defense budget cuts. Projected growth will be too high if defense spending isn't increased.

<u>B-21 Raider Contract Issues:</u>

Politicians have raised concerns over the secrecy surrounding the specifics on the cost to build a B-21 which remains secretive to protect the project. Officials claim that if they released specifics on the cost to build the new bomber then foreign countries could figure out how the stealth bomber is built. The B-21 is still under development and unforeseen cost spikes in raw materials or reductions in efficiencies could hurt NOC's margins or reduce sales growth.

<u>Unmanned Vehicle Concerns:</u>

I expected unmanned vehicles/ drones to play a larger role in NOC's growth as their use in modernization of the military is increased, but if the growth in drone usage for defense isn't as fast as expected then my sales growth estimates may not be achieved.

<u>The Graying of the Aerospace Industry:</u>

Looming retirements and a shrinking number of qualified candidates entering the aerospace industry threatens to cause worker shortages and could result in NOC's inability to complete its contracts. In order to attract new talent NOC may have to increase salaries to be more competitive with companies like Google or Amazon.

Appendix 1: Income Statement

Income Statements (Millions)							
Items	2012	2013	2014	2015	2016E	2017E	2018E
Sales	25,218	24,661	23,979	23,526	24,042	24,673	25,423
Costs of goods sold	19,638	19,282	18,378	17,884	18,248	18,603	19,067
Gross Profit	5,580	5,379	5,601	5,642	5,794	6,069	6,356
Operating Expense							
SG&A, R&D, and other	2,403	2,259	2,382	2,551	2,428	2,566	2,695
Earniung before interst & Tax	3,177	3,120	3,219	3,091	3,366	3,504	3,661
Interest expense	212	257	282	301	313	329	345
Earning before tax	2,965	2,863	2,937	2,790	3,053	3,174	3,316
Taxes	987	911	868	800	846	829	866
Net Income	$1,978	$1,952	$2,069	$1,990	$2,207	$2,346	$2,450
Divdends							
Basic Shares	248.6	229.6	208.8	189.4	189.4	184.4	179.3
Earnings per share	$7.96	$8.50	$9.91	$10.51	$11.65	$12.72	$13.66
Dividends per share	$2.15	$2.37	$2.70	$3.18	$3.28	$3.47	$3.68

Appendix 2: Balance Sheet

Balance Sheet (Millions)							
Items	Jan-12	Jan-13	Jan-14	Jan-15	Jan-16	Jan-17	Jan-18
ASSETS							
Current assets							
Cash	3,862	5,150	3,863	2,319	3,537	3,550	3,564
Operating assets ex cash	4,530	4,338	4,321	4,015	4,255	4,367	4,500
Operating assets	8,392	9,488	8,184	6,334	7,793	7,917	8,063
Operating liabilities	6,056	5,815	5,892	5,457	5,722	5,872	6,051
NOWC	2,336	3,673	2,292	877	2,071	2,045	2,013
NOWC ex cash (NWC)	(1,526)	(1,477)	(1,571)	(1,442)	(1,467)	(1,505)	(1,551)
NFA	18,151	16,893	18,388	18,120	18,517	19,003	19,581
Invested capital	20,487	20,566	20,680	18,997	20,588	21,048	21,594
Total assets	$26,543	$26,381	$26,572	$24,454	$26,310	$26,921	$27,645
Short-term and long-term debt	3,930	5,928	5,925	6,416	6,416	6,416	6,416
Other liabilities	7,043	4,018	7,520	7,059	7,064	7,069	7,074
Equity	9,514	10,620	7,235	5,522	7,108	7,563	8,104
Total supplied capital	20,487	20,566	20,680	18,997	20,588	21,048	21,594
Total liabilities and equity	$26,543	$26,381	$26,572	$24,454	$26,310	$26,921	$27,645

Appendix 3: Sales Forecast

Sales							
Items	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Sales	$25,218	$24,661	$23,979	$23,526	$24,042	$24,673	$25,423
Growth		*-2.2%*	*-2.8%*	*-1.9%*	*2.2%*	*2.6%*	*3.0%*
Aerospace Systems	9,977	10,014	9,997	10,004	10,304	10,654	11,059
Growth		*0.4%*	*-0.2%*	*0.1%*	*3.0%*	*3.4%*	*3.8%*
% of sales	*39.6%*	*40.6%*	*41.7%*	*42.5%*	*42.9%*	*43.2%*	*43.5%*
Electronic Systems	6,950	7,149	6,951	6,842	6,945	7,066	7,207
Growth		*2.9%*	*-2.8%*	*-1.6%*	*1.5%*	*1.8%*	*2.0%*
% of sales	*27.6%*	*29.0%*	*29.0%*	*29.1%*	*28.9%*	*2.0%*	*28.3%*
Information Systems	7,356	6,596	6,222	5,894	5,971	6,078	6,200
Growth		*-10.3%*	*-5.7%*	*-5.3%*	*1.3%*	*1.8%*	*2.0%*
% of sales	*29.2%*	*26.7%*	*25.9%*	*25.1%*	*24.8%*	*24.6%*	*6.0%*
Technical Services	3,019	2,843	2,799	2,838	2,895	2,967	3,071
Growth		*-5.8%*	*-1.5%*	*1.4%*	*2.0%*	*2.5%*	*3.5%*
% of sales	*12.0%*	*11.5%*	*11.7%*	*12.1%*	*12.0%*	*12.0%*	*12.1%*
Intersegment eliminations	(2,084)	(1,941)	(1,990)	(2,052)	(2,073)	(2,093)	(2,114)
Growth		*-6.9%*	*2.5%*	*3.1%*	*1.0%*	*1.0%*	*1.0%*
% of sales	*-8.3%*	*-7.9%*	*-8.3%*	*-8.7%*	*-8.6%*	*-8.5%*	*-8.3%*
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
United States	22,268	21,278	20,085	19,458	20,123	20,725	21,381
Growth		*-4.4%*	*-5.6%*	*-3.1%*	*3.4%*	*3.0%*	*3.2%*
% of sales	*88.3%*	*86.3%*	*83.8%*	*82.7%*	*83.7%*	*84.0%*	*84.1%*
International	2,085	2,493	3,045	3,339	3,366	3,392	3,458
Growth		*19.6%*	*22.1%*	*9.7%*	*0.8%*	*0.8%*	*1.9%*
% of sales	*8.3%*	*10.1%*	*12.7%*	*14.2%*	*14.0%*	*13.8%*	*13.6%*
Other Customers	865	890	849	729	541	555	572
Growth		*2.9%*	*-4.6%*	*-14.1%*	*-25.8%*	*2.6%*	*3.0%*
% of sales	*3.4%*	*3.6%*	*3.5%*	*3.1%*	*2.3%*	*2.3%*	*2.3%*

Appendix 4: Ratios

Ratios	2012	2013	2014	2015	2016E	2017E	2018E
Profitability							
Gross margin	22.1%	21.8%	23.4%	24.0%	24.1%	24.6%	25.0%
Operating (EBIT) margin	12.6%	12.7%	13.4%	13.1%	14.0%	14.2%	14.4%
Net profit margin	7.8%	7.9%	8.6%	8.5%	9.2%	9.5%	9.6%
Activity							
NFA (gross) turnover		1.41	1.36	1.29	1.31	1.32	1.32
Total asset turnover		0.93	0.91	0.92	0.95	0.93	0.93
Liquidity							
Op asset / op liab	1.39	1.63	1.39	1.16	1.36	1.35	1.33
NOWC Percent of sales		12.2%	12.4%	6.7%	6.1%	8.3%	8.0%
Solvency							
Debt to assets	14.8%	22.5%	22.3%	26.2%	24.4%	23.8%	23.2%
Debt to equity	41.3%	55.8%	81.9%	116.2%	90.3%	84.8%	79.2%
Other liab to assets	26.5%	15.2%	28.3%	28.9%	26.8%	26.3%	25.6%
Total debt to assets	41.3%	37.7%	50.6%	55.1%	51.2%	50.1%	48.8%
Total liabilities to assets	64.2%	59.7%	72.8%	77.4%	73.0%	71.9%	70.7%
Debt to EBIT	1.24	1.90	1.84	2.08	1.91	1.83	1.75
EBIT/interest	14.99	12.14	11.41	10.27	10.75	10.65	10.61
Debt to total net op capital	19.2%	28.8%	28.7%	33.8%	31.2%	30.5%	29.7%
ROIC							
NOPAT to sales		8.6%	9.5%	9.4%	10.1%	10.5%	10.6%
Sales to IC		120.1%	116.3%	118.6%	121.5%	118.5%	119.2%
Total		10.4%	11.0%	11.1%	12.3%	12.4%	12.7%
Total using EOY IC	10.3%	10.3%	11.0%	11.6%	11.8%	12.3%	12.5%
ROE							
5-stage							
EBIT / sales		12.7%	13.4%	13.1%	14.0%	14.2%	14.4%
Sales / avg assets		0.93	0.91	0.92	0.95	0.93	0.93
EBT / EBIT		91.8%	91.2%	90.3%	90.7%	90.6%	90.6%
Net income /EBT		68.2%	70.4%	71.3%	72.3%	73.9%	73.9%
ROA		7.4%	7.8%	7.8%	8.7%	8.8%	9.0%
Avg assets / avg equity		2.63	2.97	4.00	4.02	3.63	3.48
ROE		19.4%	23.2%	31.2%	35.0%	32.0%	31.3%
3-stage							
Net income / sales		7.9%	8.6%	8.5%	9.2%	9.5%	9.6%
Sales / avg assets		0.93	0.91	0.92	0.95	0.93	0.93
ROA		7.4%	7.8%	7.8%	8.7%	8.8%	9.0%
Avg assets / avg equity		2.63	2.97	4.00	4.02	3.63	3.48
ROE		19.4%	23.2%	31.2%	35.0%	32.0%	31.3%
Payout Ratio		27.9%	27.2%	30.3%	28.1%	27.3%	26.9%
Retention Ratio		72.1%	72.8%	69.7%	71.9%	72.7%	73.1%
Sustainable Growth Rate		14.0%	16.9%	21.7%	25.1%	23.3%	22.9%

Appendix 5: Cash Flow Statement

Cash Flow Statement	2013	2014	2015	2016E	2017E	2018E
Cash from Operatings (understated - depr'n added to net assets)						
Net income	1,952	2,069	1,990	2,207	2,346	2,450
Change in Net Working Capital ex cash	(49)	94	(129)	25	38	46
Cash from operations	$1,903	$2,163	$1,861	$2,232	$2,384	$2,496
Cash from Investing (understated - depr'n added to net assets)						
Change in NFA	1,258	(1,495)	268	(397)	(486)	(578)
Cash from investing	$1,258	($1,495)	$268	($397)	($486)	($578)
Cash from Financing						
Change in Short-Term and Long-Term Debt	1,998	(3)	491	0	0	0
Change in Other liabilities	(3,025)	3,502	(461)	5	5	5
Dividends	(545)	(563)	(603)	(621)	(640)	(660)
Change in Equity ex NI and Dividends	(301)	(4,891)	(3,100)	0	(1,250)	(1,250)
Cash from financing	($1,873)	($1,955)	($3,673)	($616)	($1,885)	($1,905)
Change in Cash	1,288	(1,287)	(1,544)	1,218	13	13
Beginning Cash	3,862	5,150	3,863	2,319	3,537	3,550
Ending Cash	$5,150	$3,863	$2,319	$3,537	$3,550	$3,564

Appendix 6: 3- stage DCF Model

3-stage Discounted Cash Flow							
	Year						
	1	2	3	4	5	6	7
	First Stage		Second Stage				
Cash flows	2017	2018	2019	2020	2021	2022	2023
Sales Growth	*2.6%*	*3.0%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*
NOPAT / S	*10.5%*	*10.6%*	*10.6%*	*10.6%*	*10.6%*	*10.6%*	*10.6%*
S / NWC	*(16.39)*	*(16.39)*	*(16.39)*	*(16.39)*	*(16.39)*	*(16.39)*	*(16.39)*
S / NFA (EOY)	*1.30*	*1.30*	*1.30*	*1.30*	*1.30*	*1.30*	*1.30*
S / IC (EOY)	*1.41*	*1.41*	*1.41*	*1.41*	*1.41*	*1.41*	*1.41*
ROIC (EOY)	*14.8%*	*15.0%*	*15.0%*	*15.0%*	*15.0%*	*15.0%*	*15.0%*
ROIC (BOY)		*15.5%*	*15.5%*	*15.5%*	*15.5%*	*15.5%*	*15.5%*
Share Growth		*-2.7%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Sales	$24,673	$25,423	$26,313	$27,234	$28,187	$29,174	$30,195
NOPAT	$2,589	$2,705	$2,800	$2,898	$2,999	$3,104	$3,213
Growth		*4.5%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*
- Change in NWC	-38	-46	-54	-56	-58	-60	-62
NWC	*-1505*	*-1551*	*-1605*	*-1661*	*-1719*	*-1780*	*-1842*
Growth NWC		*3.0%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*
- Chg NFA	486	578	685	709	734	760	786
NFA EOY	*19,003*	*19,581*	*20,267*	*20,976*	*21,710*	*22,470*	*23,256*
Growth NFA		*3.0%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*
Total inv in op cap	448	532	631	653	676	700	724
Total net op cap	17498	18030	18662	19315	19991	20690	21415
FCFF	$2,141	$2,173	$2,169	$2,245	$2,323	$2,405	$2,489
% of sales	*8.7%*	*8.5%*	*8.2%*	*8.2%*	*8.2%*	*8.2%*	*8.2%*
Growth		*1.5%*	*-0.2%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*
- Interest (1-tax rate)	243	255	264	273	283	293	303
Growth		*4.9%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*
FCFE w/o debt	$1,898	$1,918	$1,905	$1,972	$2,041	$2,112	$2,186
% of sales	*7.7%*	*7.5%*	*7.2%*	*7.2%*	*7.2%*	*7.2%*	*7.2%*
Growth		*1.0%*	*-0.7%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*
/ No Shares	184.4	179.3	179.3	179.3	179.3	179.3	179.3
FCFE	$10.30	$10.70	$10.62	$10.99	$11.38	$11.78	$12.19
Growth		*3.9%*	*-0.7%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*
* Discount factor	0.91	0.84	0.77	0.70	0.64	0.59	0.54
Discounted FCFE	$9.42	$8.95	$8.13	$7.69	$7.28	$6.90	$6.53
Third Stage							
Terminal value P/E							
Net income	$2,346	$2,450	$2,536	$2,625	$2,717	$2,812	$2,910
% of sales	*9.5%*	*9.6%*	*9.6%*	*9.6%*	*9.6%*	*9.6%*	*9.6%*
EPS	$12.72	$13.66	$14.14	$14.64	$15.15	$15.68	$16.23
Growth		*7.4%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*
Terminal P/E							19.20
* Terminal EPS							$16.23
Terminal value							$311.59
* Discount factor							0.54
Discounted terminal value							$166.84

Summary		
First stage	$18.36	Present value of first 2 year cash flow
Second stage	$36.53	Present value of year 3-7 cash flow
Third stage	$166.84	Present value of terminal value P/E
Value (P/E)	**$221.73**	= value at beg of fiscal yr 2017

Appendix 7: Comparable Companies

		Current	Market	Price Change						Earnings Growth								LT Debt/ S&P		LTM Dividend	
Ticker	Name	Price	Value	1 day	1 Mo	3 Mo	6 Mo	52 Wk	YTD	LTG	NTM	2014	2015	2016	2017	Pst 5yr	Beta	Equity	Rating	Yield	Payout
NOC	NORTHROP GRUMMAN CORP	$232.58	$40,995	(0.0)	(6.8)	8.7	4.6	22.4	23.2	8.3	-1.1%	16.8%	6.6%	12.8%	3.2%	8.8%	0.57	110.8%	A	1.50%	29.0%
RTN	RAYTHEON CO	$142.00	$41,698	(1.0)	(5.0)	4.3	4.5	12.9	14.0	8.6	-4.9%	16.9%	-3.2%	10.5%	-0.7%	7.0%	0.59	51.0%	A	2.06%	38.3%
BA-GB	BAE SYSTEMS	$7.31	$23,213	(0.6)	(1.5)	12.9	12.9	17.0	18.4	6.3		-14.5%	0.0%	-16.9%	10.2%	0.0%	0.43			3.57%	
HO-FR	THALES	$97.17	$20,491	0.1	0.0	12.4	22.8	33.0	33.3	10.2		-24.7%	25.8%	10.7%	11.9%		0.55			1.53%	
GD	GENERAL DYNAMICS CORP	$172.66	$52,578	(0.3)	(1.5)	11.3	24.0	24.0	25.7	7.3	5.6%	11.4%	16.0%	7.8%	2.8%	5.9%	0.81	34.3%	A	1.76%	31.7%
LMT	LOCKHEED MARTIN CORP	$249.94	$73,227	(0.3)	(5.8)	4.3	0.7	13.7	15.1	8.6	-4.9%	17.0%	2.2%	6.6%	3.9%	9.0%	0.53	615.8%	A+	2.71%	51.8%
HRS	HARRIS CORP	$102.47	$12,735	(0.6)	(1.1)	11.9	22.8	17.2	17.9		107.9%	2.8%	10.9%	0.0%	1.8%		1.17	133.9%	B	2.01%	71.7%
BA	BOEING CO	$155.68	$96,080	(0.0)	3.4	18.2	19.9	6.3	7.7	11.1	38.6%	21.6%	-10.2%	-8.2%	31.9%	10.7%	1.13	470.3%	A-	2.80%	63.6%
Average			$45,127	(0.3)	(2.3)	10.5	14.0	18.3	19.4	8.6	23.5%	5.9%	6.0%	2.9%	8.1%	6.9%	0.72	236.0%		2.24%	47.7%
Median			$41,346	(0.3)	(1.5)	11.6	16.4	17.1	18.2	8.6	2.2%	14.1%	4.4%	7.2%	3.6%	7.9%	0.58	122.3%		2.04%	45.0%
SPX	S&P 500 INDEX	$2,239		(0.5)	1.8	3.3	6.7	8.5	9.5			8.7%	0.2%	3.4%	6.6%						

		2015		P/E							2015	2015			EV/	P/CF	P/CF	Sales Growth			Book
Ticker	Website	ROE	P/B	2013	2014	2015	TTM	NTM	2016	2017E	NPM	P/S	OM	ROIC	EBIT	Current	5-yr	NTM	STM	Pst 5yr	Equity
NOC	http://www.northropgrumman.com	31.9%	7.13	27.9	23.9	22.4	19.8	20.1	19.8	19.2	7.8%	1.74	12.8%	15.9%	13.1	13.8	9.3	3.9%	6.5%	-7.5%	$32.62
RTN	http://www.raytheon.com	18.9%	3.98	23.8	20.4	21.0	19.0	19.9	19.0	19.2	8.5%	1.79	12.6%	13.6%	14.2			4.3%	5.1%	-1.6%	$35.65
BA-GB	http://www.baesystems.com	59.2%	7.34	10.6	12.4	12.4			14.9	13.5	7.1%	0.88		16.0%	13.2	15.0	10.4			-4.5%	$1.00
HO-FR	http://www.thalesgroup.com	18.8%	4.36	22.0	29.2	23.2			20.9	18.7	5.8%	1.34	6.6%	14.3%	12.1	14.5	7.7			1.4%	$22.30
GD	http://www.generaldynamics.com	24.4%	4.65	24.6	22.1	19.0	18.4	17.4	17.6	17.2	8.8%	1.67	13.7%	20.5%	10.9	14.0	11.0	2.7%	2.3%	-0.6%	$37.16
LMT	http://www.lockheedmartin.com	144.5%	31.52	26.1	22.3	21.8	19.6	20.6	20.5	19.7	7.3%	1.59	11.2%	26.7%	15.2	15.4	10.7	-0.4%	4.5%	0.1%	$7.93
HRS	http://www.harris.com	23.2%	4.16	20.5	19.9	18.0	36.2	17.4	18.0	17.7	9.5%	1.71	18.4%	4.4%	10.8	17.7		-2.6%		4.7%	$24.60
BA	http://www.boeing.com	228.7%	46.13	22.0	18.1	20.2	23.7	17.1	22.0	16.7	5.0%	1.00	4.8%	32.5%	13.7	15.1	11.7	-2.6%	2.6%	8.4%	$3.38
Average		68.7%	13.66	22.2	21.0	19.7	22.8	18.8	19.1	17.7	7.5%	1.47	11.4%	18.0%	12.9	15.1	10.1	0.9%	4.2%	0.1%	
Median		28.1%	5.89	22.9	21.2	20.6	19.7	18.7	19.4	18.2	7.5%	1.63	12.6%	15.9%	13.2	15.0	10.6	1.1%	4.5%	-0.2%	
spx	S&P 500 INDEX			20.6	18.9	18.9			18.2	17.1											

Appendix 8: Porter's 5 Forces

Threat of New Entrants – Very Low

The defense sector is extremely difficult for new entrants. Northrop Grumman specifically develops highly advanced aircraft and weapon systems; massive start-up costs and the United States Government regulations prevent new firms from entering the sector.

Threat of Substitutes – Very Low

Northrop Grumman develops highly advanced aircraft and weapon systems. It invests heavily in R&D to maintain competitiveness with other aerospace / defense companies. NOC has the most advanced stealth bomber on the market and won the contract to make the next generation of stealth bombers; this makes NOC very resistant to substitutes.

Supplier Power – Moderate

Although Northrop Grumman develops a lot of parts itself, NOC does need to order parts such as electronics from other manufacturers. The specialized nature of these parts can make the cost high for NOC.

Buyer Power- High

About 80% of Northrop's sales are to the United States Government. Such a high concentration of sales going to one customer makes the buyer's power high. The US government has the right to stop a work under a contract for a limited time for its convenience. With the US government as its main customer, NOC is beholden to it more than other customers.

Intensity of Competition – High

The defense sector although small, has high competition as most of the companies have one primary costumer, the US government, that they need to win contracts from. When the US government needs a new product, it allows defense contractors to offer bids to complete the contracts, sometimes worth well into the billions of dollars. NOC won the LRS-B contract to build the B-21 competing against the combined forces of Lockheed Martin and Boeing; after LMT and BA lost the contract they disputed it in court but ultimately NOC was deemed to have properly won the contract.

Appendix 9: SWOT Analysis

Strengths	Weaknesses
Government Relationships B-21 Contract Unmanned Vehicles	US Government Largest Customer Possible B-21 Cancelations Low International Sales
Opportunities	**Threats**
Next Generation Fighter Global Conflict/ DoD budget Increase Greater Drone Usage	Aging Workforce / Worker Shortages Budget Cuts / US Deficit Concerns Peace