CATÓLICA LISBON
BUSINESS & ECONOMICS

Equity Valuation: The Boeing Company

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Dissertation submitted in partial fulfilment of requirements for the MSc in Finance, at the Universidade Católica Portuguesa, June 2020.

Abstract

This Master Thesis object is to place a value for the Equity of The Boeing Company (BA), one of the World's largest aerospace and defense company's. Out of the set of valuation methodologies, the Discounted Cash Flow ("DCF") by means of a Free Cash Flow to Firm ("FCFF") and Relative Valuation through EV/EBITDA and P/E, will be used. Emphasis will be given to the FCFF. The Boeing Company is facing challenging times, in light of the novel Coronavirus crisis. On top of a previous crisis the company faced by the grounding of it's most important airplane, the 737 MAX. Given the high macroeconomic and company specific uncertainties, three scenarios and sensitivity analysis to critical variables were performed. The analysis performed, sustains the basis to the issue of a HOLD recommendation, with a price target of $132.5 for 30th June 2020. The scenarios considered and multiples approach, allow for a wider scope range between $92.8 and $173.5 for the PPS. The results were compared with those of a report issued by Refinitiv.

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Keywords: Equity Research; The Boeing Company; Aerospace and Defense;

Resumo

O objecto desta tese de mestrado é atribuir um valor ao capital prórprio da The Boeing Company (BA), uma dais maiores empresas do Mundo de aeroespacial e defesa. Da panóplia de metodoligias de avaliação de empresas, of Fluxos de Caixa Descontados sob meio do Free Cash Flow to Firm e avaliação relativa com base em múltiplos de mercado, designadamente EV/EBITDA e P/E, foram utilizados. Ênfase será dado aos Fluxos de Caixa Descontados. The Boeing Company enfrenta um panorama desafiante, derivado da crise do novo Coronavirus. Adicionalmente, a empresa já enfrentava uma crise decorrente da proibição de voo do seu mais importante avião, o 737 MAX. Dado as incertezas macroeconomicas e idiosincráticas, foram considerados 3 cenários a análises de sensibilidade a variáveis críticas foram realizadas. O estudo realizado, sustenta a base de emissão de uma recomendação de MANTER, com um preço alvo de $132.5 para a data de 30 de Junho de 2020. Os cenários analisados e a avaliação relativa, permitem uma perspectiva mais ampla que culmina numa intervalo de valores para o Preço por Ação de $92.8 a $173.5. Os resultados foram comparados com os de um relatório emitido pela Refinitiv.

Título da Tese: Equity Valuation: The Boeing Company

Autor: João Pedro Rocha Alves Alvim de Castro

Palavras Chave: Avaliação de Empresas; The Boeing Company; Aeroespacial e Defesa;

Acknowledgements

This Master Thesis represents the end of a very important stage in my life as a student and the beginning of a new journey as a professional. It was a challenging, demanding and fast paced experience as well as enriching and fulfilling.

I would like to acknowledge the importance of my advisor, José Carlos Tudela Martins, for his availability, responsiveness, meaningful insights throughout this process.

Additionally, I want to express my gratefulness to my parents, Maria Leonor Rocha Alves and Pedro Alvim de Castro, as well as my sister, Filipa Alvim de Castro, for their support, motivation and encouragement.

Last but not least, I thank my girlfriend, Ana Carolina Fonseca, and my dear friends and colleagues Patricia Mirco, Alexandra Paiva, Beatriz Cruz, Jorge Videira, and Francisco Gonçalves.

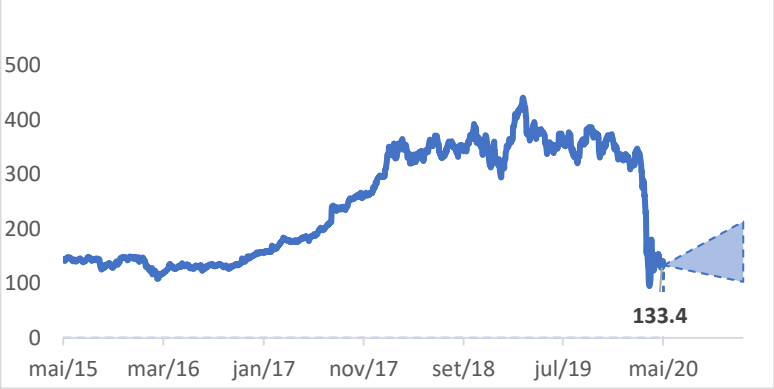
The Boeing Company

Recommendation: Hold
Ticker: BA
Stock Exchange: NYSE

Target Price: $132.5
Current Price: $133.4[1]
Difference: (0.7%)

Country: United States
Sector: Industrials
Industry: Aerospace & Defense

Boeing is facing several challenges, which have already been priced in. The company is highly sensitive to the ability of surpassing such critical challenges.



Valuation Date: 20th June 2020	
Base Case	**$132.5**
Best Case	**$173.5**
Worst Case	**$92.8**
EV/EBITDA	**$103.3**
P/E	**$95.2**

Target Price is $132.5, although given the volatile environment the possibility of favorable developments leads to a best case scenario PPS of $173.5, which represents a 30.93% upside. The risk is at a fair price given the downside of a worst case scenario yielding a PPS of $92.8, which represents a 29.95% downside.

(in $ bn)	2018	2019	2020P	2021P	2022P	2023P	2024P	2025P
Revenues	101.1	76.6	58.3	78.8	103.9	115.3	120.5	124.7
EBITDA	14.2	0.7	(15.5)	(3.0)	9.5	14.5	15.8	15.5
EBITDA %	14.0%	1.0%	(26.5%)	(3.8%)	9.1%	12.6%	13.1%	12.4%
Net Debt	6.2	17.8	34.9	37.2	46.9	37.8	23.9	15.6
Net Debt/ EBITDA	0.98x	37.19x	-	-	5.96x	3.26x	2.11x	1.62x

[1] Reference date as of 02-05-2020.

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1. Introduction

This dissertation begins with a Literature Review, in which the set of valuation methodologies are described, critically analyzed and define which ones will be used in this equity valuation. These include the DCF, through the FCFF and the relative valuation through the EV/EBITDA and P/E multiples.

Afterwards, there is a company overview of Boeing and a description of it's four business segments, BCA, BDS, BGS and BC. Followed by a business overview with a consolidated financial and operational analysis as well as on a business segment basis. To complement, there is an industry analysis of the Global Aerospace and Defense, an overview of competitors and market share coupled with detailed analysis of each segment within the Aerospace and Defense industry.

This leads to the valuation chapter, in which all the necessary estimated variables in the Income Statement, Balance Sheet and Cash Flow Statement are thoroughly explained and displayed in visual elements such as figures and charts. This business plan forms the basis for the FCFF which is also explained and lead to a final PPS, named the base case. Relative valuation is also performed. Given the macroeconomic and idiosyncratic uncertainties facing Boeing, in light of the novel Coronavirus and 737 Max Grounding crisis, there is a sensitivity analysis to critical assumptions made during the process. To synthetize the sensitivity analysis, two additional scenarios are formed in which these critical variables assume more optimistic values (best case) and more pessimistic values (worst case)

To conclude, a comparison between this equity valuation and a valuation report issued by Refinitiv is performed, as key outputs of this research are highlighted.

2. Literature Review

2.1 Introduction

In a broad perspective, there are four groups of valuation methods. Firstly, the Discounted Cash Flows valuation, which determines the value of an asset based upon the present value of expected future Cash Flows. Secondly, Liquidation and Accounting valuation, which relies on valuing the asset based on accounting or book value as starting point. Followed by relative valuation methods, which determine the asset's worth by comparing it with the price of similar assets, using a common variable, e.g. earnings, cash flows, book value or sales. Lastly, contingent claim valuation, which uses option pricing models to appraise the value of assets that share option characteristics. (Damodaran A. , 2007)

2.2 Discounted Cash Flows Valuation

The rationale supporting the discounted cash flows valuation is that the value of any given asset is derived from the future cash flows it is expected to generate, discounted back to the present moment at a discount rate which reflects the risk associated with these cash flows.

2.2.1 Free Cash Flow Models

2.2.1.1 Free Cash Flow to Firm ("FCFF")

According to (Modigliani & Miller, 1958), the value of a firm can be determined by discounting its after-tax operating cash flows to the present value, using the firm's cost of capital as discount rate. (Pinto, Henry, Robinson, & Stowe, 2010) state that the "FCFF is the cash flow available to all the company's available suppliers of capital after all operating expenses (including taxes) have been paid." Suppliers of capital comprise shareholders and debtholders. There are two possible methodologies to arrive at FCFF. One, through the cash flow statement, with the operational cash flow as starting point (equation 1) and the second is through the income statement, starting by the net income (equation 2).

$$FCFF = Cash\ Flow\ from\ Operations + Interest\ expense * (1 - Tax\ Rate) - Investment\ in\ fixed\ capital$$

Equation 1 FCFF through the Cash Flow Statement (Pinto et al., 2010)

$$FCFF = Net\ Income + Net\ noncash\ charges + Interest\ Expense * (1 - Tax\ rate) - Investment\ in\ fixed\ capital - Investment\ in\ working\ capital$$

Equation 2 FCFF through the Income Statement (Pinto et al., 2010)

This methodology implies discounting all Free Cash Flows ("FCF") to both suppliers of capital, shareholders and debtholders, using as discount rate the Weighted Average Cost of Capital ("WACC"). The WACC represents the after tax required rate of return for both shareholders and debtholders, weighted by the proportion of each type of capital in the company's capital structure. To use this discount rate, we are implying a constant capital structure over the period. Therefore, we should make sure there are not foreseen material changes to the capital structure.

$$WACC = \frac{Debt}{Debt + Equity} * kd * (1 - t_c) + \frac{Equity}{Debt + Equity} * ke$$

Equation 3 Weighted Average Cost of Capital formula.

Where:

- Debt: Market Value of Debt
- Equity: Market Value of Equity
- K_d: Cost of debt (required rate of return for debtholders)
- K_e: Cost of equity (required rate of return for shareholders)
- t_c: Corporate tax rate

After determining these two inputs, and instead of breaking the model in several parts, a general approach can be reached. In the most general form, the value of the firm can be presented as the value of expected free cash flow to the firm.

$$Value\ of\ Firm = \sum_{t=1}^{t=\infty} \frac{FCFF_t}{(1 + WACC)^t}$$

Equation 4 Value of Firm (Damodaran, 2007)

Where:

- $FCFF_t$: $Free\ Cash\ Flow\ to\ Firm\ in\ Year\ t$

- $WACC$: $Weighted\ average\ cost\ of\ capital$

If the firm gets to at a steady state after n years and starts to grow at a stable growth rate g_n afterwards, the value of the firm can be arrived at through:

$$Value\ of\ Operating\ Assets\ of\ the\ Firm = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1+WACC)^t} + \frac{\left(\frac{FCFF_{n+1}}{(WACC - g_n)}\right)}{(1+WACC)^n}$$

Equation 5 Value of Operating Assets of Firm (Damodaran, 2007)

Where:

- n: Number of years until firm arrives at steady state ("Explicit Period")
- g_n: Cash Flow perpetual growth rate

2.2.1.2 Free Cash Flow to Equity ("FCFE")

FCFE comprises all free cash flow available to shareholders, after debt service and reinvestments are made. It may be seen as similar to the Dividend Discount model, although instead of discounting actual dividends, potential dividends are discounted (Damodaran A. , 2007). There are 3 venues to arrive at FCFE, one is starting by FCFF, other is Cash Flow from Operations and lastly Net Income.

$$Free\ Cash\ Flow\ to\ Equity = FCFF - Interest\ expense * (1 - Tax\ Rate) + Net\ borrowing$$

Equation 6 Computing FCFE starting by FCFF (Pinto, Henry, Robinson, & Stowe, 2010)

$$Free\ Cash\ Flow\ to\ Equity = Cash\ Flow\ from\ Operations - Investment\ in\ fixed\ capital + Net\ borrowing$$

Equation 7 Computing FCFE starting by Cash Flow from Operations

$$Free\ Cash\ Flow\ to\ Equity = Net\ Income + Net\ non\ Cash\ Charges - Investment\ in\ fixed\ capital - Investment\ in\ working\ capital + Net\ borrowing$$

Equation 8 Computing FCFE starting by Net Income

Since in this methodology we are discounting only Cash Flows available to shareholders, the appropriate discount rate is the Cost of Equity (K_e). Equivalently to the FCFF, this method has

an explicit period coupled with a terminal value, as described before. This model has the flexibility of not implying a constant capital structure, since the debt is handled before arriving at the FCFE. With it, we compute directly the value of equity, in opposition to the FCFF that leads us to the Enterprise Value.

$$Equity\ Value = \sum_{t=1}^{t=n} \frac{FCFE_t}{(1+K_e)^t} + \frac{\frac{FCFE_{n+1}}{(K_e - g_n)}}{(1+K_e)^n}$$

Equation 9 Computing Equity Value from FCFE with Explicit Period and Terminal Value

2.3 Relative Valuation

In the relative valuation approach, we value an asset based on how similar assets are priced in the market. This methodology involves three inputs, firstly finding similar assets that are priced by the market, secondly choosing a common variable to scale the market prices and be able to output comparable standardized prices, i.e. convert the assets or equity value in a multiple of a variable such as sales, EBITDA, net income or other. Lastly, make adjustments for discrepancies among asset, e.g. a high growth company should trade at a higher multiple than a similar low growth company. Thus, these differences need to be accounted for.

There is a divergence in the rationale driving DCF valuations and Relative Valuations. In the DCF, we try to determine the intrinsic value based on the assets ability to generate cash flows, whereas in the Relative Valuation we believe in the market accurateness, on average. If the markets are indeed accurate both methodologies should converge, while if markets frequently miss price assets they should diverge.

Regarding the first step, when we search for a comparable firm, we are looking for a company with similar cash flows, growth prospects and risk profile.The majority of analysts classify comparable firms as in the same industry (Damodaran A. , 2007), which implies companies in the same industry have the same profile, as previously defined. (Boatman & Baskin, 1981) Study the precision of Price Earnings ratio ("PE") estimates using a random sample of companies from the same sector and a smaller set of companies with the closest 10 year average growth rate in earnings and reach the conclusion that the latter provides the most accurate results.

(Cheng & McNamara, 2000) Find that using a combination of industry and fundamentals, yields the best results. One limitation of this methodology is, if companies are filtered to narrowly, then the final set might be too small. Concerning the second step of finding the right multiple, the main goal is to find a measure that we can standardize and convert to a common variable. This common variable can be the company's earnings, book value, sales, EBITDA or even an industry specific measure, e.g. the number of visitors to a company's web site. The latter has to be used wisely, since these are not applicable to all industries and therefore it might get tricky to realize how cheap or expensive a stock may be. In the previous company's web page example, €100 per visit it's harder to understand than 10x PE.

In the denominator, the common variable used can be regarding the most current period data providing a current ratio, the previous 12 months variable, yielding a trailing ratio or the next period expected variable, giving a forward ratio. Multiples can be divided in two broad categories, price multiples and enterprise multiples. Price multiples have in the numerator the equity value of the business while enterprise multiples have the value of the operating assets of the firm.

(Damodaran A. , Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, 2002) Breaks the usage of multiples per industry and concludes that Enterprise Value/EBITDA multiples are more frequently used in heavy infrastructure companies, whereas price ratios, e.g. PE or Price to Book are more used in financial services firms. (Liu, Nissim, & Thomas, 2002) Study the performance of different ratios and state that forward PE performs best, multiples of sales and operating cash flow underperform and EBITDA and book value multiples are in between.

Regarding the third stage, adjusting for differences between companies, regardless of how thorough we are in selecting the comparable firms, we will never end up with perfectly identical assets. Thus, some adjustments are often made such as, subjective adjustments, modified multiples or statistical regressions. These techniques will not be used in this research, therefore further explanations will not be extended

In the process of valuing Boeing, the peer group will be determined with a combination of industry and fundamental filtering as it has been proven to be the best performing approach. In what concerns the multiples, the one paid more attention to will be EV/EBITDA. Mainly for two reasons, one is that enterprise value in the numerator allows to better compare companies with different capital structures in opposition to price multiples, with equity value. Furthermore, comparing PE and EV/EBITDA, since the EBITDA is an accounting line item above net

income, is less subject to non-recurring items affecting it and accounting manipulation. No adjustments to the multiples will be made.

2.4 Additional Inputs

2.4.1 Cost of equity ("k_e")

To compute the Cost of Equity (k_e), we will recur to the Capital Asset Pricing Method ("CAPM"). This methodology, first introduced by Jack Treynor (1961, 1962), William F. Sharpe (1964), John Lintner (1965) and Jan Mossin (1966), determines the required rate of return by investors to add an asset to a well diversified portfolio. This approach assesses the asset's sensitivity to Market Risk (Beta), the market expected return and the return of the risk-free asset.

$$k_{ei} = rf + \beta_i * MRP$$

Equation 10 Cost of Equity Calculation using CAPM

Where:

- rf: Risk-free rate;
- β: Stock sensitivity to market risk;
- MRP: Market Risk Premium or Market Excess Return.

2.4.1.1 Risk-Free Rate ("rf")

With regards to the rf, it represents the return of the investment with the lowest risk available. There is some dispute on whether it should be a government Treasury Bill ("T-Bill") or a government Bond. The fact is, most of the times the T-Bill has a lower return than a Bond, since it is a shorter period is less risky. Nonetheless, since we are not considering an investment with less than one year but a long-term one, we should compare it with a long-term Bond to avoid the reinvestment risk we would have in a T-Bill.

Reason why, the approach used in this research being the U.S. Government 30 year Bond yield. Since it is the U.S. Bond with the longest maturity available.

2.4.1.2 Beta ("β")

Beta is the stock sensitivity to market movements as a whole. It represents the market, systematic or undiversifiable risk.

In the CAPM approach, since the rf and market risk premium will be the same for all companies, this is the only input that will change. It can be seen as the stock incremental risk to a diversified investor. If it is greater, equal or smaller than one it means the stock is more, equal or less risky than the market, respectively. There are several ways to calculate it, in this Boeing valuation exercise and the most common practice, is to use an ordinary least square linear regression with the stock returns as the dependent variable and a proxy for market returns, such as the Standard & Poor's 500. The time span can vary, we shall use five years annualized monthly returns.

2.4.1.3 Market Risk Premium ("MRP")

"Riskier investments should have higher expected returns than safer investments, to be considered good investments" (Damodaran A. , Equity Risk Premiums (ERP): Determinants, Estimation and Implications, 2012) .

There are three ways to measure MRP. One, is the survey approach, where investors are asked about their expectations of equity returns in the future. The second one, is historical premiums where historical returns of stocks are computed. Within this method, there are several important factors to consider that will heavily impact the output. Namely the timespan considered, risk free rate above which we compute the premium and the averaging approach. The third method is forecast a forward looking premium based on market rates or prices on assets traded today.

In this study, the historical risk premium approach will be used as it has been shown to be the best performing methodology (Damodaran A. , Equity Risk Premiums (ERP): Determinants, Estimation and Implications, 2012) and it is the most commonly used.

$$MRP = Average\ Annual\ Equity\ Index\ Return - Average\ Return\ on\ Treasury\ Bonds$$

Equation 11 Market Risk Premium (Zenner et al, 2008)

2.4.2 Terminal Growth Rate

The terminal growth rate is the rate at which the company shall grow at after reaching the steady state, into perpetuity. The final valuation is highly sensitive to this input and it is a considerably

subjective matter. Although the defined value is always arguable, we can establish a ceiling at the global economy long-term growth rate because if a company were to growth at more than that into perpetuity, it would mean that at some point it would be worth more than global GDP, which is impossible. Additionally, if we don't believe that the company will disappear, it can't be lower than zero.

2.4.3 Cost of Debt ("k_d")

There are two ways to arrive at the cost of debt. If the company is investment grade and has bonds outstanding, it is possible to use the Yield to Maturity ("YTM") of its long-term bonds, if they are liquid and have no options attached. Otherwise, the company's credit rating should be used to arrive at the cost of debt.

The reason why the company should be investment grade is, the cash flows from the bond are promised cash flows, i.e. the company has to meet the coupons payments plus the principal at maturity. Since investment grade companies have low default probability, the risk of the company not meeting its obligations is fairly small, which is not the case for non-investment grade companies. Additionally, the bond should be liquid, otherwise the current YTM might be outdated and not reflect the accurate credit risk existent at the moment. (Company, Koller, Goedhart, & Wessels, 2010)

Since Boeing is an investment grade company, has liquid Bonds outstanding with no options attached, the weighted average YTM of those bonds will be used to determine the cost of debt.

3. The Boeing Company

3.1 Boeing Company Overview

Incorporate in 1916, Boeing is the world's largest aerospace company. It is a manufacturer of commercial jets, defense, space and security systems. Headquartered in Chicago, Illinois, USA, Boeing is present in 65 countries and employs 153 000 people worldwide. The entity operates in three industry segments: commercial airplanes; defense, space & security; and financing solutions. In 2019, the company generated $76.6bn of revenue (FY18: $101.1bn).

3.2 Business Segments

Boeing is structured in four business segments, commercial airplanes ("BCA"), defense, space & security ("BDS"), global services segment ("BGS") and Boeing capital ("BC"). BCA manufacturers commercial jetliners, BDS provides military airplanes, weapons and systems to defense governmental agencies. BGS provides support to BCA and BDS clients through a diversified range of products and services. BC provides financing and leasing solutions to its clients to support the acquisitions of the company products and services.

3.2.1 Commercial Airplanes

This segment develops and manufactures commercial airplanes in addition to related support services. The product portfolio includes airplanes for passenger and cargo purposes, with the 737, 747, 767, 777 and 787 series. At the moment the company is still developing the 737 MAX and 777X. Currently there are more than 10 000 Boeing commercial jetliners in service. This business unit employs more than 60 000 people worldwide. Concerning the related services provided, these comprise engineering and maintenance, supply chain, training and professional services and digital solutions and analytics.

3.2.2 Defense, Space and Security

This business segment does research and development, production of manned and unmanned military aircraft and weaponry for strike, surveillance and mobility. Example of products are defense and intelligence systems, missiles, computers and satellite systems. The main client of this business unit is the United States Department of Defense ("US DoD"), representing c. 86% of 2018 turnover. Other clients include NASA and other international defense institutions.

3.2.3 Global Service Segment

BGS is a support unit to provide customer assistance throughout the lifespan of the products. This assistance is provided both for the Commercial Airlines and Defense business unit. Typical services are platforms, supply chain and logistics management, maintenance, upgrades, spare parts, pilot and maintenance training as well as data analytics.

3.2.4 Boeing Capital

This BU is engaged in providing financing solutions to Boeings clients as well as managing the group financial exposure. Product portfolio comprises operating leases, finance leases, notes, receivables, assets held for sale and investments.

3.3 Recent Events - 737 MAX Grounding

In 29 October 2018, Lion Air Flight 610 a domestic Indonesian flight operated by Lion Air crashed into the Java Sea 13 minutes after take-off, killing 189 passengers and crew. It was the first deadly crash involving the Boeing 737 Max, which was introduced in 2017.

An investigation into the accident by the Indonesian National Transportation Safety Committee concluded flight control problems, clues of angle of attack and other mechanisms problems connected with a design issue comprising the Manoeuvring Characteristics Augmentation System ("MCAS") of the 737 MAX series that caused a sudden airplane dive. Following this event, the U.S. Federal Aviation Administration and Boeing communicated warnings to all operators of the 737 Max series to avoid any recurrence. On 10 March 2019, Ethiopian Airlines Flight 302 which was operated by a Boeing 737 Max 8, crashed 6 minutes after take-off, killing all 157 people aboard. The cause of the accident is still under investigation.

As a result, in March 13th 2019, the Federal Aviation Administration ("FAA") issued a suspension order on the 737 MAX series operations in the U.S., followed by other non U.S. authorities and regulators (hereunder referred to as "the grounding"). Deliveries of the 737 MAX series have been suspended until clearance is granted.

3.4 Business Overview

3.4.1 Boeing Consolidated Revenues

Revenue decreased 24% yoy in FY19 to $76.6bn, on the back of a $25.2bn (44%) decline in BCA segment as a result of the 737 MAX grounding leading clients to slow demand until the issue is solved and there is an understanding on whether the series will be able to fly again or not. This is evidenced by the contraction in deliveries of the 737 series from 580 (FY18) to 127 (FY19). BDS and BGS remained solid, experiencing a Compounded Annual Growth Rate ("CAGR") of 4.7%, 12.4% over 2017-2019, respectively. BC was not able to offset the indirect loss in revenue from the grounding and resulted in a CAGR of -10.8% over 2017-2019.

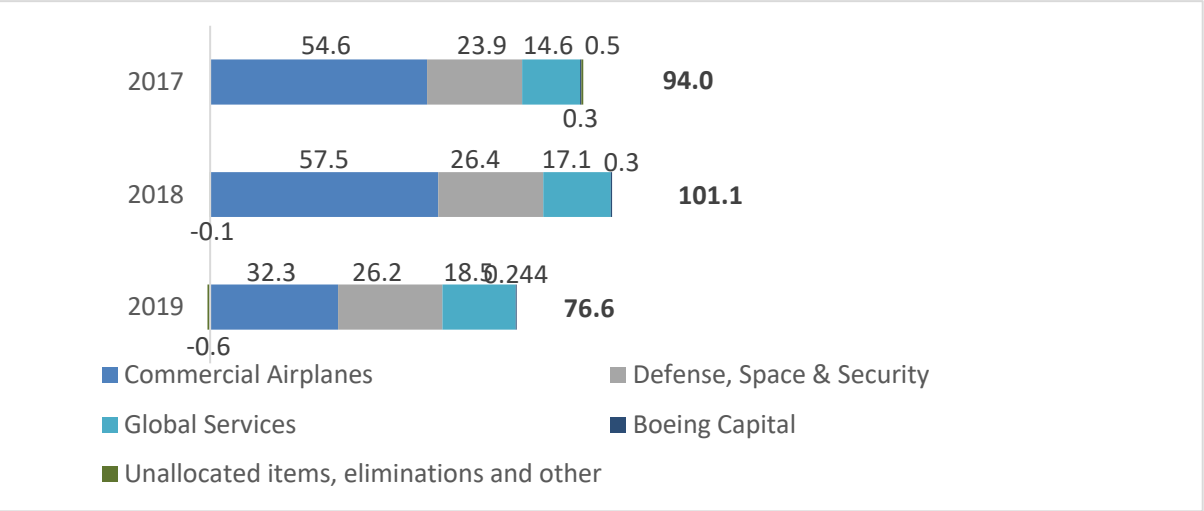

Figure 1 Revenue Breakdown by Business Segment over 2017-2019 (in $ Billion)

3.4.1.1 Revenue Geographical Breakdown

Despite having a considerable dependency on the U.S. market with 50% of total sales coming from there, besides that there is a sustained geographical diversification evidenced by sales to the 5 continents. After the U.S., Asia other than China is the second most important region accounting for 13%, followed by Europe with 12%.

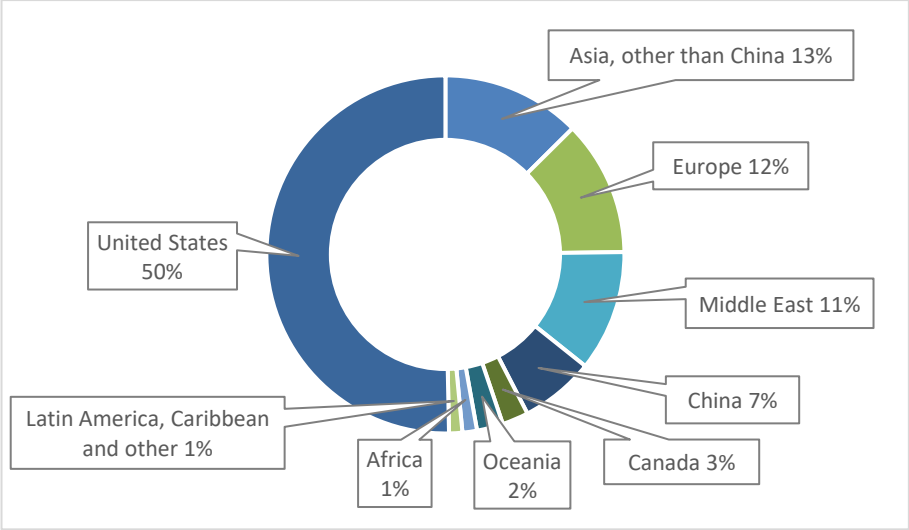

Figure 2 Boeing Consolidated Revenue Geographical Breakdown in 2019

3.4.2 Results of Operations

Boeing Consolidated Operating profit and margins have been significantly impacted by the grounding, due to an initial reduction and freeze, as of January 2020, of 737 MAX production

which increases overall cost per airplane in the 737 program, estimated at $6.3bn in FY19 as well as a $8.3bn charge related to an estimate of potential concessions and other considerations to clients, net of insurance, as a consequence of the grounding and delays.

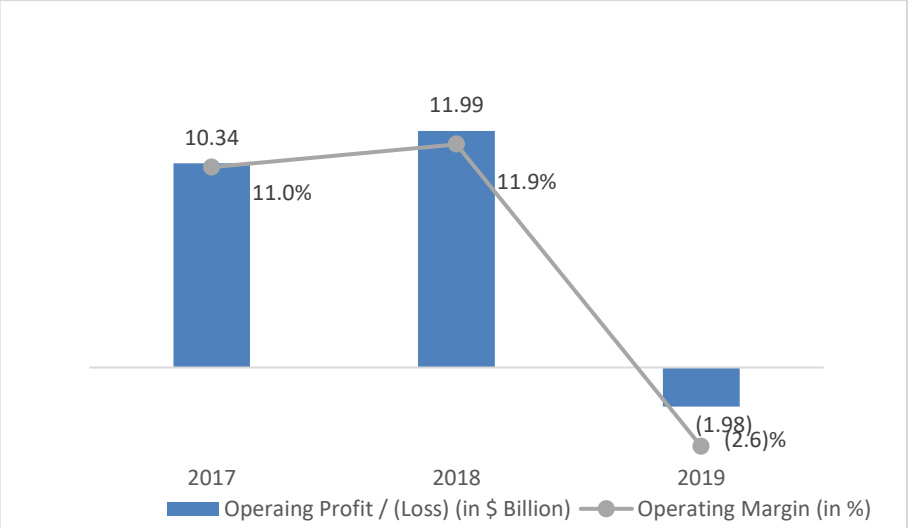

Figure 3 Boeing Consolidated Results of Operations over 2017-2019

3.5 BCA

3.5.1 BCA Financial and Operational Performance

BCA segment was significantly affected due to the grounding, as the 737 series represented 72% of BCA deliveries as of 2018. The reduction in unit deliveries of the 737 series amounted to 78.1% resulting in 127 737 series airplanes delivered in FY19 (FY18: 580) and a grand total of airplanes delivered of 380 (FY18: 806). Besides the effect of the severe delivery reduction, there were other 2 factors, already mentioned previously, driving the operating loss of $6.7bn (FY18: $7.8bn). One was the earnings charge related with the potential concessions to clients and other was the increase in cost per unit of the 737 program given the inefficiencies of producing at a smaller scale and with excess capacity.

	737	*747*	*767*	*777*	*787*	*Total*
2019						
Cumulative Deliveries	7439	1555	1176	1627	939	
Deliveries	127	7	43	45	158	380
2018						
Cumulative Deliveries	7312	1548	1133	1582	781	
Deliveries	580	6	27	48	145	806
2017						
Cumulative Deliveries	6732	1542	1106	1534	636	
Deliveries	529	14	10	74	136	763
2016						
Cumulative Deliveries	6203	1528	1096	1460	500	
Deliveries	490	9	13	99	137	748

Table 1 Boeing Commercial Airplanes Deliveries by Series over 2016-2019

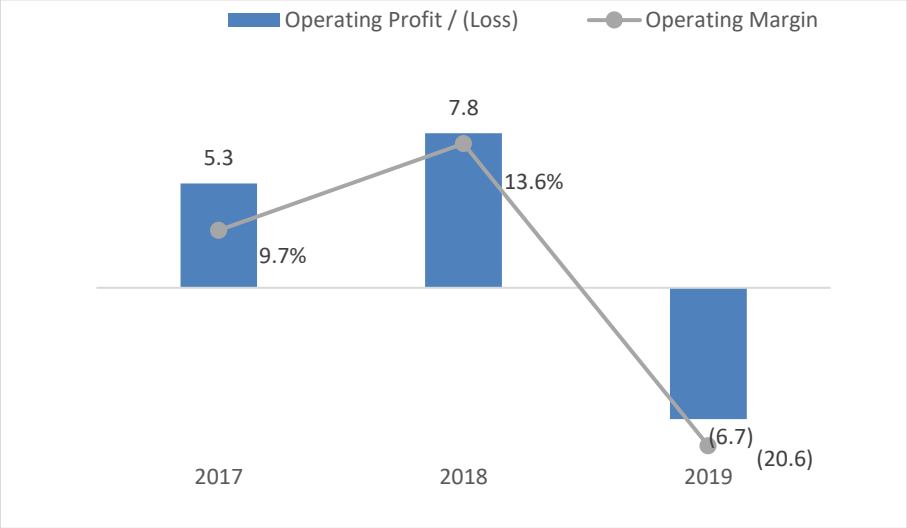

Figure 4 BCA Revenues Breakdown by Airplane

To better gauge the dependency of Boeing in the 737 program, an estimate of the BCA breakdown per airplane was conducted. Although Boeing does not disclose the Revenue per program, since they do disclose the average price per program and number of deliveries, it is possible to arrive at the Gross Revenues by multiplying the two. Then, it is possible to infer the average discount in all programs, by dividing (1- Net Revenue) by Gross Revenue. Thus, by multiplying the average discount by each program Gross Revenue, the Net Revenue per program is estimated as per the chart below.

An analysis of the chart, allows to see that the 737 program in a normal year such as 2018, represented almost half of BCA Revenues (49%) and 28% of Boeing Consolidated Total Net Revenue. In 2019, given the plummeting of deliveries due to the grounding, the 737 weight diminished 35 p.p. which was the main driver of the deterioration of the company's financial performance.

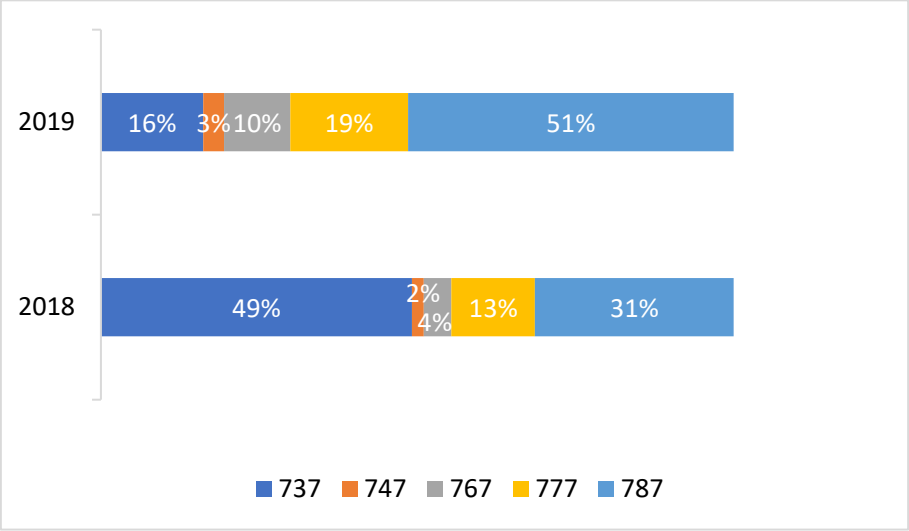

Figure 5 BCA Segment Result of Operations over 2017-2019

3.6 BDS

3.6.1 BDS Financial Performance

BDS operating profit increased $0.9bn yoy in FY19 mainly due to lower costs regarding development programs. Particularly in the KC-46A contract, Boeing accounted charges of $143m in FY19 compared to $722m in FY18.

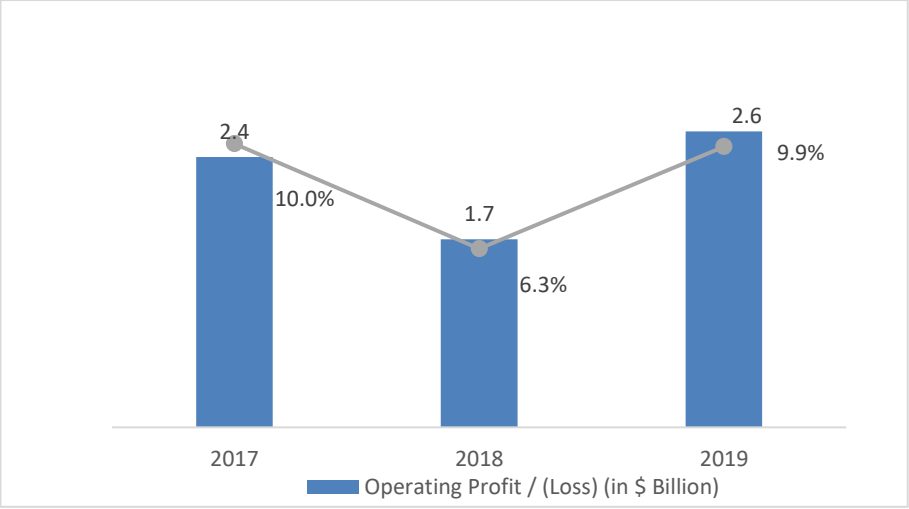

Figure 6 BDS Segment Result of Operations over 2017-2019

3.7 BGS

3.7.1 BGS Financial Performance

BGS earnings growth of $161m are a result of an increase in revenue, as the operating margin as remained relatively stable around 15%, despite a less favourable product mix. Revenue increase is due to the acquisition of KLX in 2018 and more services provided to governments. These effects were partially offset by a decrease in commercial airlines services.

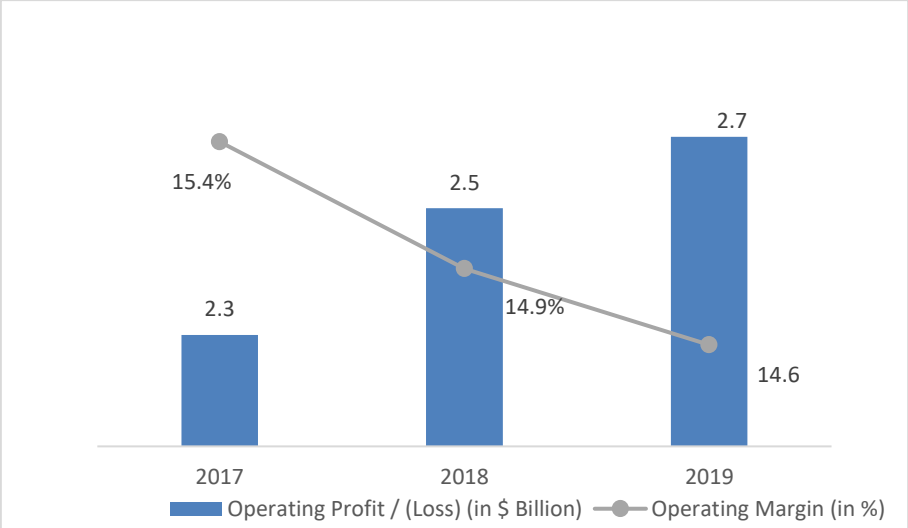

Figure 7 BGS Segment Result of Operations over 2017-2019

3.8 Boeing Consolidated Backlog

Boeing total backlog[2] amounted to $463bn. Boeing Commercial Airlines backlog was $377bn (FY19), having diminished slightly from $408bn in FY18, currently representing a total of c.5 400 commercial airplanes. Regarding Defense, Space & Security backlog increased 4% yoy in FY19 to $63.9bn, of which 29% is from non U.S. clients. Of the grand total $463bn, $436.5 refers to contractual obligations while the remaining $26.9bn is to unobligated backlog. The main cause for the global decrease in total backlog is BCA, for which deliveries exceeded new orders.

[2] Contractual backlog excludes purchase options, orders for which contracts have not been signed and unobligated government contract funding.

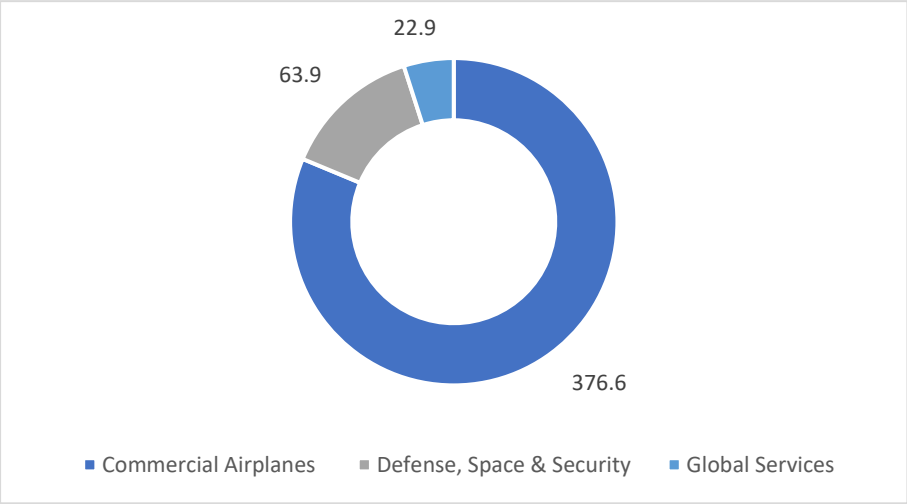

Figure 8 Boeing Consolidated Backlog Breakdown by Segment in FY19 (in $ Billions)

3.8.1 BCA Backlog

Another evidence of Boeing dependency on the 737 program is the chart of BCA Backlog by program. By analysing the chart, it is possible to see that the 737 amounts to 81% of BCA Backlog (in nº of airplanes) and despite the fact that some of these future deliveries might be cancelled with no or a small compensation, depending on the type of contract, it is still a reference of future deliveries and demand for the company. If the grounding lasts much longer in time, some of these deliveries might be cancelled rightfully and given the heavy reliance on the 737, the financial strength of the company might be at stake.

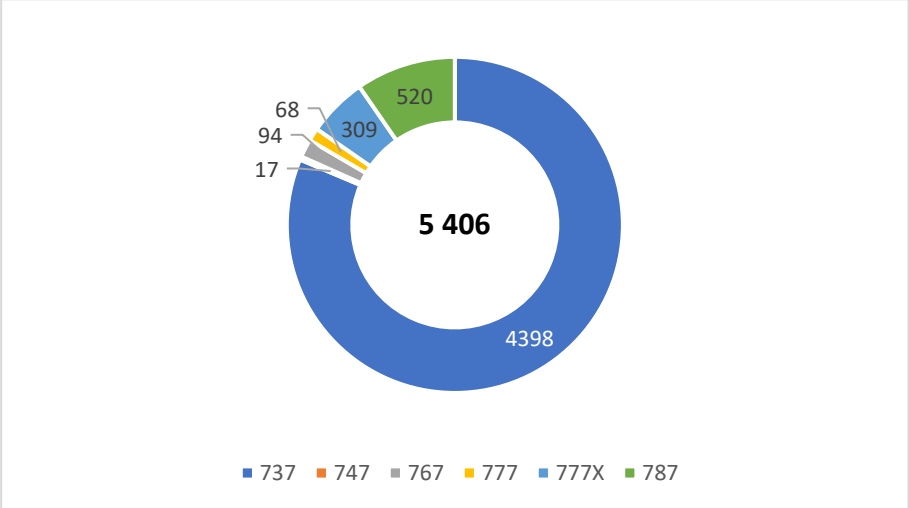

Figure 9 BCA Backlog by program (in nº of airplanes)

4. Industry Analysis

4.1 Global Aerospace & Defense

The global aerospace & defense industry grew 7.3% in 2018 to $1 339bn. It comprises the civilian aerospace market (50.9%) and the military aerospace and defense market (49.1%). Civilian aerospace comprehends revenues from manufacturers of civilian aerospace procurement whereas military aerospace includes military aircraft, military vehicles, naval vessels and systems and ordnance. (Marketline, 2019)

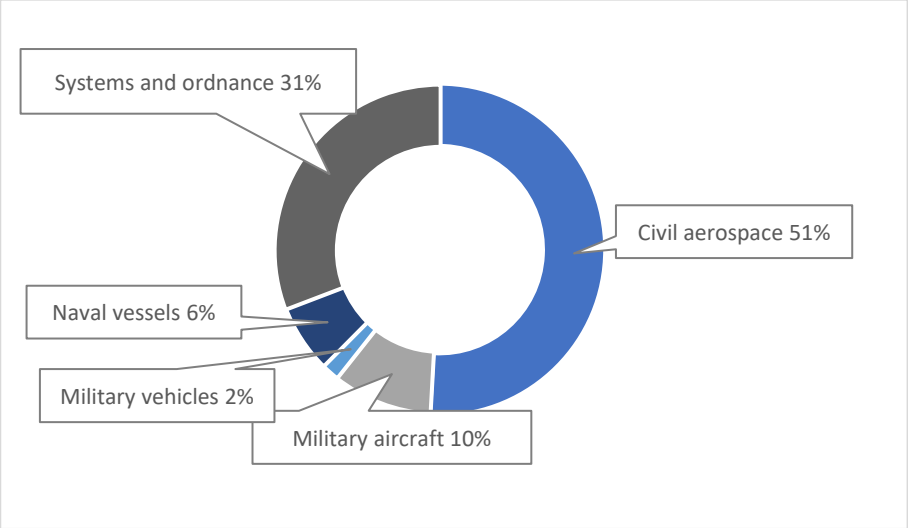

Figure 10 Global Aerospace & Defense Industry Segments Breakdown by Value (in $) in 2018

Over the 2014-2018 period the industry experienced a 4.3% CAGR, driven by the Asia-Pacific market which grew at a CAGR of 6.9% over the same period with China's increased participation in the global commercial aerospace market and supply chain of competitors within it. In opposition the U.S. compares with just 1.7% CAGR for the same period.

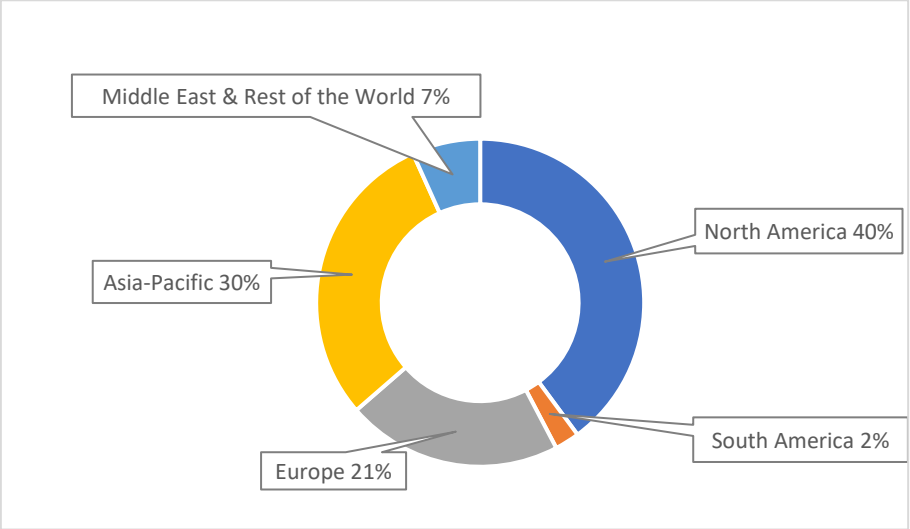

Figure 11 Global Aerospace & Defense Geographical Breakdown by Value (in $) in 2018

In terms of competition, this industry is close to a duopoly with Boeing and Airbus leading the market. However, in light of Commercial Aircraft Corporation of China, a state-owned company, this paradigm is expected to change in the future. Geopolitical tensions have been a driver of the military aerospace growth, due to increased defense global spending. There is also an emergent threat within this segment, namely cyber threats which make cyber security programs a key component of military strategies nowadays, in addition to the traditional ones.

4.2 Competitors and Market Share

To get a better grasp of the commercial airplanes industry, in particular, which is Boeing's most important segment, a refined approach is to look at the number of commercial airplanes delivered by each manufacturer over time.

As per the chart below, it is possible to assess each competitors market share of the total number of airplanes delivered and conclude that previous to the grounding, Boeing had the biggest share of the market every year, the industry was getting more concentrated over time as Boeing and Airbus accounted together for a bigger stake each year. The effect of the grounding has been severe by decreasing Boeing's market share in 19.5 p.p. and making Airbus the market leader for the first time since 2011.

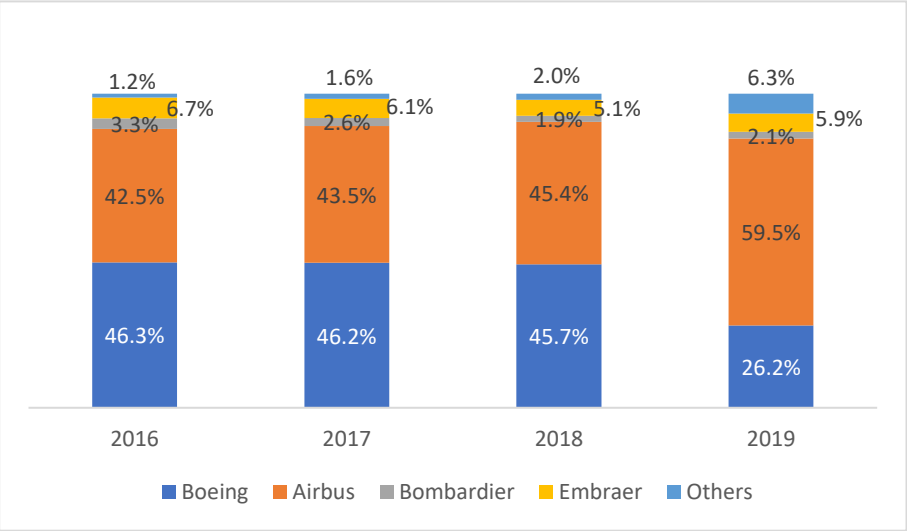

Figure 12 Aerospace Industry Market Share by Nº of Airplanes

4.3 Recent Events - COVID-19

In December 2019 an infectious disease caused by the most recently discovered coronavirus outbroke in Wuhan, China. This virus belongs to a family of viruses which cause respiratory infections ranging from the common cold to more severe diseases such as Middle East

Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS), in humans. The most recently discovered coronavirus causes coronavirus disease ("COVID-19"). (World Health Organization, "WHO"). The COVID-19 has had 2 314 621 confirmed cases and 157 847 deaths over virtually the whole world, as of 20 April 2020 (World Health Organization, 2020).

In March 11 the WHO declared COVID-19 a pandemic, afterwards several countries imposed severe travel restrictions and Agence France-Presse ("AFP") estimated that more than 3.9 billion people, or half the world's population had been asked or ordered to stay home by their governments to prevent the spread of the COVID-19. This paradigm has caused almost unprecedent economic impact, with the International Monetary Fund ("IMF") forecasting a World real Gross Domestic Product decline of 3%, making this lockdown the greatest recession since the Great Depression in 1929 and far worse than the 2009 Global Financial Crisis with a World GDP decline of 0.1% (International Monetary Fund, 2020). Although the economic impact is wide, some industries are particularly more affected in the present and even when lockdowns starts to loosen because of the gradual recovery and some sectors recovering faster than others. Namely, leisure companies and related ones such as hotels, airliners, restaurants, among others.

For the airlines industry, which represents the bulk commercial aviation companies' clients, the International Air Transport Association estimates a negative impact on revenues of c. 55% depending on the length of the precautionary measures taken. This is likely to make airliners cancel and postpone their investment in new airplanes as they try to preserve balance sheet and gauge the impact on demand in the long term.

Regarding the aerospace and defense industry, Airbus has already announced the intention to cut production around 50% over the next three to six months while Boeing delivered 73% fewer airplanes in the 1Q 2020 compared to the 1Q 2018 which would be the last normal homologous quarter the company had before the grounding and the COVID-19.

5. Valuation

5.1 Valuation Overview

To value Boeing the FCFF was the valuation methodology. The valuation reference date is 30th June 2020, thus only half of 2020 year FCFF were considered.

An explicit period of 10 years was forecasted, afterwards the company is expected to reach again a maturity stage and grow at a stable rate which will allow to determine the terminal value. The company's operations were divided in the four reported business segments: BCA, BDS, BGS and BC; as basis for the business plan underlying the financial model.

Given all the uncertainties surrounding the company at the moment, namely the depth of the COVID-19 impact, when the 737 will be ungrounded and how long it will take to recover pre COVID-19 and pre Grounding levels, three scenarios were considered. A base case, which is the most likely outcome, a best case and worst case scenario. Additionally, a sensitivity analysis to critical variables was made.

Throughout the description of the valuation methodology, reference is made to the base case and afterwards key outputs of best and worst case scenarios are displayed. In addition, sensitivity analysis to key variables was made in the base case.

5.2 Forecasts

5.2.1 Revenues

5.2.1.1 BCA Revenues

To arrive at BCA Revenues, the segment was divided into 737 program airplanes and non 737 airplanes, which include the 747, 767, 777 and 787 programs.

5.2.1.1.1 737 Revenues

The key drivers of the 737 program revenue are:

- Number of 737 airplanes delivered per month until date of ungrounding of the 737 MAX series;
- Number of months since ungrounding to reach cruise speed, defined as the target monthly deliveries of 737 program;
- 737 Cruise Speed or target monthly airplanes delivered of the 737 series.

In the base case, this means the ungrounding will occur in December 2020. Since 737 production has halted, it will remain with 0 units of the 737 airplanes produced until the ungrounding. The restart monthly production rate will be 12 airplanes per month, it will take 24 months to reach cruise speed and the target monthly rate is 52 airplanes per month.

Year	2018	2019	2020	2021	2022	2023	2024	2025
737 Avg Monthly Rate	48	11	1	25	48	52	53	54

Table 2 Base Case 737 Average Monthly Production Rate (in Nº of Units)

5.2.1.1.2 747, 767, 777 and 787 Revenues

Three key drivers of non 737 program airplanes:

- 2020 production decrease;
- Number of months to reach 2019 production level (non 737 cruise speed);
- Long-term growth rate;

In the base case, this means a deliveries and production decline of 35% in 2020. The segment's cruise speed (level of 2019) is set to be reached in two and a half years, so in 2023. Afterwards, the segment is forecasted to grow at the Boeing's long-term growth rate of 1.7%.

Year	2018	2019	2020	2021	2022	2023	2024	2025
Total	**18.8**	**21.1**	**13.7**	**16.2**	**18.6**	**21.1**	**21.4**	**21.8**
747	0.5	0.6	0.4	0.4	0.5	0.6	0.6	0.6
767	2.3	3.6	2.3	2.7	3.2	3.6	3.6	3.7
777	4.0	3.8	2.4	2.9	3.3	3.8	3.8	3.9
787	12.1	13.2	8.6	10.1	11.6	13.2	13.4	13.6

Table 3 Base Case Non 737 Average Monthly Production Rate (in Nº of Units)

5.2.1.1.3 BCA Revenues in the Base Case

Year	2018	2019	2020	2021	2022	2023	2024	2025
BCA Revenue (in $ M)	57 499	32 255	18 177	37 527	59 165	67 122	69 633	72 238
% yoy	5.3%	(43.9%)	(43.6%)	106.5%	57.7%	13.4%	3.7%	3.7%

Table 4 BCA Segment Revenues

5.2.1.2 BDS

5.2.1.2.1 Forecasting Methodology

Taking into account that BDS primary customer is the U.S. DoD and this client accounted for 84% of 2019 segment Revenues, plus that the second best client is the National Aeronautics and Space Administration ("NASA") which is also an entity of the U.S. federal government, we can safely say that BDS income heavily depends on the U.S. government.

To estimate BDS Revenues, the relationships between the U.S. GDP, the U.S. Government Expense, the U.S. Military spending and BDS revenues were exploited.

5.2.1.2.2 U.S. GDP and U.S. Government Expense Relationship

Firstly, by looking at the chart below we can see that there is a stable relationship between the U.S. GDP and U.S. Government Expense, which averages at 35.5% from 2013 to 2019, thus this value is assumed to remain constant in the future at 35.5%.

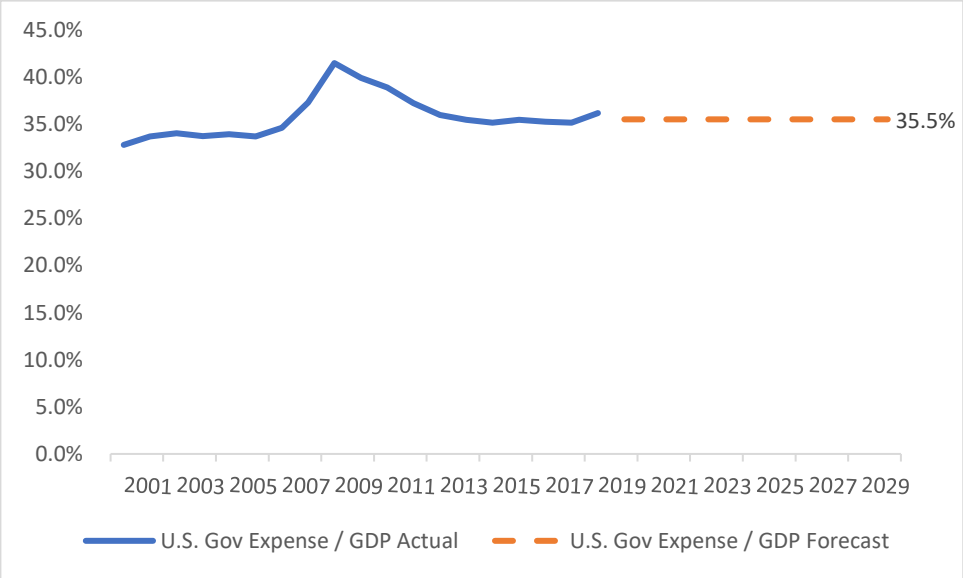

Figure 13 U.S. Government Expense and U.S. GDP Relationship

5.2.1.2.3 U.S. Government Military Expense and U.S. Government Expense Relationship

Afterwards, the relationship between the U.S. Government military expense and the U.S. Government expense was investigated. The chart below allows us to understand that there is a stable relationship between the two variables. Over the 2001-2019 period the U.S. Government has spent between 8% and 12% of their budget on military. There is no sign of a trend, therefore the average of the last three years of 8.94%was taken as an assumption of percentage of total expense in military.

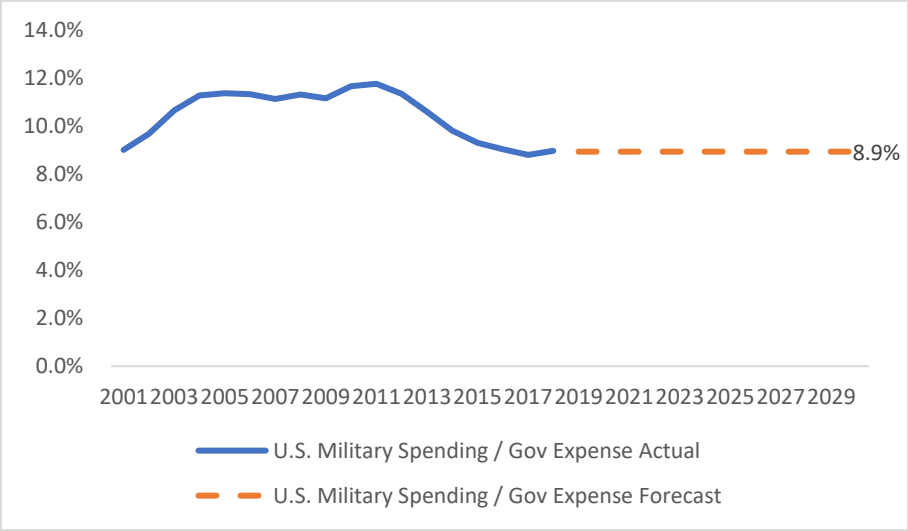

Figure 14 U.S. Gov. Spending and Military Spending Relationship

5.2.1.2.4 BDS Market Share

Then, to arrive at BDS Revenue, it's market share of the U.S. military spending was researched. A careful analysis of the numbers, allows to understand that BDS has been able to increase it. Thus, the assumption that BDS would increase its market share in 0.1% over the next five years, and from 2024 onwards it would stabilize and be able to capture 0.0443 USD of revenue per each USD the U.S. Government spends in military.

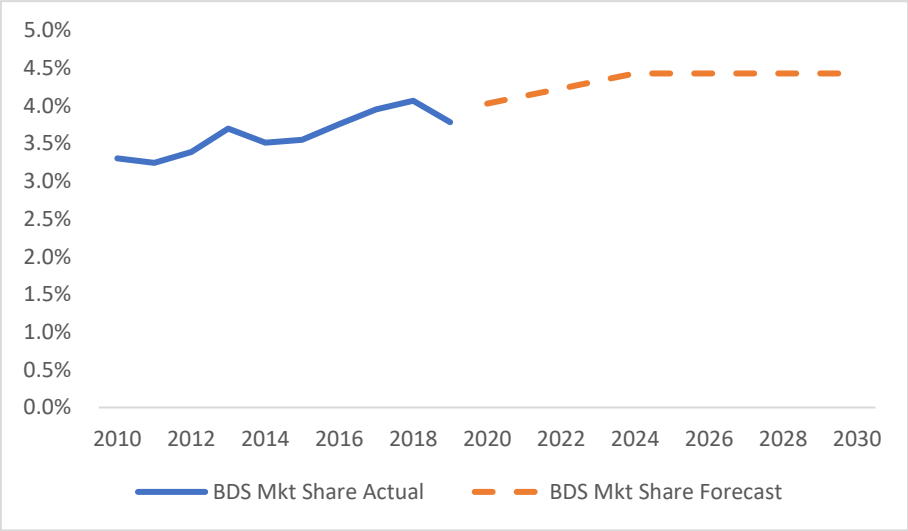

Figure 15 BDS Market Share of U.S. Military Spending

5.2.1.2.5 BDS Revenues

Year	2018	2019	2020	2021	2022	2023	2024	2025
BDS Revenue (in $ M)	25 806	26 996	25 806	26 996	28 212	29 454	30 647	31 168
% yoy	*10.3%*	*(0.6%)*	*(1.6%)*	*5.7%*	*5.5%*	*4.1%*	*4.0%*	*1.7%*

Table 5 Boeing Defense and Security Segment Revenues over 2018-2025 (in $ M)

5.2.1.3 BGS

5.2.1.3.1 Forecasting Methodology

BGS provides services to BCA and BDS clients worldwide, nonetheless there is more stability associated with its Revenues due to the frequent maintenance required by all commercial and military equipments. This is evidenced by the increase in Revenue in 2019 of 8.3% to $18.5bn despite the slump in BCA segment. As a result, the forecasting methodology assumed half of the Revenue is constant and would grow at 4.9% and the other half would be equal to 20.3% of BCA and BGS Revenue (2018 percentage).

5.2.1.3.2 BGS Revenues

Year	2018	2019	2020	2021	2022	2023	2024	2025
BGS Revenue (in $ M)	17 056	18 468	14 160	13 988	16 221	18 328	19 809	20 904
% yoy	*16.7%*	*8.3%*	*(23.3%)*	*(1.2%)*	*16.0%*	*13.0%*	*8.1%*	*5.5%*

Table 6 Boeing Global Services Revenues

5.2.1.4 BC

5.2.1.4.1 BC Forecasting Methodology

Taking into account that BC provides financing solutions for the acquisition of Boeing's products and services, it is fair to assume that there is a relationship between BCA, BDS, BGS Revenues and BC Revenues. Thus, following an analysis of BC Revenues as a percentage of BCA, BDS and BGS Revenues, as per the chart below, there is evidence of this relationship.

It is possible to observe that BC represented between 0.27% and 0.33% of other segments Revenue over the 2016-2019 period. There is no trend and it seems a stable and relatively constant relationship. Therefore, the assumption of BC Revenues representing 0.311%, which is the average of the last four years, was taken.

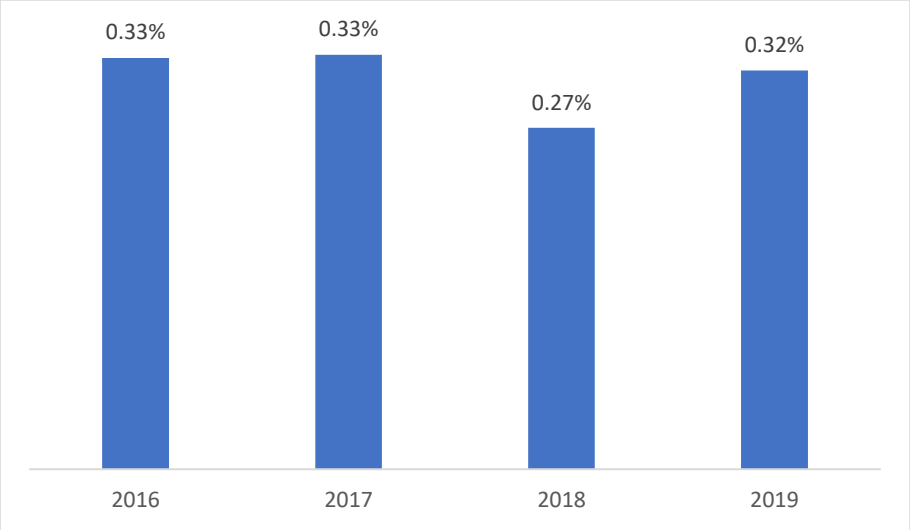

Figure 16 BC Revenues as % of BCA, BDS and BGS Revenue over 2016-2019

5.2.1.4.2 BC Revenues

Year	2018	2019	2020	2021	2022	2023	2024	2025
BC Revenue (in $ M)	274	244	181	244	322	358	374	387
% yoy	*-10.7%*	*-10.9%*	*-25.8%*	*35.0%*	*32.0%*	*10.9%*	*4.5%*	*3.5%*

Table 7 Boeing Capital Revenues

5.2.1.5 Boeing Consolidated Revenue

The impact on Boeing Total Consolidated Revenue is observable in the chart below. As it is possible to see, there is a severe impact in 2020 and a two year period to reach the level of Revenue pre COVID-19 and pre Grounding levels, only achieved in 2023. Afterwards, the company reaches cruise speed and starts to growth at a lower and more stable rate.

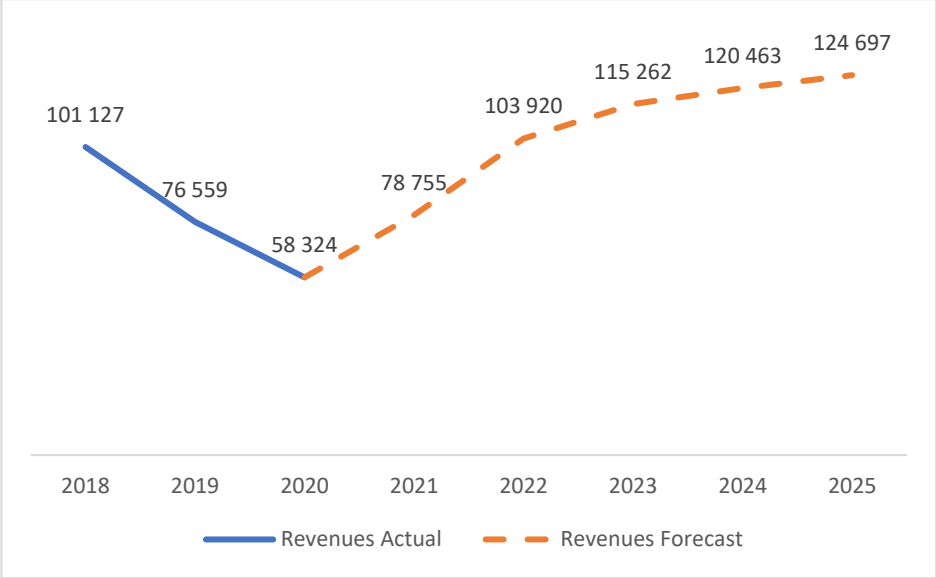

Figure 17 Boeing Total Consolidated Revenue (in $ Million)

5.2.2 Operational Costs ("Opex")

5.2.2.1 Operational Costs Overview

Boeing distinguishes 8 different types of Operational Costs:

- Cost of Products ("COP") -
- Cost of Services ("COS");
- Selling, General and Administrative Expenses ("SG&A");
- Research and Development ("R&D");
- Boeing Capital Interest Expense;
- Operating Investments;
- Disposals;
- Other Income and Expenses;

Boeing discloses the consolidated Operating Costs breakdown per type, although it does not disclose the breakdown per business segment by type, i.e. discloses the total Operating Costs per segment but not COP, COS and so forth within each business segment. Notwithstanding, it is of extreme relevance for this valuation to be able to separately forecast each of these line items since each business segment might growth at different rates and has different operating margins.

Therefore, an estimate for each of these costs individually was taken. Namely, each of the business segments Opex weight in Boeing Consolidated total Opex was computed, thus arriving at 55.7%, 27.8%, 16.3% and 0.2% for BCA, BDS, BGS and BC, respectively. Then, each of the line item costs was divided between the segments according to these weights. Meaning, BCA was allocated 55.7% of the Cost of Products, Cost of Services, Wages and Salaries and SG&A and so forth for each of the other business segment. D&A and R&D are disclosed within each segment, thus no assumption was needed. Boeing Capital Interest Expense and Other Income and Expenses were forecasted separately.

Additionally, since the company is expected to perform with excess capacity in the near future, thus at lower efficiency and consequently with lower margins, the variable costs had to be estimated as well. So that, the division between fixed and variable costs can be measured as well as the inefficiencies of operating with excess capacity. Variable costs were estimated by subtracting the actual and estimated Wages and Salaries, SG&A, COS, R&D and D&A to each of the segments total Opex. These costs include raw materials, parts, sub-assemblies and subcontracting.

5.2.2.2 Wages and Salaries

Boeing does not disclose the Wages and Salaries expense since 2010. Nonetheless, the company does disclose the number of employees as at year end. Given the importance of this cost item, it would be important to estimate it separately.

Therefore, the average cost per employee for 2010 was computed arriving at $98 923. To get to each year's cost per employee the average cost was assumed to grow at inflation rate. By multiplying by the average number of employees in a given year, which is the average number between beginning and end of year, the total cost of Wages and Salaries was estimated for each year.

In 2020, this means a decrease in year-end nº of employees of 5%, totaling 153 000 (2019: 161 000), an average number of employees totaling 157 050 and an average cost per employee of $118 077.

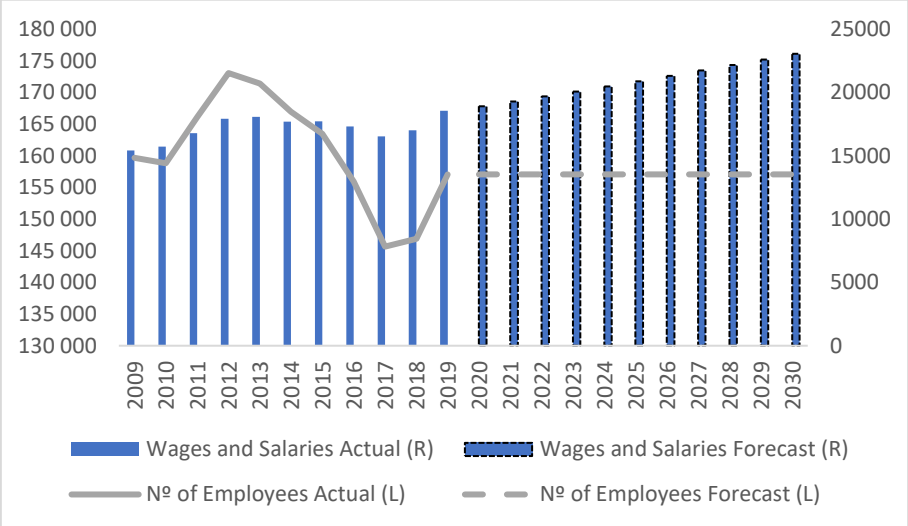

Figure 18 Boeing Consolidated Wages and Salaries and Average Nº of Employees (in $ M)

5.2.2.3 Variable Costs

5.2.2.3.1 BCA

To properly assess BCA segment's variable costs, the variable costs per airplane were analyzed. Over 2017, 2018, 2019 these amounted to $40m, $37m and $49m, respectively. This raises the question that when the company is delivering less airplanes, the variable cost per airplane increases. Most likely, as a result of higher costs of raw materials and parts given the smaller scale of purchase.

As a result, to estimate the future variable costs, while the company is not in cruise speed, so manufacturing less airplanes than the 806 units in 2018, a variable cost per unit function was built. By using the observations over 2017 and 2019, and performing the following regression:

$$Variable\ Cost\ per\ Unit = \alpha + \beta * Number\ of\ Units$$

Equation 12 BCA Variable Costs per Unit

The outputs were an α of -59.5 and a β equal to 0.0266274. This means that the maximum variable cost the company would bear to built one airplane is $59.42m and that, on average, saves $0.0266274m for each airplane it builds. These costs are assumed to have a floor of $37m, which is the smallest figure achieved, during 2018 (assumed to be the maximum efficiency level). Meaning whatever the production, the variable costs will not go lower than that. The cost is adjusted for inflation each year.

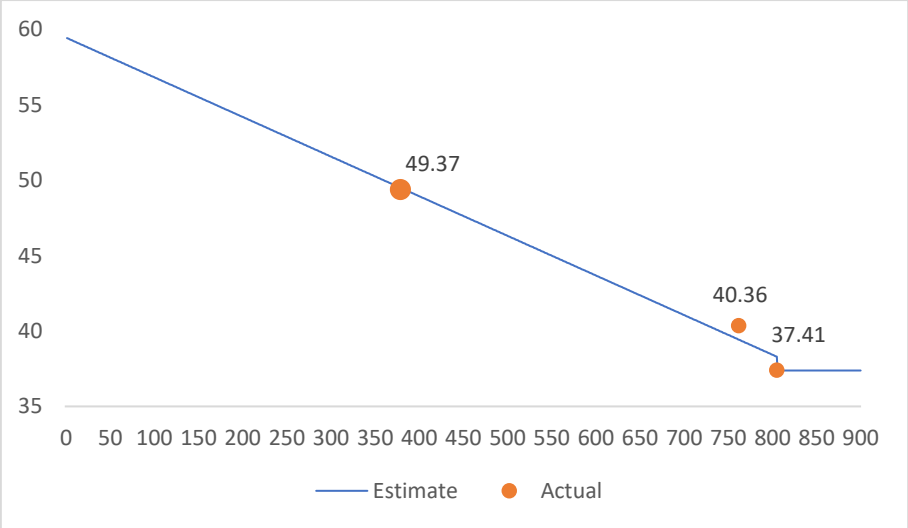

Figure 19 BCA Variable Costs Function (in $ M)

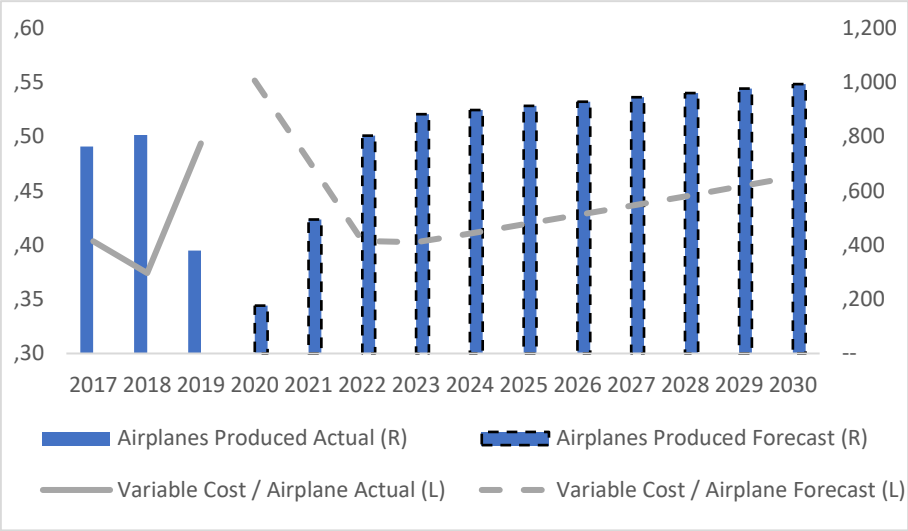

Figure 20 BCA Variable Cost Per Airplane (in $M) and Nº of Airplanes Produced

5.2.2.3.2 BDS

Over the 2017, 2018 and 2019 period BDS variable costs as a percentage of the segment's revenue amounted to 52.7%, 58.0% and 52.6%, respectively. Since this relationship appears to be stable, the average of the last three years 54.4% was taken as assumption.

5.2.2.3.3 BGS

Over the 2017, 2018 and 2019 BGS variable costs as a percentage of the segment's revenue amounted to 52.3%, 62.3% and 59.0%, respectively. Since this relationship appears to be stable, the average of the last three years 57.9% was taken as assumption.

5.2.2.4 SG&A

SG&A was estimated as being a fixed cost, therefore within each business segment it is expected to grow the 2019 amount at the inflation rate.

5.2.2.5 R&D

R&D for each business segment was forecasted as a percentage of its Revenues. For every business segment the average of 2017, 2018 and 2019 was used as estimate, amounting to 3.96%, 3.12%, 0.94% for BCA, BDS and BGS, respectively. BC does not incur in R&D costs. In addition, there are unallocated R&D expenses which seem to be uncorrelated with Boeing

Consolidated Net Revenues and therefore were estimated using the average amount of 2017, 2018 and 2019 and growing at the inflation rate thereafter.

5.2.2.6 BC Interest Expense

This line item was forecasted as a percentage of BC Revenues. Over 2017, 2018 and 2019 it represented 22.8%, 25.2% and 25.4%, respectively. Since this relationship appears to be stable, the average of the last two years, 25.3%% was taken as assumption.

5.2.2.7 BCA Concessions to customers

In 2019 BCA recorded $8 259m of concessions to customers for disruptions and associated delivery delays related to the 737 MAX grounding, net of insurance covered. As a result, for each year the 737 is not unground it is expected that the company will incur in an identical charge.

In the base case this means a charge of $8 259m in 2020 and since the ungrounding occurs in December 2020, it's the only charge.

5.2.3 Capital Expenditures ("Capex")

To accurately forecast Capex, the breakdown by business segment was necessary. For BCA, the Capex per airplane delivered was analyzed, whereas for BDS and BGS it was forecasted as a % of Revenue. BC does not have allocated Capex, since it is the financial services arm of the company.

5.2.3.1 BCA

Through an analysis of the historical Capex, it is possible to verify that in normal years, such as 2017 and 2018, this ranged between $0.7m and $0.8m per airplane delivered. In an abnormal year, such as 2019 where the number of deliveries was smaller than usually, this amounted to $1.1m per airplane.

As a result, the forecasted Capex per airplane was made dependent on the number of airplanes delivered. While Boeing is operating with excess capacity, defined as while total number of airplanes delivered is smaller than 2018 level of 806 units, this will amount to $1.1m (2019 Capex) and growing yearly at inflation rate. When the company reaches cruise speed, the Capex per airplane will be equal to the average of 2017 and 2018 of $0.79m adjusted by the inflation and growing at the inflation rate thereafter.

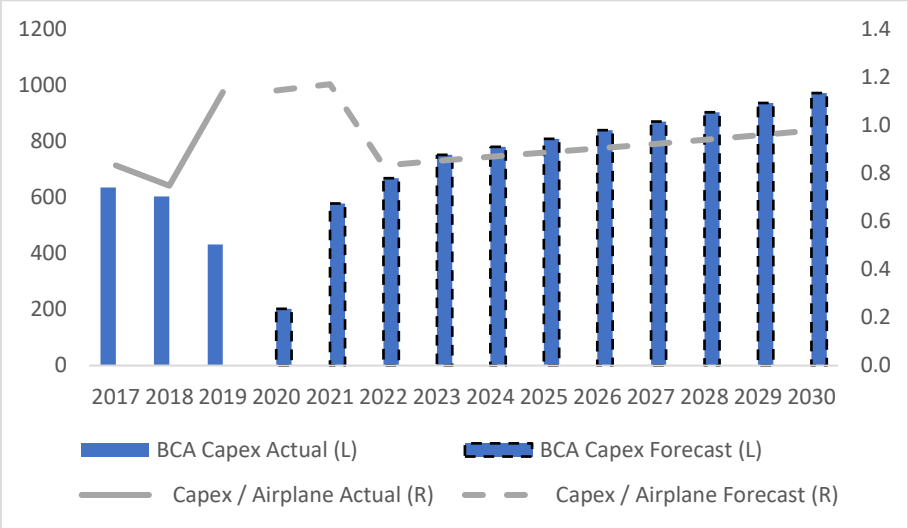

Figure 21 BCA Total Capex (in $ M) and Capex per Airplane (in $m)

5.2.3.2 BDS

For BDS, the Capex was estimated as a percentage of BDS Revenues. Over the 2017-2019 period this relationship has remained relatively stable ranging from 0.77% and 0.88%. Therefore, the average of these last three years was taken, 0.81%.

Year	2018	2019	2020	2021	2022	2023	2024	2025
BDS Capex (in $M)	208	202	210	219	229	239	249	253
BDS Capex/ BGS Revenues	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%

Table 8 Boeing Defense and Security Capex

5.2.3.3 BGS

For BGS, the Capex was estimated as a percentage of BGS Revenues. Over the 2017-2019 period this relationship has remained relatively stable ranging from 1.18% and 1.35%. Therefore, the average of these last three years was taken, 1.26%.

Year	2018	2019	2020	2021	2022	2023	2024	2025
BGS Capex (in $M)	231	218	178	176	204	230	249	262
BGS Capex/ BGS Revenues	1.4%	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%

Table 9 Boeing Global Services Capex

5.2.4 Unallocated items

Unallocated Capex does not seem to be related with Boeing total Consolidated Revenues as it has remained with a stable and growing trend over the last three year, despite Revenues plummeting in 2019. Over 2017, 2018 and 2019 unallocated Capex amounted to $713m, $679m and $981m, respectively. As a result, the forecast is the 2019 level of $981m, growing at the inflation rate.

5.2.5 D&A

To forecast D&A, the relationship between period D&A and total Gross Property, Plant and Equipment was investigated. Over 2017, 2018 and 2019, period D&A divided by Gross PPE was 6.75%, 6.77% and 7.13%, respectively. This yearly depreciation rate was forecasted to remain stable for the historical assets plus the new assets acquired. Meaning, they will be depreciated at the same average rate of 2019, totaling 7.13% of total Gross PPE

Year	2019	2020	2021	2022	2023	2024	2025
Gross Existing PPE	31 844	31 844	31 844	31 844	31 844	31 844	31 844
Gross New Capex	--	1 577	3 560	5 695	7 973	10 329	12 753
Gross PPE	**31 844**	**33 421**	**35 404**	**37 539**	**39 817**	**42 173**	**44 597**
Existing PPE D&A	(2 271)	(2 271)	(2 271)	(2 271)	(2 271)	(2 271)	(1 147)
Existing PPE D&A %	*7.1%*	7.1%	7.1%	7.1%	7.1%	7.1%	3.6%
New Capex D&A	--	(112)	(254)	(406)	(569)	(737)	(910)
New Capex D&A %	--	*7.1%*	*7.1%*	*7.1%*	*7.1%*	*7.1%*	*7.1%*
Total D&A	**(2 271)**	**(2 383)**	**(2 525)**	**(2 677)**	**(2 840)**	**(3 008)**	**(2 057)**

Table 10 Boeing Consolidated D&A

Given the economic difficulties the company is expected to experience in the next 2 and a half years, to offset some of these disruptions the company will postpone investments. For this reason, until 2025 the company will invest in PPE less than the D&A, thus reducing net PPE. Only after 2025 will the company invest to support the expected growth.

5.2.6 Working Capital

5.2.6.1 Assets

5.2.6.1.1 Inventories

Days Inventory Outstanding ("DIO") surged in 2019 as a result of a similar manufacturing rate as in the previous year coupled with substantial less sales. The outcome was DIO of 445 days in 2019 compared with 313 DIO in 2018. The level of Inventory is expected to remain at the same amount of 2019 ($76 622m) until Boeing reaches cruise speed. In addition, the forecast is for DIO to take 4 years to reach the regular target level of 313 experienced in 2018, and remain at that level afterwards.

5.2.6.1.2 Clients

Days Receivables Outstanding ("DRO") have remained stable throughout the 2017-2019 period, ranging from 11 and 16 days. Given the stability of this figure, the estimate is for this to continue at the 2019 level of 16 DRO in the forecasted period.

5.2.6.1.3 Unbilled Receivables

Unbilled Receivables has remained stable through the last three years, ranging between 9% and 12% of Revenues. Therefore, while the company is not in cruise speed it will be 12% (2019 figure), whereas when Boeing reaches cruise speed it will represent 10% of Revenues (2018 figure).

5.2.6.1.4 Customer Financing

Customer Financing has remained stable through the last four years, ranging between 0.2% and 0.5% of Revenues. Therefore, the average of the last four years, 0.4%, was assumed as estimate.

5.2.6.1.5 Other Current Assets

Other Current Assets has remained stable through the last three years, ranging between 2.6% and 4.1% of Revenues. Since it increased when Revenues decreased, while the company is not in cruise speed it is forecasted as 4.1% (2019 figure), whereas when Boeing reaches cruise speed it will represent 2.3% of Revenues (2018 figure).

5.2.6.2 Liabilities

5.2.6.2.1 Payables

Average Days Payable Outstanding ("DPO") increased in 2019 to 75, from 55 in 2017 and 2018, as a result of the company assuming a defensive approach and trying to offset some of the financial disruption caused by the grounding by taking more time to pay its suppliers. Therefore, while the company is not in cruise speed, as previously defined, DPO will remain at the 2019 level of 75 and when the company reaches cruise speed it will stabilize at 55.

5.2.6.2.2 Accrued Liabilities

Accrued Liabilities remained stable between 2016 and 2018, ranging between 57 and 63 days of Opex. When Boeing's Revenues decreased in 2019, it increased to 107 days of Opex. Therefore, while the company is not in cruise speed it is forecasted as 107 days (2019 figure), whereas when Boeing reaches cruise speed it will represent 60.47 days (average of 2016, 2017 and 2018).

5.2.6.2.3 Income Taxes Payable

Income Taxes Payable as percentage of Revenues ranged between 0.40% and 0.48% over 2017 and 2018, whereas in 2019 increased to 0.88%. Therefore, while the company is not in cruise speed it is forecasted as 0.88% (2019 figure), whereas when Boeing reaches cruise speed it will represent 0.44% (average of 2017 and 2018).

5.2.6.3 Changes in Working Capital

Year	2018	2019	2020	2021	2022	2023	2024	2025
Assets								
Inventories	62 567	76 622	76 622	76 622	77 934	77 366	74 164	76 534
DIO	*313*	*445*	*480*	*355*	*366*	*339*	*313*	*313*
Clients	3 879	3 266	2 488	3 360	4 433	4 917	5 139	5 320
DRO	*14*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
Unbilled Receivables	10 025	9 043	6 889	9 302	10 302	11 426	11 942	12 362
% of Revenues	*10%*	*12%*	*11.8%*	*11.8%*	*9.9%*	*9.9%*	*9.9%*	*9.9%*
Customer Financing	460	162	211	285	376	417	436	451
% of Revenues	*0.5%*	*0.2%*	*0.4%*	*0.4%*	*0.4%*	*0.4%*	*0.4%*	*0.4%*
Other Current Assets	2 335	3 106	2 366	3 195	2 399	2 661	2 781	2 879
% of Revenues	*2.3%*	*4.1%*	*4.1%*	*4.1%*	*2.3%*	*2.3%*	*2.3%*	*2.3%*
Liabilities								
Payables	12 916	15 553	13 496	16 649	13 982	14 887	15 470	15 981
DPO	*55*	*75*	*75*	*75*	*55*	*55*	*55*	*55*
Accrued Liabilities	14 323	22 198	19 262	23 762	15 422	16 421	17 063	17 628
Days of Opex	*(61)*	*(107)*	*(107)*	*(107)*	*(60)*	*(60)*	*(60)*	*(60)*
Income Taxes Payable	485	670	(577)	(711)	(411)	(438)	(455)	(470)
% of Revenues	*0.5%*	*0.9%*	*0.9%*	*0.9%*	*0.4%*	*0.4%*	*0.4%*	*0.4%*
Working Capital	51 542	53 778	56 396	53 064	66 452	65 918	62 384	64 406
Change in WC	**(1 611)**	**(2 236)**	**(2 618)**	**3 332**	**(13 388)**	**535**	**3 533**	**(2 022)**

Table 11 Boeing Consolidated Working Capital

5.2.7 Taxes

To forecast taxes, the historical effective tax rate was investigated. Over 2016-2018 period, it fluctuated between 9.9% and 16.3%, therefore the average of 12.8% was assumed as estimate. Since in some years, the company might experience a loss, the tax credit assumed in that case was the U.S. federal statutory tax rate of 21%.

Year	2018	2019	2020	2021	2022	2023	2024	2025
Taxes	(1 144)	1 623	4 231	1 666	(492)	(1 173)	(1 410)	(1 549)
Effective Tax Rate	9.9%	71.9%	*21.0%*	*21.0%*	*12.8%*	*12.8%*	*12.8%*	*12.8%*

Table 12 Boeing Consolidated Taxes

5.2.8 Consolidated Financial Debt

Boeing has had a very conservative capital structure. This is evidenced by the historical NFD/EBITDA ratio which ranged between 0.16x and 0.44x between 2016 and 2018.

In 2019 the situation worsened considerably for two reasons. Firstly, given the financial impact of the grounding the company's EBITDA diminished considerably, on top of an increase in financial debt to cover some these financial impacts and to assure liquidity. Both these drivers led the NFD/EBITDA ratio to increase to 24.27x in 2019 and Financial Debt to rise 97% from $13.5bn to $27.3bn. In the 1Q 2020, Boeing made an additional debt issue raising the debt balance to $38.9bn.

Boeing has a minimum cash balance policy, evidenced by the cash levels observed between 2016-2019 which ranged from $7.6bn to $9.5bn. For this reason, the policy is assumed to stay in place and a minimum cash balance of $9.485bn is the estimated rule. Therefore, whenever the company has a negative period Cash Flow, it will raise the necessary amount of debt to maintain the cash balance. Then, a target FD/EBITDA ratio is established at 1.08x. So, whenever the company has positive FCF, if the current leverage is above the target 1.08x, it will amortize debt. If the current leverage is below the target ratio, it will raise debt in the exact amount to reach it. In the long/term, after Boeing reaches the target leverage it will only refinance debt as it matures to keep the target leverage ratio.

In the base case, this means that the company will need to add leverage until 2022 up to $56.9bn and only afterwards will it be able to start to pay down debt. From 2022 to 2027, Boeing generates FCF to pay down debt and move towards its target capital structure, which happens in 2027. Thereafter, the company only re-leverages to keep the capital structure.

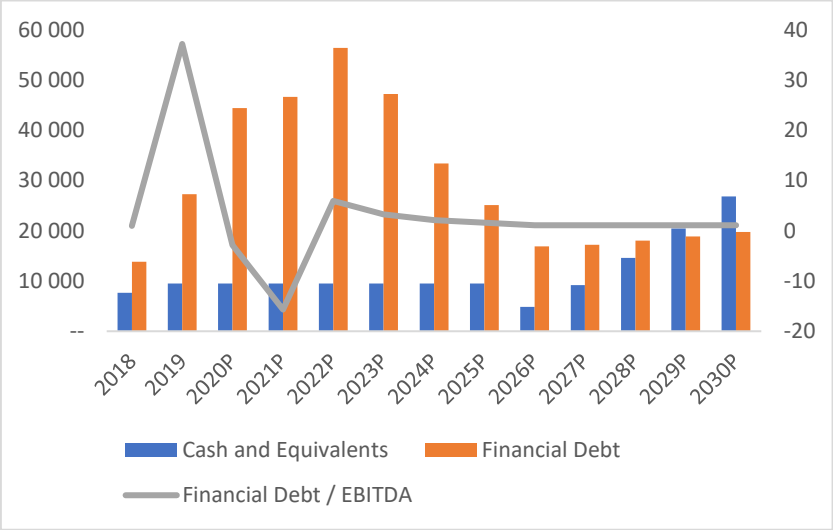

Figure 22 Boeing Consolidated Financial Debt, Cash and FD/EBITDA

5.2.9 Dividends

In March 2020 Boeing suspended its dividends as a result of the financial challenges it's facing. It is assumed that the company will restart to pay dividends again when the FCF after debt service allows, which means 2027 in the base case. In 2019, Boeing payed $8.24 per share in dividends, therefore it is forecasted to pay $8.24 per share in 2027 and growing at the inflation rate onwards.

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Dividends	--	--	--	--	--	--	--	4 649	4 742	4 837	4 934
Dividends per Share	--	--	--	--	--	--	--	8.24	8.40	8.57	8.74

Table 13 Dividends and Dividends per Share

5.3 WACC

5.3.1 Cost of Equity

5.3.1.1 Risk Free Rate

As a proxy for the risk-free rate, the YTM of the U.S. 30 year Bond was used. This amounted to 1.25%[3].

5.3.1.2 Target Capital Structure

Boeing has historically had a conservative capital structure, with a small percentage of debt. Over the last 5 years, the Debt to Capital ranged between 5% and 15%, excluding the most recent past, after 20th

[3] Reference date of 02-05-2020.

February 2020, where the market capitalization soured and this ratio increased substantially. Therefore, it was assumed that the company would keep employing this financial structure policy and the target Debt to Capital ratio is 10%.

5.3.1.3 Beta

5.3.1.3.1 Equity Beta

To arrive at Beta, the last 5 years monthly returns of Boeing were regressed against the S&P 500, in an Ordinary Least Squares Regression, from 02/05/2015 to 02/05/2020. This value was retrieved from Thomson Reuters Eikon and it totaled 1.46. This means, that Boeing stock has been, on average, 46% more volatile than the market as a whole. It is worthy to note that, the company risk profile surged recently as a result of the both airplane crashes, the grounding and the particular negative effect of COVID-19 in the aerospace industry.

5.3.1.3.2 Asset Beta

By applying the following formula, it is possible to go from the Equity or Levered Beta to the Asset or Unlevered Beta:

$$B^{Unlevered} = \frac{B^{Levered}}{(1 + (1 - Tax\ rate) * \frac{Debt}{Equity})}$$

Equation 13 Asset Beta (Unlevered Beta) Calculation

5.3.1.4 Market Risk Premium

Equity Risk Premium was estimated at 5.75%, as per the recommendation of KPMG in their Equity Market Risk Premium – Research Summary (KPMG, 2019).

5.3.1.5 Cost of Equity Calculation

With the previous explained inputs, the Cost of Equity can now be computed as follows:

$$K_e = 1.25\% + 1.46 * (5.75\%) = 9.65\%$$

Equation 14 Cost of Equity Calculation

5.3.2 Cost of Debt

To arrive at Boeing's Cost of Debt, the weighted average YTM of all their bonds outstanding was computed, totaling 5.13%[4]. Which coupled with a U.S. federal statutory tax rate of 21% and the following formula, allows to reach the company's after-tax Cost of Debt:

$$\text{After Tax Cost of Debt} = 5.13\% * (1 - 21\%) = 4.05\%$$

Equation 15 After Tax Cost of Debt Calculation

[4] Reference date of 02-05-2020.

5.3.3 WACC Calculation

With all the aforementioned inputs, it is now possible to calculate the WACC, through the following formula:

$$WACC = 4.05\% * 10\% + 9.64\% * 90\% = 9.09\%$$

Equation 16 WACC Calculation

5.4 DCF

5.4.1 FCFF

5.4.1.1 Terminal Growth Rate

The terminal growth rate is equivalent to the IMF estimate for the U.S. GDP long-term growth rate, which is 1.7%. The main reason being that this is the Boeing's main market and the biggest driver of future growth.

5.4.1.2 Yearly FCFF Calculation

Year	2020[5]	2021	2022	2023	2024	2025
EBIT	(17 836)	(5 500)	6 780	11 651	12 796	13 466
Taxes on EBIT	4 231	1 666	(492)	(1 173)	(1 410)	(1 549)
NOPLAT	(13 606)	(3 834)	6 288	10 478	11 386	11 917
D&A	2 383	2 525	2 677	2 840	3 008	2 057
Capex	(1 577)	(1 983)	(2 135)	(2 278)	(2 356)	(2 425)
Change in WC	(2 618)	3 332	(13 388)	535	3 533	(2 022)
FCFF	**(15 417)**	**39**	**(6 558)**	**11 574**	**15 571**	**9 528**

Table 14 Yearly FCFF Calculation

[5] Figures refer to full year. Please note that for the purposes of valuation only half of 2020 FCFF was considered, taking into account that the valuation reference date is 30th June 2020.

5.4.1.3 FCFF for DCF Valuation Purposes

Year	2020[6]	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
FCFF (in $bn)	(7.7)	0.0	(6.6)	11.6	15.6	9.5	9.1	9.7	10.3	10.9	11.5
Discount Factor (%)	*96%*	*89%*	*82%*	*75%*	*69%*	*64%*	*59%*	*54%*	*50%*	*46%*	*43%*

Table 15 Boeing Consolidated FCFF and Discount Factor for DCF purposes

5.4.1.4 Price Per Share Calculation

DCF FCFF	
PV Explicit Period FCFF (in $ bn)	36.9
Terminal Growth Rate (in %)	*1.7*
WACC (in %)	9.1
Terminal Value (in $ bn)	73.4
Enterprise Value (in $ bn)	**110.3**
Net Debt (in $ bn)	35.5
Equity Value (in $ bn)	**74.8**
Number of Shares (in m)	564.2
Price Per Share (in $)	**132.5**

Table 16 Boeing Consolidated Price per Share Calculation

[6] Figures refer to half of 2020 FCFF. Please note that for the purposes of valuation only half of 2020 FCFF was considered, taking into account that the valuation reference date is 30th June 2020.

5.4.1.5 Sensitivity Analysis

5.4.1.5.1 Overview

The sensitivity analysis refers to the base case scenario assumptions described previously, except for the two variables analyzed.

Given all the aforementioned uncertainties surrounding the company at the moment, it is of absolute essence to assess the sensitivity of the company's value to possible variations in the variables considered. As such, and considering all the volatility in the macroeconomic environment, a first sensitivity analysis was made for the variables of date of 737 ungrounding and time, in months, for the 737 program to reach cruise speed.

5.4.1.5.2 Boeing 737 MAX

Given the crucial importance of the 737 series to Boeing, since it represented 28% of Total Boeing Consolidated Revenues of 2018, the company is highly dependent on how fast it's able to reach an agreement with the regulator and unground it. In addition, how quickly the company is able to reach cruise speed is also of crucial importance. This is dependent on how fast the clients surpass the fears risen by both 737 airplane crashes as well as from the COVID-19 tremendous impact on airliners and aerospace industries.

For the periods considered, on average, each quarter the ungrounding is deferred costs Boeing $5.1 in PPS. In addition, for all the possible ungrounding dates considered in this sensitivity analysis, each quarter longer for the company to reach cruise speed, costs on average, $2.0 in the PPS.

Months to Recover	Ungrounding Date				
	30/09/2020	30/12/2020	30/03/2021	30/06/2021	30/09/2021
12	139.7	136.8	132.3	126.0	119.9
15	139.0	137.2	131.7	125.3	119.3
18	137.0	133.4	127.0	121.0	116.5
21	136.4	132.6	126.3	121.4	115.9
24	136.0	**132.5**	127.3	121.0	115.6
27	126.5	124.7	118.6	112.3	106.3
30	126.3	123.7	116.7	110.6	106.0
33	125.5	121.5	115.3	110.5	105.2
36	124.8	120.4	115.5	109.8	104.5

Table 17 Sensitivity Analysis to 737 Ungrounding Date and Nº of Months to Reach Cruise Speed

5.4.1.5.3 Boeing Non 737 Airplanes

The non 737 airplanes are also an important segment of the business, accounting for 35.4% of Boeing total Consolidated Revenues. For this reason, a sensitivity analysis on the impact of the COVID-19 is of critical importance. On average, for each additional 5 p.p. the segment declines in 2020, Boeing loses $3.5 in PPS. Each year longer it takes the company to recover the pre COVID-19 (2019) output level costs Boeing $13.0 in PPS, on average.

Years to Recover \ Non 737 Airplanes 2020 Decline	-20%	-25%	-30%	-35%	-40%	-45%	-50%
1	153.7	151.4	149.0	146.8	144.5	142.2	140.0
2	142.6	139.5	136.5	**132.5**	129.5	126.4	123.4
3	132.1	127.3	123.4	119.6	115.8	112.1	108.4
4	121.2	116.6	112.1	107.6	103.1	98.8	94.5

Table 18 Sensitivity Analysis to Non 737 Nº of Airplanes Decline and Years to Reach Cruise Speed

5.4.1.5.4 WACC and Terminal Growth Rate

The terminal value represents 65.2% of the value of the company and these two variables are two of its main drivers, in addition the calculations are subjective and rely on a set of assumptions. For these reasons, a sensitivity analysis is required.

On average, an increase in WACC of 0.1 p.p. would lead to a decrease in PPS of $3.5, whereas an increase in the Terminal Growth rate of 0.1 p.p. would lead to an increase in PPS of $3.0, on average. These figures refer to the variations described within the range in the table below.

Terminal Growth Rate \ WACC	8.8%	8.9%	9.0%	9.1%	9.2%	9.3%	9.4%
1.4%	134.1	130.6	127.3	124.0	120.8	117.7	114.6
1.5%	137.1	133.6	130.1	126.7	123.4	120.3	117.1
1.6%	140.3	136.6	133.0	129.6	126.2	122.9	119.7
1.7%	143.5	139.7	136.1	**132.5**	129.1	125.7	122.4
1.8%	146.8	142.9	139.2	135.5	132.0	128.5	125.2
1.9%	150.2	146.3	142.4	138.7	135.0	131.5	128.0
2.0%	153.8	149.7	145.7	141.9	138.1	134.5	131.0

Table 19 Sensitivity Analysis to WACC and Terminal Growth Rate

5.4.1.5.5 Beta

According to Mckinsey (Valuation: Measuring and Managing the Value of Companies, 5th Edition), to estimate Beta one should use a period with at least 60 observations, and monthly returns are preferable over weekly or daily returns. This means that the most accurate period is 5 years monthly returns.

This was the methodology used in this valuation, nonetheless others argue that more frequent returns could lead to a better estimate of Beta (1980, Nobel laureate Robert Merton). To gauge the possible effects of a different approach regarding Beta estimation, the outcome with a 2-year weekly beta was also computed.

Increased Frequency Beta Approach	
Cost of Equity	
Beta Unlevered	1.81
Beta Levered	1.97
Ke	12.58%
WACC[7]	11.73%
PPS (in $)	65.3

Table 20 Increased Frequency Beta Approach

If this 2 years weekly Beta of 1.97 was used, the PPS would be substantially lower than the base case, leading to $65.3.

[7] Please note, all variables not displayed in the table were were estimated as in the previous WACC calculation.

As it is possible to observe in the figure below, the 5-year levered monthly Beta is already close to historical highs, which means it already reflects the increased operational risk the company is facing.

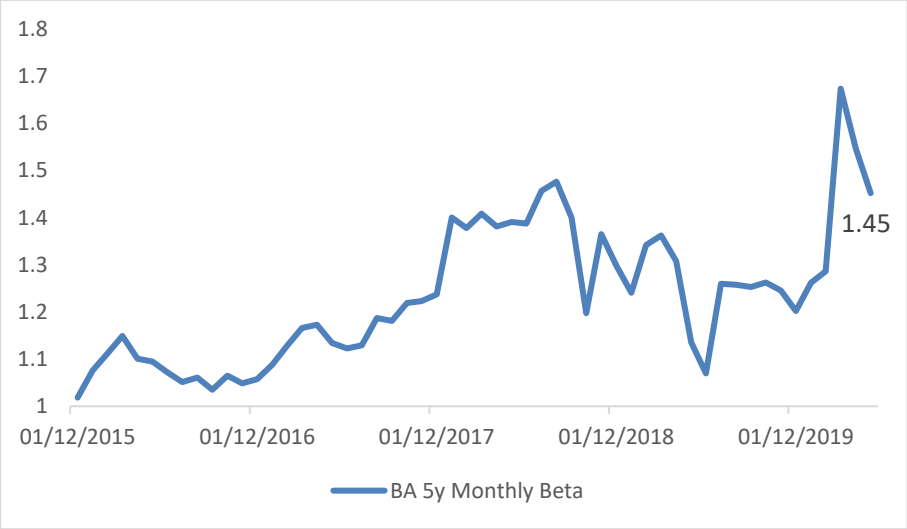

Figure 23 Boeing Trailing 5y Levered Monthly Beta

5.4.1.5.6 Operational Risk

As previously mentioned, both crises drove the company's operational risk higher, which negatively impacts Boeings value since increases the discount rate. The aforementioned analysis raises the question that when the company is able to surpass them and this risk diminishes its value will rise as a consequence even considering the same Cash Flows. To illustrate this point, in 26th February 2020 (which can be seen as a pre Covid-19 crisis) Boeing had a 5 year Levered Monthly Beta of 1.28 and the YTM of its outstanding Bonds was 2.58%. With these two inputs Boeing's PPS would rise to $178.6, which is 35% higher than the current recommendation of $132.5.

Levered Beta \ Cost of Debt	2.63%	3.13%	3.63%	4.13%	4.63%	5.13%	5.63%	6.13%	6.63%	7.13%	7.63%
1.66	105.7	104.7	103.7	102.8	101.8	100.9	100.0	99.1	98.2	97.3	96.5
1.61	113.2	112.1	111.1	110.0	109.0	108.0	107.0	106.1	105.1	104.2	103.3
1.56	121.1	120.0	118.9	117.8	116.7	115.6	114.6	113.5	112.5	111.5	110.6
1.51	129.7	128.5	127.3	126.1	124.9	123.8	122.6	121.5	120.5	119.4	118.3
1.46	138.9	137.5	136.3	135.0	133.7	**132.5**	131.3	130.1	129.0	127.8	126.7
1.41	148.7	147.3	146.0	144.6	143.2	141.9	140.6	139.3	138.1	136.9	135.6
1.36	159.4	157.9	156.4	154.9	153.5	152.1	150.7	149.3	147.9	146.6	145.3
1.31	171.0	169.4	167.8	166.2	164.6	163.0	161.5	160.0	158.5	157.1	155.7
1.26	183.6	181.8	180.1	178.3	176.6	174.9	173.3	171.6	170.0	168.5	166.9

Table 21 Sensitivity Analysis to Levered Beta and Cost of Debt

5.4.1.6 Scenarios Analysis

5.4.1.6.1 Overview

Given all the uncertainties the company is subject to, to get a better sense of the impact of changes in more than two variables at the same time, three possible scenarios were built.

In general terms, the three scenarios represent a moderate and most likely recovery (base case) and what could be called a "U" shaped recovery. A soon and fast recovery (best case), would mean a "V" shaped recovery, and a late and long recovery (worst case) would be an "L" shaped recovery. This is well represented by the Revenue evolution as plotted in the chart below.

Figure 24 Revenues by Scenario Comparison

5.4.1.6.2 Macroeconomic Inputs

Regarding the U.S. real GDP decline in 2020, the IMF estimate of 6% was taken for the base and best case, whereas in the worst case a heavier figure of 9% was considered.

The time for the U.S. GDP to reach the 2019 level was worsened by one year in each scenario. Meaning, 1, 2 and 3 years for the best, base and worst case scenarios, respectively.

5.4.1.6.3 Operational Inputs

5.4.1.6.3.1 BCA

5.4.1.6.3.1.1 737

Boeing had set a first provisional date for the ungrounding for July 2019, which proved to be unreachable. Afterwards the company has postponed the target ungrounding date several times, once for October 2019, then to January 2020, then to "mid-2020" and the latest estimate is to "late summer 2020".

Therefore, the best case scenario would be at the end of the 3Q 2020 (September 2020), and for the base and worst case, one additional quarter for each was considered. Thus, 4Q 2020 (December 2020) and 1Q 2021 (March 2021) for the base and worst case, respectively.

The time to reach cruise speed was 18, 24 and 36 months for the best, base and worst case, respectively. Therefore, delaying it in each scenario.

Before the grounding, Boeing had announced the intention to increase the 737 production rate from 52 airplanes per month (highest rate effectively achieved) to 57. The question of will there be demand and conditions to do so in the near future arises. As a result, this possibility was also considered, resulting in 52 target rate for the base and worst case, and 57 in the best case.

5.4.1.6.3.1.2 Non 737

For the non 737 production decline in 2020, the three possibilities considered were -30%, -35% and -40% for the best, base and worst case scenario, respectively.

Regarding the time to reach the 2019 level, it was worsened by one year in each scenario. Meaning, 1, 2 and 3 years for the best, base and worst case scenarios, respectively.

5.4.1.6.4 Inputs and Outputs

	Base Case	Best Case	Worst Case
Macroeconomic Inputs			
U.S. 2020 GDP Growth Rate	-6%	-6%	-9%
Years for GDP to recover	2	1	3
U.S. GDP Long Term growth rate	1.70%	1.70%	1.70%
Inflation Beyond 2024	2.0%	2.0%	2.0%
Operational Inputs			
Boeing Commercial Airplanes			
737			
Monthly Production rate until ungrounding	0	0	0
Restart of 737 MAX production date	dec/20	set/20	mar/21
Restart of 737 MAX production rate per month	12	12	12
Target 737 MAX Production Rate per month	52	57	52
Time to reach cruise speed (in moths)	24	18	36
Cruise Speed Growth Rate	1.70%	1.70%	1.70%
Non 737 Airplanes			
Production Decline in 2020 (%)	-35.0%	-30.0%	-40.0%
Years to Recover (reach 2019 level)	2	1	3
Cruise Speed Growth Rate	1.70%	1.70%	1.70%
Output			
Price Per Share ($)	132.5	173.5	92.8

Figure 25 Scenarios Main Assumptions and PPS Overview

5.5 Relative Valuation

5.5.1 Peer Group

To find Boeing's peer group and perform the relative valuation, all the 108 companies classified as in the Aerospace and Defense Industry by the Global Industry Classification Standard ("GICS") were used. Followed by a removal of outliers and companies without available data (62) leading to 46 companies. Then, two additional filters were used. The median Revenues growth from the last 5 years and the median EBITDA margin from the last 5 years. The cut off points were determined as Boeing's Median Revenues growth rate (-1.1%) and EBITDA margin (9.9%) of the last 5 years plus 3 p.p. (ceiling cut off) and minus 3 p.p. (floor cut off). This led to 6 final peers, as per the chart below.

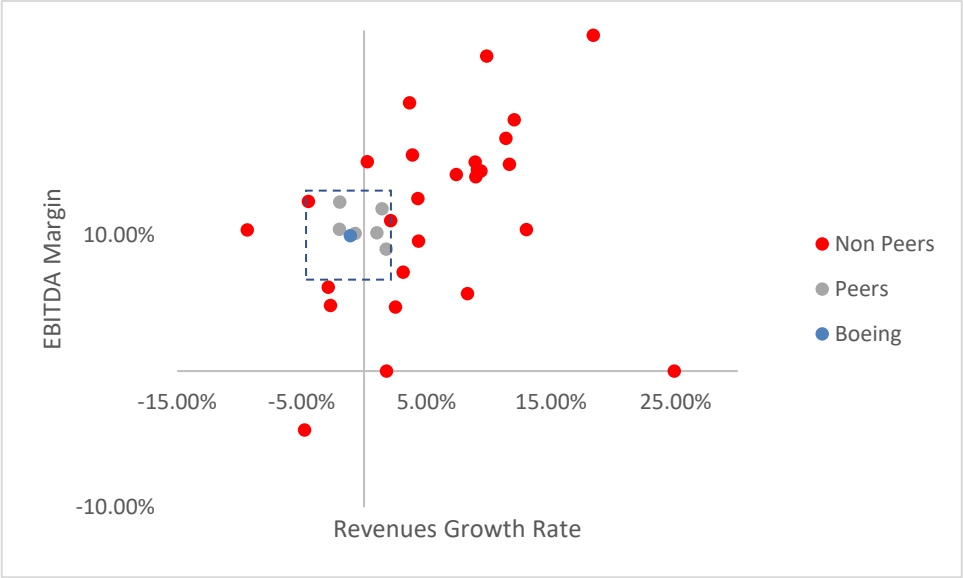

Figure 26 Boeing Peer Group Criteria and Selection

5.5.2 Multiples

	Market Cap (in $bn)	EV/EBITDA	P/E
Airbus SE	43.9	8.9x	9.3x
BAE Systems PLC	18.8	8.4x	10.8x
Allegheny Technologies Inc	0.968	4.3x	6.5x
Astronics Corp	0.249	6.1x	9.2x
AeroVironment Inc	1.356	31.4x	36.8x
CPI Aerostructures Inc	0.033	9.3x	7.0x
Median		8.7x	9.2x

Table 22 Boeing Peers Market Capitalization and Multiples

5.5.3 Adjustments

Taking into account the short- and medium-term impacts of both the COVID-19 and the Grounding, to accurately value Boeing in relative terms it is necessary to use the EBITDA and Net Income of 2023, which is the next year the company reaches close to the long-term margins. Thus, this will provide the valuation at December 2023, which then needs to be discounted to June 2020 at the WACC rate.

5.5.4 P/E

P/E	
Net Income 2023 (in $ bn)	8..0
Median Multiple	9.2x
Equity Value in Dec 2023 (in $ bn)	74.2
Cost of Equity (in %)	9.65
Equity Value in June 2020 (in $ bn)	53.7
Price per Share (in $)	95.2

Table 23 P/E Multiple Valuation

5.5.5 EV/EBITDA

EV/EBITDA	
EBITDA 2023 (in $ bn)	14.49
Median Multiple	8.7x
Enterprise Value Dec 2023 (in $ bn)	125.4
WACC (in %)	9.09
Enterprise Value June 2020 (in $ bn)	92.5
Net Debt (in $ bn)	34.2
Price per Share (in $)	103.3

Table 24 EV/EBITDA Multiple Valuation

5.6 Valuation Summary

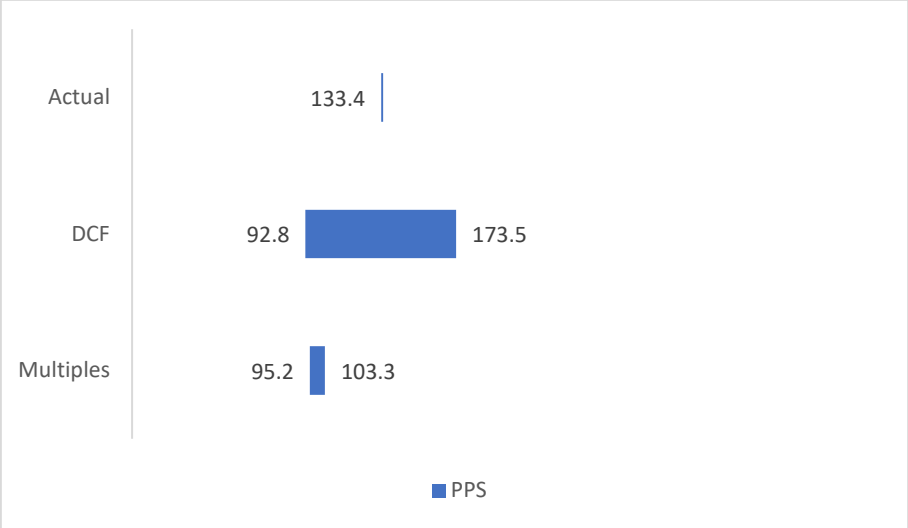

Figure 27 Valuation Summary of different methodologies (in $)

6. Comparison with Refinitiv Report

6.1 Overview

Refinitiv Boeing report was issued in May 11th 2020 with a 12-month price target of $155, this represents a 16.15% upside from closing price of $133.44. This report also mentions a high and low possibility of $209 and $102, respectively, based on analysts' estimates.

6.2 Revenues

Regarding Revenues, the base case is more conservative than the Refinitiv estimate, foreseeing less 16.5% Revenues in 2020 and less 20.3% in 2021.

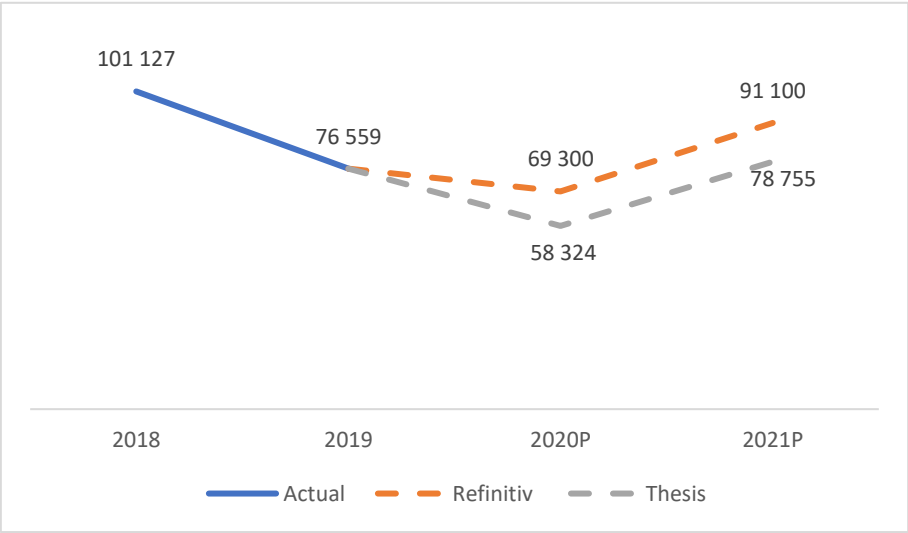

Figure 28 Thesis and Refinitiv Report Boeing Consolidated Revenues

6.2.1 Earnings per Share

Regarding the Earnings per Share, the thesis presents a gloomier near-term outlook, with a figure 7.6x lower totaling -$28.2 for 2020. For 2021, the Thesis still predicts negative EPS of -$11.1 whereas Refinitiv foresees positive EPS of $7.7.

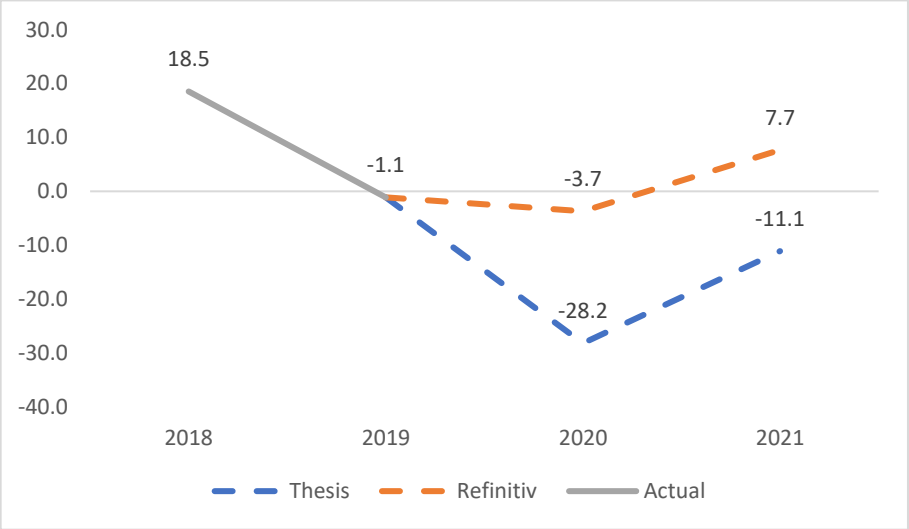

Figure 29 Thesis and Refinitiv Report Earnings per Share

6.3 Price per Share

As a result, by having lower fundamentals over the next couple of years, the thesis ends up having a lower PPS. The base case presents a PPS of $132.5, comparing with the mean of $155 of Refinitiv, which is 17% higher.

One possible explanation for this difference is the sell side analysts optimistic bias, meaning they are on average more optimistic on earnings forecast and price per share forecast. (Russel, Stanimir, & Michael, 2017). This happens because analysts are dependent on manager for

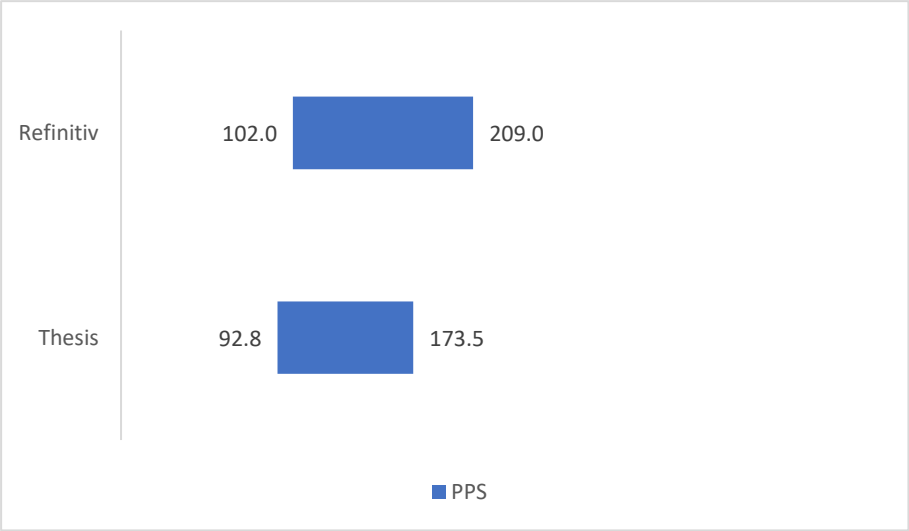

Figure 31 Thesis and Refinitiv Report Price per Share

information and are subsidized by investment banking revenues, which means they have incentives to please managers and facilitate investment banking activities.

7. Conclusion

The Boeing Company is facing a lot of uncertainty at this moment, as a result of the Covid-19 and 737 MAX Grounding crises.

This is evidenced by a wide range of PPS between the best and worst case scenarios of $92.8 and $173.5, which implies an 87% difference from the worst case. In addition, the company's cost of debt, estimated by the weighted average YTM of its outstanding Bonds, almost doubled from 2.58% in 26th February 2020 to 5.13% in 2nd May 2020. The difference between the unlevered 5-year monthly Beta (1.34) and the unlevered 2-year weekly Beta (1.81) also implies a recent increase in Boeing's operational risk of circa 47 p.p. compared to the market.

The most critical variables for the company are when will the 737 MAX be ungrounded with an impact of 5.1 $ in PPS per each quarter it is delayed. How long will it take for the 737 MAX program to reach its cruise speed level, with an estimated impact of 2.0$ in PPS per each month longer it takes the company to reach it. With regards to the non 737 MAX airplanes, the critical variables are how much will the segment decline in 2020, with each 5 p.p. increase in the decline costing Boeing on average 3.5$ in PPS and how long will it take for this segment to reach it's cruise speed, with each year longer estimated cost averaging 13.0$ in PPS.

8. Appendix

8.1 Literature Review

8.1.1 Adjusted Present Value

The APV methodology is based on the principle of additivity, hence the value of a project amounts to the sum of its Cash Flow generating parts (Luehrman T. A., 1997). This method divides the value of the firm in two pieces, the unlevered firm plus the valued added by debt, or capital structure choice. In opposition to the FCFF method, where the effects of debt are included in the discount rate, the estimate for the value and costs of debt is calculated separately from the operating assets. The effects of debt consist in the expected tax benefits of debt on the bright side, minus the expected value of bankruptcy costs on the downside. (Damodaran A. , 2007)

$$Value\ of\ Levered\ Firm = \frac{FCFF_0 * (1+g)}{\rho_u - g} + t_c * D - \pi_a * BC$$

Equation 17 Firm Value using APV (Damodaran, 2007)

Where:

- $\frac{FCFF_0 * (1+g)}{\rho_u - g}$: Value of Unlevered Firm.
- $t_c * D$: Value of Tax Benefits;
- $\pi_a * BC$: Present Value of Expected Bankruptcy Costs.

8.1.2 Dividend Discount Model

DDM are the oldest Discounted Cash Flows model. To apply this model, we need expected Dividends and the Cost of Equity as inputs.

$$Value\ of\ Firm = \sum_{t=1}^{t=\infty} \frac{E(DPS_t)}{(1+k_e)^t}$$

Equation 18 Value of Firm using Dividend Discount Model

Where:

- $E(DPS_t)$: Expected Dividends per Share in Period t
- k_e: Cost of equity

  There are other variations of the DDM which are somewhat more sophisticated and allow for two or more stages of different growth rates (Damodaran A. , 2007), but they will not be addressed in this study. Even in these cases, the models have several limitations, namely FCFE may not be equal to dividends payed, e.g. companies may

hold cash and not distribute dividends and consequently the model would undervalue the shareholders stake value. Or, companies could pay more dividends than the cash flows they generate, then overvaluing the company.

For these reasons, this model will not be used to value Boeing.

8.1.3 Liquidation and Accounting Valuation

This method determines the value of a business as the sum of each of its current assets separately. Measures for it can be, the book value of a business assets, book value plus earnings or accounting fair value (Damodaran A. , 2007). Nonetheless, a business is a going concern instead of a collection of assets, hence the value of a business should correspond to the value of previous investments that led to current assets, but also to the amount of future investments that will lead to future assets (growth assets). A considerable amount of growth firm's market value is from the future assets the company is expected to generate. For these companies with profitable growth possibilities, asset-based valuations will undervalue the business in opposition to going concern.

Liquidation valuation is based on valuing the business current assets, but as if they would have to be sold now. In this particular asset-based valuation approach, we bear the cost of the discount associated with a fire sale.

Due to the limitations mentioned before, these models will not be applied to value Boeing, since it could undervalue the business by overlooking the growth prospects and future positive net present value projects the company might engage in.

8.2 Company Overview

8.2.1 BCA

Figure 32: Boeing Next-Generation 73

Figure 33: Boeing Next-Generation 737

BOEING 737-700

- 126 2ND CLASS SEATS
- 149 MAXIMUM SEATS
- RANGE 3 500 KM
- AVG PRICE $89.1M

BOEING 737-800

- 162 2ND CLASS SEATS
- 189 MAXIMUM SEATS
- RANGE 4 200 KM
- AVG PRICE $106.1M

BOEING 737-900

- 178 2ND CLASS SEATS
- 220 MAXIMUM SEATS
- RANGE 4 300 KM
- AVG PRICE $112.6M

BOEING 737 MAX 7

- 138-153 2ND CLASS SEATS
- 172 MAXIMUM SEATS
- RANGE 7 130 KM
- AVG PRICE $99.7M

BOEING 737 MAX 8

- 162-178 2ND CLASS SEATS
- 210 MAXIMUM SEATS
- RANGE 6 570 KM

BOEING 737 MAX 178-193 2ND CLASS SEATS

- 220 MAXIMUM SEATS
- RANGE 6570 KM
- AVG PRICE $128.9M

BOEING 737 MAX 10

- 188-204 2ND CLASS SEATS
- 230 MAXIMUM SEATS
- RANGE 6 110 KM
- AVG PRICE $134.9M

Figure 3: Boeing 767

Figure 4: Boeing 777

Figure 5: Boeing 777X

BOEING 767F

- 52 480KG PAYLOAD
- RANGE 3 694 KM
- AVG PRICE $220.3M

BOEING 777-200LR

- 317 2ND CLASS SEATS
- RANGE 15 843 KM
- AVG PRICE $346.9M

BOEING 777-300ER

- 396 2ND CLASS SEATS
- RANGE 13 649 KM
- AVG PRICE $375.5M

BOEING 777-8

- 384 2ND CLASS SEATS
- RANGE 16 170 KM
- AVG PRICE $410.2M

BOEING 777-9

- 426 2ND CLASS SEATS
- RANGE 13 500 KM
- AVG PRICE $442.2M

Figure 6: Boeing 747 - 8

BOEING 747-8

- 410 3 CLASS SEATS
- RANGE 14 310 KM
- AVG PRICE $418.4M

Figure 7: Boeing 787

BOEING 787-8

- 248 2 CLASS SEATS
- RANGE 13 530 KM
- AVG PRICE $248.3M

BOEING 787-9

- 296 2 CLASS SEATS
- RANGE 13 950 KM
- AVG PRICE $292.5M

BOEING 787-10

- 336 2 CLASS SEATS
- RANGE 11 750 KM
- AVG PRICE $338.4M

Figure 8: Boeing Freighters

BOEING 747-8F

- 137 700 7KG PAYLOAD
- RANGE 7 630 KM
- AVG PRICE $419.2M

BOEING 777F

- 102 010 KG PAYLOAD
- RANGE 9 204 KM
- AVG PRICE $352.3M

BOEING 767F

- 52 480 KG PAYLOAD
- RANGE 6 028 KM
- AVG PRICE $220.3M

Figure 9: Boeing Business Jets

- **BBJ 787**
- **BBJ 777X**
- **BBJ 747-8**

It is important to clarify that Boeing has stopped the manufacturing of the 737 Next Generation program in 2019, as the new version 737 MAX was developed and has arrived. Nonetheless, the company still had some scheduled deliveries for 2020, therefore this program is still presented, despite the fact that has been discontinued.

8.3 Industry Analysis

8.3.1 Global Commercial Aircraft Industry

The global commercial aircraft industry grew 8.4% in 2018 to $682bn (2017: $629bn), over the 2014-2018 period experienced a CAGR of 5.5%.

The total order backlog is at an all-time peak amounting to more than 14 000 airplanes with about 38 000 expected to be manufactured globally over the next 20 years. In 2018, total airplane deliveries reached slightly more than 1 600 units and is expected to add another 100 in 2019. (Deloitte 2019 global aerospace and defense industry outlook)

8.3.2 Global Defense and Security Industry

The Global Defense and Security Industry grew 6.2% in 2018 to $658bn (2017: $619bn), over the 2014-2018 period experienced a CAGR of 3.2%.

Since the Donald Trump's election in 2016 the budget of the DoD has been rising. As a result, Russia and the Middle East. Other countries such as China, Japan and India have also risen their defense spending as a result of geopolitical tensions in the Middle East and North Korea.

8.3.3 United States Commercial Aircraft Industry

The United States Commercial Aircraft grew 9.9% in 2018 to $215bn (2017: $196bn), over the 2014-2018 period the industry experienced a CAGR of 9.8%.

This industry is one of the biggest exporters in the U.S., the steep growth can be attributed to fast economic growth and increased air travel in rising markets such as the Asian, coupled with the airlines need to replace aging fleet by new and more fuel efficient airplanes.

8.3.4 United States Defense and Security Industry

In 2018 the United States Defense & Security Industry grew 5.9% to $289bn (2017: $272.9bn), over the 2014-2018 period experienced a CAGR of (2.8)%. During the presidency of Barack Obama, the US DoD military spending shrank at a CAGR of (3.1)% over the 2009-2016 period, contracting from $764bn to $613bn, at 2017 constant currency. This was the main factor driving this trend as the U.S. is one of the main clients of this industry. After Donald Trump joined office in January 2017, as announced during his campaign, he has turned the trend around and for 2020 the DoD budget is set as $738bn, an increase of over 20% since 2017.

8.3.5 Porters 5 Forces Analysis

Competition in the industry is fierce since there are few competitors competing for few but large government and commercial contracts. Companies in the industry are large and there has been some consolidation recently, resulting in strengthening the incumbent's positions.

Given this large scale of the players it's difficult for new entrants to join the market, in addition the capital intensive factor and high expertise required.

The aforementioned factors contribute to the bargaining power of these companies with regards to both suppliers and clients. Nonetheless, since a lot of these clients are governments, given their financial power, this effect is mitigated to some extent. Despite the suppliers being a much less concentrated industry in the supply chain, since their required inputs are high quality, this offsets some of their weaker negotiating power.

The threat of substitutes is light, either for manufacture of defense products as for commercial airlines. For the first, there are no substitutes to the manufacture of defense products and for the latter, the substitutes to commercial airplanes are other means of transportation, e.g. sea and road, but these are more time consuming.

8.4 Financial Statements

8.4.1 Boeing Historical Consolidated Income Statement

	2016	2017	2018	2019
Turnover	**94 571.0**	**94 005.0**	**101 127.0**	**76 559.0**
Cost of Products	(72 713.0)	(68 879.0)	(72 922.0)	(62 877.0)
Gross Margin	**21 858.0**	**25 126.0**	**28 205.0**	**13 682.0**
Gross Margin %	23%	27%	28%	18%
Cost of Services	(8 018.0)	(7 663.0)	(8 499.0)	(9 154.0)
SG&A	(3 616.0)	(4 095.0)	(4 567.0)	(3 909.0)
R&D	(4 627.0)	(3 179.0)	(3 269.0)	(3 219.0)
Boeing Capital Interest Expense	(59.0)	(70.0)	(69.0)	(62.0)
Operating Investments	303.0	204.0	111.0	(4.0)
Disposals	(7.0)	21.0	75.0	691.0
Other Income/Expense	40.0	123.0	92.0	438.0
EBITDA	**7 292.2**	**12 514.3**	**14 193.3**	**734.2**
EBITDA margin	*7.7%*	*13.3%*	*14.0%*	*1.0%*
Depreciation & Amortization	(1 418.0)	(2 047.0)	(2 114.0)	(2 271.0)
EBIT	**5 874.2**	**10 467.3**	**12 079.3**	**(1 536.8)**
Financial Results	(306.0)	(360.0)	(475.0)	(722.0)
EBT	**5 568.2**	**10 107.3**	**11 604.3**	**(2 258.8)**
EBT margin	*5.9%*	*10.8%*	*11.5%*	*(3.0%)*
Income tax	(673.0)	(1 649.0)	(1 144.0)	1 623.0
Net Income	**4 895.2**	**8 458.3**	**10 460.3**	**(635.8)**
Net margin	*5.2%*	*9.0%*	*10.3%*	*(0.8%)*
Effective tax rate	*12.1%*	*16.3%*	*9.86%*	*71.9%*

Table 25 Boeing Historical Consolidated Income Statement

8.4.2 Boeing Provisional Consolidated Income Statement

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Turnover	**58 324**	**78 755**	**103 920**	**115 262**	**120 463**	**124 697**	**128 845**	**133 013**	**137 261**	**141 620**	**146 111**
Cost of Products	(51 713)	(66 553)	(77 760)	(83 178)	(86 438)	(89 200)	(91 883)	(94 581)	(97 329)	(100 144)	(103 039)
Gross Margin	**6 611**	**12 202**	**26 160**	**32 084**	**34 025**	**35 497**	**36 962**	**38 432**	**39 932**	**41 476**	**43 072**
Gross Margin %	0	0	0	0	0	0	0	0	0	0	0
Cost of Services	(9 587)	(10 040)	(10 515)	(11 013)	(11 533)	(12 079)	(12 650)	(13 248)	(13 875)	(14 531)	(15 219)
SG&A	(4 595)	(4 698)	(4 808)	(4 919)	(5 017)	(5 117)	(5 220)	(5 324)	(5 431)	(5 539)	(5 650)
R&D	(1 961)	(2 901)	(3 975)	(4 411)	(4 584)	(4 737)	(4 892)	(5 052)	(5 217)	(5 387)	(5 562)
Boeing Capital Interest Expense	(46)	(62)	(82)	(90)	(95)	(98)	(101)	(104)	(108)	(111)	(115)
Operating Investments	--	--	--	--	--	--	--	--	--	--	--
Disposals	--	--	--	--	--	--	--	--	--	--	--
Other Income/Expense	(8 259)	--	--	--	--	--	--	--	--	--	--
EBITDA	**(15 453)**	**(2 975)**	**9 457**	**14 491**	**15 803**	**15 523**	**15 186**	**15 973**	**16 760**	**17 558**	**18 375**
Depreciation & Amortization	(2 383)	(2 525)	(2 677)	(2 840)	(3 008)	(2 057)	(1 087)	(1 270)	(1 458)	(1 650)	(1 848)
EBIT	**(17 836)**	**(5 500)**	**6 780**	**11 651**	**12 796**	**13 466**	**14 099**	**14 703**	**15 302**	**15 908**	**16 527**
Financial Results	(2 310)	(2 433)	(2 919)	(2 451)	(1 741)	(1 320)	(902)	(882)	(925)	(969)	(1 014)
EBT	**(20 146)**	**(7 933)**	**3 861**	**9 200**	**11 054**	**12 146**	**13 197**	**13 821**	**14 377**	**14 938**	**15 512**
Income tax	4 231	1 666	(492)	(1 173)	(1 410)	(1 549)	(1 683)	(1 763)	(1 834)	(1 905)	(1 978)
(Net Income	**(15 915)**	**(6 267)**	**3 369**	**8 027**	**9 644**	**10 597**	**11 514**	**12 059**	**12 543**	**13 033**	**13 534**

Table 26 Boeing Provisional Consolidated Income Statement

8.4.3 Boeing Historical Balance Sheet

	2016	2017	2018	2019
Non Current Assets	**27 509**	**27 168**	**29 529**	**31 396**
Customer financing, net	3 773	2 756	2 418	2 136
Property, plant and equipment, net	12 807	12 672	12 645	12 502
Goodwill	5 324	5 559	7 840	8 060
Acquired intangible assets, net	2 540	2 573	3 429	3 338
Deferred income taxes	332	321	284	683
Investments	1 317	1 260	1 087	1 092
Other assets	1 416	2 027	1 826	3 585
Current Assets	**62 488**	**85 194**	**87 830**	**102 229**
Inventories	43 199	61 388	62 567	76 622
Clients	8 832	2 894	3 879	3 266
Unbilled Receivables		8 194	10 025	9 043
Customer Financing	428	309	460	162
Other current assets		2 417	2 335	3 106
Cash and Equivalents	8 801	8 813	7 637	9 485
Short Term and other Investments	1 228	1 179	927	545
Total Assets	**89 997**	**112 362**	**117 359**	**133 625**
Equity	**877**	**1 713**	**410**	**(8 300)**
Capital	5 061	5 061	5 061	5 061
Additional Paid in Capital	4 762	6 804	6 768	6 745
Treasury Stock	(36 097)	(43 454)	(52 348)	(54 914)
Retained Earnings	40 714	49 618	55 941	50 644
Accumulated Other Comprehensive Loss Result for the financial year	(13 623)	(16 373)	(15 083)	(16 153)
Non Controlling interest	60	57	71	317
Total Liabilities	**89 120**	**110 649**	**116 949**	**141 925**
Non Current Liabilities	**38 986**	**36 001**	**35 359**	**44 613**
Financings (Non Current)	9 568	9 782	10 657	19 962
Accrued Retiree Health Care	5 916	5 545	4 584	4 540
Accrued Pension Plan Liability	19 943	16 471	15 323	16 276
Provisions				
Deffered Tax	1 338	2 188	1 736	413
Other Long Term Liabilities	2 221	2 015	3 059	3 422
Current Liabilities	**50 134**	**74 648**	**81 590**	**97 312**
Suppliers	11 190	12 202	12 916	15 553
Financings (Current)	384	1 335	3 190	7 340
Accrued Liabilities	14 691	13 069	14 808	22 868
Advances and Progress Billings	23 869	48 042	50 676	51 551
Equity + Liabilities	**89 997**	**112 362**	**117 359**	**133 625**

Table 27 Boeing Historical Balance Sheet

8.4.4 Boeing Provisional Balance Sheet

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Non Current Assets	**30 589**	**30 047**	**29 505**	**28 944**	**28 292**	**28 660**	**30 065**	**31 356**	**32 530**	**33 582**	**34 509**
Customer financing, net	2 136	2 136	2 136	2 136	2 136	2 136	2 136	2 136	2 136	2 136	2 136
Property, plant and equipment, net	11 695	11 153	10 611	10 050	9 398	9 766	11 171	12 462	13 636	14 688	15 615
Goodwill	8 060	8 060	8 060	8 060	8 060	8 060	8 060	8 060	8 060	8 060	8 060
Acquired intangible assets, net	3 338	3 338	3 338	3 338	3 338	3 338	3 338	3 338	3 338	3 338	3 338
Deferred income taxes	683	683	683	683	683	683	683	683	683	683	683
Investments	1 092	1 092	1 092	1 092	1 092	1 092	1 092	1 092	1 092	1 092	1 092
Other assets	3 585	3 585	3 585	3 585	3 585	3 585	3 585	3 585	3 585	3 585	3 585
Current Assets	**98 607**	**102 794**	**105 475**	**106 817**	**104 492**	**107 575**	**105 927**	**112 616**	**121 080**	**130 102**	**139 705**
Inventories	76 622	76 622	77 934	77 366	74 164	76 534	78 835	81 151	83 508	85 924	88 408
Clients	2 488	3 360	4 433	4 917	5 139	5 320	5 497	5 674	5 856	6 042	6 233
Unbilled Receivables	6 889	9 302	10 302	11 426	11 942	12 362	12 773	13 186	13 607	14 039	14 484
Customer Financing	211	285	376	417	436	451	466	481	497	513	529
Other current assets	2 366	3 195	2 399	2 661	2 781	2 879	2 975	3 071	3 169	3 270	3 374
Cash and Equivalents	9 485	9 485	9 485	9 485	9 485	9 485	4 836	8 507	13 898	19 770	26 132
Short Term and other Investments	545	545	545	545	545	545	545	545	545	545	545
Total Assets	**129 196**	**132 842**	**134 980**	**135 761**	**132 784**	**136 235**	**135 992**	**143 972**	**153 609**	**163 683**	**174 214**
Equity	**(24 215)**	**(30 482)**	**(27 113)**	**(19 086)**	**(9 442)**	**1 155**	**8 019**	**15 336**	**23 042**	**31 141**	**39 643**
Capital	5 061	5 061	5 061	5 061	5 061	5 061	5 061	5 061	5 061	5 061	5 061
Additional Paid in Capital	6 745	6 745	6 745	6 745	6 745	6 745	6 745	6 745	6 745	6 745	6 745
Treasury Stock	(54 914)	(54 914)	(54 914)	(54 914)	(54 914)	(54 914)	(54 914)	(54 914)	(54 914)	(54 914)	(54 914)
Retained Earnings	50 644	34 729	28 462	31 831	39 858	49 502	55 449	62 221	69 442	77 052	85 053
Accumulated Other Comprehensive Loss	(16 153)	(16 153)	(16 153)	(16 153)	(16 153)	(16 153)	(16 153)	(16 153)	(16 153)	(16 153)	(16 153)
Result for the financial year	(15 915)	(6 267)	3 369	8 027	9 644	10 597	11 514	12 059	12 543	13 033	13 534
Non Controlling interest	317	317	317	317	317	317	317	317	317	317	317
Total Liabilities	**153 411**	**163 324**	**162 094**	**154 848**	**142 226**	**135 081**	**127 973**	**128 637**	**130 568**	**132 542**	**134 571**
Non Current Liabilities	**57 574**	**59 324**	**66 253**	**59 583**	**49 471**	**43 470**	**37 509**	**37 220**	**37 839**	**38 467**	**39 110**
Financings (Non Current)	32 923	34 673	41 602	34 932	24 820	18 819	12 858	12 569	13 188	13 816	14 459
Accrued Retiree Health Care	4 540	4 540	4 540	4 540	4 540	4 540	4 540	4 540	4 540	4 540	4 540
Accrued Pension Plan Liability	16 276	16 276	16 276	16 276	16 276	16 276	16 276	16 276	16 276	16 276	16 276
Provisions											
Deffered Tax	413	413	413	413	413	413	413	413	413	413	413
Other Long Term Liabilities	3 422	3 422	3 422	3 422	3 422	3 422	3 422	3 422	3 422	3 422	3 422
Current Liabilities	**95 837**	**104 000**	**95 841**	**95 265**	**92 755**	**91 610**	**90 464**	**91 417**	**92 728**	**94 075**	**95 461**
Suppliers	13 496	16 649	13 982	14 887	15 470	15 981	16 486	16 996	17 519	18 057	18 612
Financings (Current)	12 106	12 749	15 297	12 844	9 126	6 920	4 728	4 622	4 849	5 080	5 317
Accrued Liabilities	18 685	23 051	15 011	15 983	16 608	17 158	17 699	18 248	18 809	19 386	19 982
Advances and Progress Billings	51 551	51 551	51 551	51 551	51 551	51 551	51 551	51 551	51 551	51 551	51 551
Equity + Liabilities	**129 196**	**132 842**	**134 980**	**135 761**	**132 784**	**136 235**	**135 992**	**143 972**	**153 609**	**163 683**	**174 214**

Table 28 Boeing Provisional Balance Sheet

8.5 Boeing Provisional Financial Debt

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Inital Balance	27 302	45 028	47 422	56 899	47 776	33 946	25 739	17 586	17 191	18 037	18 897
Withdrawals	17 726	2 393	9 477	--	--	--	--	--	847	859	879
Repayments	--	--	--	(9 123)	(13 830)	(8 207)	(8 153)	(396)	--	--	--
Net change in Debt	17 726	2 393	9 477	(9 123)	(13 830)	(8 207)	(8 153)	(396)	847	859	879
Final Balance	**45 028**	**47 422**	**56 899**	**47 776**	**33 946**	**25 739**	**17 586**	**17 191**	**18 037**	**18 897**	**19 775**
Interest	(2 310)	(2 433)	(2 919)	(2 451)	(1 741)	(1 320)	(902)	(882)	(925)	(969)	(1 014)
Applicable Interest Rate	5.13%	5.13%	5.13%	5.13%	5.13%	5.13%	5.13%	5.13%	5.13%	5.13%	5.13%
Financial Debt / EBITDA Ratio	(2.9)	(15.9)	6.0	3.3	2.1	1.7	1.2	1.1	1.1	1.1	1.1

Table 29 Boeing Consolidated Provisional Financial Debt

8.6 Revenues

8.6.1 BCA Units Delivered

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Total	176	494	803	883	898	913	929	945	961	977	994
737	12	300	580	630	641	652	663	674	686	697	709
747	5	5	6	7	7	7	7	7	8	8	8
767	28	33	38	43	44	44	45	46	47	48	48
777	29	35	40	45	46	47	47	48	49	50	51
787	103	121	140	158	161	163	166	169	172	175	178

Table 30 BCA Units Delivered

8.6.2 BCA Average Price by Program

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
737	115	118	121	124	126	129	131	134	136	139	142
747	421	431	441	451	460	469	479	488	498	508	518
767	220	225	231	236	241	246	250	255	261	266	271
777	375	383	392	401	409	417	425	434	443	452	461
787	295	301	309	316	322	328	335	342	348	355	363

Table 31 BCA Average Price by Program

8.6.3 BCA Gross Revenue by Program

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Total	50 706	94 877	140 169	159 020	164 969	171 140	177 541	184 182	191 072	198 219	205 634
737	1 385	35 402	70 043	77 805	80 721	83 746	86 884	90 140	93 518	97 023	100 659
747	1 917	2 312	2 726	3 157	3 275	3 397	3 524	3 656	3 792	3 934	4 081
767	6 162	7 430	8 761	10 147	10 525	10 918	11 326	11 749	12 188	12 643	13 115
777	10 957	13 213	15 579	18 042	18 716	19 415	20 140	20 892	21 672	22 481	23 321
787	30 285	36 520	43 060	49 869	51 731	53 663	55 667	57 745	59 902	62 138	64 459

Table 32 BCA Gross Revenue by Program

8.6.4 BCA Average Discount

2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
64.15%	60.45%	57.79%	57.79%	57.79%	57.79%	57.79%	57.79%	57.79%	57.79%	57.79%

Table 33 BCA Average Discount

8.6.5 BCA Net Revenue by Program

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Total	18 177	37 527	59 165	67 122	69 633	72 238	74 940	77 743	80 651	83 668	86 798
737	497	14 003	29 565	32 841	34 072	35 349	36 674	38 048	39 474	40 953	42 488
747	687	915	1 151	1 333	1 382	1 434	1 488	1 543	1 601	1 661	1 723
767	2 209	2 939	3 698	4 283	4 443	4 609	4 781	4 959	5 144	5 337	5 536
777	3 928	5 226	6 576	7 616	7 900	8 195	8 501	8 818	9 148	9 489	9 844
787	10 856	14 445	18 175	21 050	21 836	22 651	23 497	24 374	25 284	26 228	27 208

Table 34 BCA Net Revenue by Program

8.6.6 737 MAX Monthly Production

jan/20	fev/20	mar/20	abr/20	mai/20	jun/20	jul/20	ago/20	set/20	out/20	nov/20	dez/20
0	0	0	0	0	0	0	0	0	0	0	12

jan/21	fev/21	mar/21	abr/21	mai/21	jun/21	jul/21	ago/21	set/21	out/21	nov/21	dez/21
14	16	18	20	22	24	26	28	30	32	34	36

jan/22	fev/22	mar/22	abr/22	mai/22	jun/22	jul/22	ago/22	set/22	out/22	nov/22	dez/22
38	40	42	44	46	48	50	52	54	56	58	52

jan/23	fev/23	mar/23	abr/23	mai/23	jun/23	jul/23	ago/23	set/23	out/23	nov/23	dez/23
52	52	52	52	52	52	53	53	53	53	53	53

jan/24	fev/24	mar/24	abr/24	mai/24	jun/24	jul/24	ago/24	set/24	out/24	nov/24	dez/24
53	53	53	53	53	53	53	53	54	54	54	54

jan/25	fev/25	mar/25	abr/25	mai/25	jun/25	jul/25	ago/25	set/25	out/25	nov/25	dez/25
54	54	54	54	54	54	54	54	54	55	55	55

jan/26	fev/26	mar/26	abr/26	mai/26	jun/26	jul/26	ago/26	set/26	out/26	nov/26	dez/26
55	55	55	55	55	55	55	55	55	55	56	56

jan/27	fev/27	mar/27	abr/27	mai/27	jun/27	jul/27	ago/27	set/27	out/27	nov/27	dez/27
56	56	56	56	56	56	56	56	56	56	57	57

jan/28	fev/28	mar/28	abr/28	mai/28	jun/28	jul/28	ago/28	set/28	out/28	nov/28	dez/28
57	57	57	57	57	57	57	57	57	57	57	58

jan/29	fev/29	mar/29	abr/29	mai/29	jun/29	jul/29	ago/29	set/29	out/29	nov/29	dez/29
58	58	58	58	58	58	58	58	58	58	58	59

jan/30	fev/30	mar/30	abr/30	mai/30	jun/30	jul/30	ago/30	set/30	out/30	nov/30	dez/30
59	59	59	59	59	59	59	59	59	59	59	60

Table 35 737 MAX Monthly Production

8.6.7 Non 737 Yearly Production

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
747	5	5	6	7	7	7	7	7	8	8	8
% yoy	*(35.0%)*	*17.9%*	*15.2%*	*13.2%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*
767	28	33	38	43	44	44	45	46	47	48	48
% yoy	*(35.0%)*	*17.9%*	*15.2%*	*13.2%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*
777	29	35	40	45	46	47	47	48	49	50	51
% yoy	*(35.0%)*	*17.9%*	*15.2%*	*13.2%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*
787	103	121	140	158	161	163	166	169	172	175	178
% yoy	*(35.0%)*	*17.9%*	*15.2%*	*13.2%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*

Table 36 Non 737 Yearly Production

8.6.8 BDS Units Produced

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Total Units	168	166	188	174	176	179	176	177	178	177	177
Aircrafts	165	163	186	171	173	177	174	175	175	175	175
F/A-18 Models	21	20	21	21	21	21	21	21	21	21	21
F-15 Models	12	11	11	12	11	12	12	11	12	12	11
C-17 Globemaster III	0	0	1	0	0	1	0	1	1	0	1
CH-47 Chinook (New)	12	13	12	12	12	12	12	12	12	12	12
CH-47 Chinook (Renewed)	25	21	23	23	22	23	23	22	23	23	22
AH-64 Apache (New)	16	18	24	19	20	21	20	20	20	20	20
AH-64 Apache (Remanufactured)	51	49	58	53	54	55	54	54	54	54	54
KC-46 Tanker	9	12	17	13	14	14	14	14	14	14	14
P-8 Models	18	17	18	18	17	18	17	17	18	17	17
C-40A	1	1	1	1	1	1	1	1	1	1	1
Satellites	3	2	2	2	2	2	2	2	2	2	2
Commercial and civil satellites	2	2	2	2	2	2	2	2	2	2	2
Military Satellites	1	1	0	1	1	0	1	0	0	1	0

Table 37 BDS Units Produced

8.7 Costs

8.7.1 Boeing Consolidated Provisional Costs

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Cost of Products	(51 713)	(66 553)	(77 760)	(83 178)	(86 438)	(89 200)	(91 883)	(94 581)	(97 329)	(100 144)	(103 039)
Wages and Salaries	(18 915)	(19 293)	(19 679)	(20 073)	(20 474)	(20 883)	(21 301)	(21 727)	(22 162)	(22 605)	(23 057)
Variable Costs	(32 040)	(46 485)	(57 289)	(62 295)	(65 137)	(67 473)	(69 721)	(71 976)	(74 272)	(76 626)	(79 051)
Cost of Services	(9 587)	(10 040)	(10 515)	(11 013)	(11 533)	(12 079)	(12 650)	(13 248)	(13 875)	(14 531)	(15 219)
SG&A	(4 595)	(4 698)	(4 808)	(4 919)	(5 017)	(5 117)	(5 220)	(5 324)	(5 431)	(5 539)	(5 650)
R&D	(1 961)	(2 901)	(3 975)	(4 411)	(4 584)	(4 737)	(4 892)	(5 052)	(5 217)	(5 387)	(5 562)
Boeing Capital Interest Expense	(46)	(62)	(82)	(90)	(95)	(98)	(101)	(104)	(108)	(111)	(115)
Operating Investments	--	--	--	--	--	--	--	--	--	--	--
Disposals	--	--	--	--	--	--	--	--	--	--	--
Other Income/ Expense	(8 259)	--	--	--	--	--	--	--	--	--	--

Table 38 Boeing Consolidated Provisional Costs

8.7.2 Boeing Consolidated Wages and Salaries

Year	2006	2007	2008	2009	2010	2011	2012	2013
Wages and Salaries	15 871	14 852	15 559	15 424	15 709	16 782	17 911	18 062
Year-end Number of Employees	154 000	159 300	162 200	157 100	160 500	171 700	174 400	168 400
Average Nº of Employees in Year		156 650	160 750	159 650	158 800	166 100	173 050	171 400
Average Cost per Employees		0.095	0.097	0.097	0.099	0.101	0.104	0.105
% yoy			2.09%	-0.18%	2.39%	2.14%	2.44%	1.81%

Table 39 Boeing Consolidated Wages and Salaries

Year	2014	2015	2016	2017	2018	2019	2020P	2021P
Wages and Salaries	17 702	17 719	17 301	16 530	17 005	18 544	18 915	19 293
Year-end Number of Employees	165 500	161 400	150 500	140 800	153 000	161 100	153 000	161 100
Average Nº of Employees in Year	166 950	163 450	155 950	145 650	146 900	157 050	157 050	157 050
Average Cost per Employees	0.106	0.108	0.111	0.113	0.116	0.118	0.120	0.123
% yoy	0.62%	2.24%	2.34%	2.30%	2.00%	2.00%	2.00%	2.00%

Table 40 Boeing Consolidated Wages and Salaries

Year	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Wages and Salaries	19 679	20 073	20 474	20 883	21 301	21 727	22 162	22 605	23 057
Year-end Number of Employees	153 000	161 100	153 000	161 100	153 000	161 100	153 000	161 100	153 000
Average Nº of Employees in Year	157 050	157 050	157 050	157 050	157 050	157 050	157 050	157 050	157 050
Average Cost per Employees	0.125	0.128	0.130	0.133	0.136	0.138	0.141	0.144	0.147
% yoy	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%

Table 41 Boeing Consolidated Wages and Salaries

8.7.3 BCA Provisional Costs Breakdown

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
R&D	(847)	(1 749)	(2 758)	(3 129)	(3 246)	(3 367)	(3 493)	(3 624)	(3 759)	(3 900)	(4 046)
R&D / BCA Revenues	(4.7%)	(4.7%)	(4.7%)	(4.7%)	(4.7%)	(4.7%)	(4.7%)	(4.7%)	(4.7%)	(4.7%)	(4.7%)
Operating Costs	(10 581)	(25 363)	(35 199)	(38 669)	(40 117)	(41 652)	(43 211)	(44 829)	(46 507)	(48 248)	(50 054)
Variable Costs	(9 734)	(23 614)	(32 441)	(35 540)	(36 871)	(38 285)	(39 718)	(41 205)	(42 747)	(44 348)	(46 008)
As % of BCA Revenue											
USD per Airplane	(55)	(48)	(40)	(40)	(41)	(42)	(43)	(44)	(44)	(45)	(46)
Wages and Salaries	(10 542)	(10 753)	(10 968)	(11 187)	(11 411)	(11 639)	(11 872)	(12 109)	(12 351)	(12 598)	(12 850)
SG&A											
COS											
Concessions to customers	(8 259)	--	--	--	--	--	--	--	--	--	--

Table 42 BCA Provisional Costs Breakdown

8.7.4 BDS Provisional Costs Breakdown

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
R&D	(805)	(842)	(880)	(919)	(956)	(972)	(989)	(1 006)	(1 023)	(1 040)	(1 058)
R&D / BDSS Revenues	(3.1%)	(3.1%)	(3.1%)	(3.1%)	(3.1%)	(3.1%)	(3.1%)	(3.1%)	(3.1%)	(3.1%)	(3.1%)
Operating Costs	(14 861)	(15 546)	(16 246)	(16 961)	(17 648)	(17 948)	(18 253)	(18 564)	(18 879)	(19 200)	(19 526)
Variable Costs	(14 055)	(14 703)	(15 366)	(16 042)	(16 692)	(16 976)	(17 264)	(17 558)	(17 856)	(18 160)	(18 468)
Wages and Salaries	(5 250)	(5 355)	(5 462)	(5 571)	(5 683)	(5 796)	(5 912)	(6 030)	(6 151)	(6 274)	(6 399)
Units Produced	231	168	166	188	174	176	179	176	177	178	177

Table 43 BDS Provisional Costs Breakdown

8.7.5 BGS Provisional Costs Breakdown

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
R&D	(149)	(147)	(171)	(193)	(209)	(220)	(230)	(238)	(247)	(255)	(263)
R&D / BGS Revenues	(0.8%)	(1.0%)	(1.2%)	(1.2%)	(1.1%)	(1.1%)	(1.1%)	(1.1%)	(1.1%)	(1.1%)	(1.1%)
Operating Costs	(15 869)	(16 224)	(16 603)	(16 985)	(17 325)	(17 671)	(18 025)	(18 385)	(18 753)	(19 128)	(19 511)
Variable Costs	(8 203)	(8 103)	(9 396)	(10 617)	(11 475)	(12 109)	(12 633)	(13 104)	(13 555)	(14 002)	(14 454)
Wages and Salaries	(3 082)	(3 143)	(3 206)	(3 270)	(3 336)	(3 403)	(3 471)	(3 540)	(3 611)	(3 683)	(3 757)

Table 44 BGS Provisional Costs Breakdown

8.7.6 BC Provisional Costs Breakdown

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Operating Costs	(90)	(107)	(129)	(139)	(144)	(149)	(153)	(157)	(162)	(166)	(171)
Variable Costs	(48)	(65)	(86)	(95)	(99)	(103)	(106)	(110)	(113)	(117)	(121)
Boeing Capital interest Expense	(46)	(62)	(82)	(90)	(95)	(98)	(101)	(104)	(108)	(111)	(115)

Table 45 BC Provisional Costs Breakdown

8.7.7 Unallocated Provisional Costs

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
R&D	(159)	(163)	(166)	(170)	(174)	(177)	(181)	(184)	(188)	(192)	(195)
Operating Costs	(917)	(937)	(959)	(981)	(1 001)	(1 021)	(1 041)	(1 062)	(1 083)	(1 105)	(1 127)
Opex (COP, ESS, SG&A,)	(758)	(775)	(793)	(811)	(827)	(844)	(861)	(878)	(895)	(913)	(932)

Table 46 Unallocated Provisional Costs

8.8 Scenarios Analysis – Additional Information

8.8.1 Best Case

8.8.1.1 Operational Outputs

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Average Variable Cost / Airplane (USD m)	53	42	39	40	41	42	43	44	44	45	46
Total Airplanes Manufactured	243	701	950	956	973	989	1 006	1 024	1 041	1 059	1 077
737 Airplanes	66	486	697	699	711	723	736	748	761	774	787
737 Avg Monthly Rate	6	41	58	58	59	60	61	62	63	65	66
Non 737	177	215	253	257	262	266	271	275	280	285	290

Table 47 Best Case Key Operational Outputs

8.8.1.2 Financial Outputs

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
EBITDA	(15 111)	2 481	14 908	16 336	17 630	17 402	17 109	17 953	18 806	19 675	20 568
Financial Debt	43 917	42 185	54 078	40 235	24 171	18 728	18 413	19 322	20 239	21 175	22 135
Cash	9 485	9 485	9 485	9 485	9 485	18 731	32 782	48 780	65 496	82 943	101 137
Net Financial Debt	34 432	32 700	44 593	30 750	14 686	(3)	(14 369)	(29 458)	(45 257)	(61 768)	(79 002)
FD / EBITDA	n.a.	17.0x	3.6x	2.5x	1.4x	1.1x	1.1x	1.1x	1.1x	1.1x	1.1x
Interest Expense / EBITDA	n.a.	0.9x	0.2x	0.1x	0.1x	0.1x	0.1x	0.1x	0.1x	0.1x	0.1x

Table 48 Best Case Key Financial Outputs

8.8.1.3 Dividends

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Dividends	--	--	--	--	--	4 649	4 742	4 837	4 934	5 033	5 133
Dividends per Share	--	--	--	--	--	8.24	8.40	8.57	8.74	8.92	9.10

Table 49 Best Case Dividends and Dividends per Share

8.8.2 Worst Case

8.8.2.1 Operational Outputs

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Average Variable Cost / Airplane (USD m)	56	52	48	44	41	42	43	44	44	45	46
Total Airplanes Manufactured	152	342	532	702	869	895	910	926	942	958	974
737 Airplanes	0	165	330	474	616	638	649	660	671	683	694
737 Avg Monthly Rate	0	14	28	40	51	53	54	55	56	57	58
Non 737	152	177	202	228	253	257	262	266	271	275	280

Table 50 Worst Case Key Operational Outputs

8.8.2.2 Financial Outputs

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
EBITDA	(16 444)	(7 954)	330	6 724	14 319	14 367	14 082	14 898	15 684	16 464	17 254
Financial Debt	46 128	53 475	55 523	53 059	53 412	47 715	41 698	34 617	26 531	17 719	18 570
Cash	9 485	9 485	9 485	9 485	9 485	14 142	18 893	23 739	28 681	34 000	49 639
Net Financial Debt	36 643	43 990	46 038	43 574	43 927	33 573	22 805	10 879	(2 150)	(16 280)	(31 069)
FD / EBITDA	n.a.	n.a.	168.1x	7.9x	3.7x	3.3x	3.0x	2.3x	1.7x	1.1x	1.1x
Interest Expense / EBITDA	n.a.	n.a.	8.6x	0.4x	0.2x	0.2x	0.2x	0.1x	0.1x	0.1x	0.1x

Table 51 Worst Case Key Financial Outputs

8.8.2.3 Dividends

	2020P	2021P	2022P	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P
Dividends	--	--	--	--	--	--	--	--	--	4 649	4 742
Dividends per Share	--	--	--	--	--	--	--	--	--	8.24	8.40

Table 52 Worst Case Dividends and Dividends per Share

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