

BOEING INVESTMENT MEMO (NYSE:BA), 30/12/2024Market cap: 134.96B Share price: 180.38 Fwd P/E: NMINVESTMENT THESIS:

Boeing, a global leader in aerospace and defence, presents a compelling long-term investment opportunity despite facing significant challenges. With a backlog of over 4,800 orders valued at \$500 billion, the company remains strategically positioned to benefit from the recovery in air travel demand, growing defence contracts, and advancements in aerospace technology. However, Boeing's financial health reflects ongoing difficulties, including negative equity of \$-23 billion, total debt of \$57.65 billion, and losses exceeding \$7 billion in 2024 due to fixed-price contract overruns and production delays.

P/E	NM
EV/EBITDA FWD	31.05X
EV/REVENUE	2.4 X

Despite these hurdles, Boeing's critical role in global aviation and defence, alongside its 32% revenue contribution from stable defence contracts and \$1 billion investment in 787 Dreamliner production, highlights its potential for recovery. With an expected doubling of passenger traffic by 2040 and a projected demand for 42,600 new aircraft over the next decade, Boeing's market dominance and strategic initiatives offer a strong foundation for long-term growth, making it an attractive, albeit high-risk, investment.

Boeing product portfolio

Boeing's product offerings span across three primary segments: Commercial Airplanes, Defense, Space & Security, and Global Services. The Commercial Airplanes segment, which accounts for approximately 43% of Boeing's revenue, includes flagship aircraft like the 737 MAX, 787 Dreamliner, and the wide-body 777 series, catering to airlines and cargo operators globally. The Défense, Space & Security division contributes 32% of total revenue, delivering military aircraft such as the F/A-18 Super Hornet, KC-46 Pegasus, and rotorcraft like the CH-47 Chinook, along with advanced space systems such as the Starliner spacecraft. Meanwhile, Global Services represents 25% of Boeing's revenue, focusing on maintenance, repair, pilot training, analytics, and digital solutions to ensure long-term customer support. This diversified product portfolio helps Boeing capture opportunities across

<i>(Square feet in thousands)</i>	Owned	Leased	Government Owned	Total
Commercial Airplanes	39,919	7,795		47,714
Defense, Space & Security	22,849	4,404		27,253
Global Services	1,265	7,004		8,269
Other ⁽¹⁾	2,205	2,809	315	5,329
Total	66,238	22,012	315	88,565

commercial aviation, defence contracts, and aftermarket services, providing a balance between cyclical commercial demand and stable defence revenues.

Figure 1: Boeing fleet value

Revenues

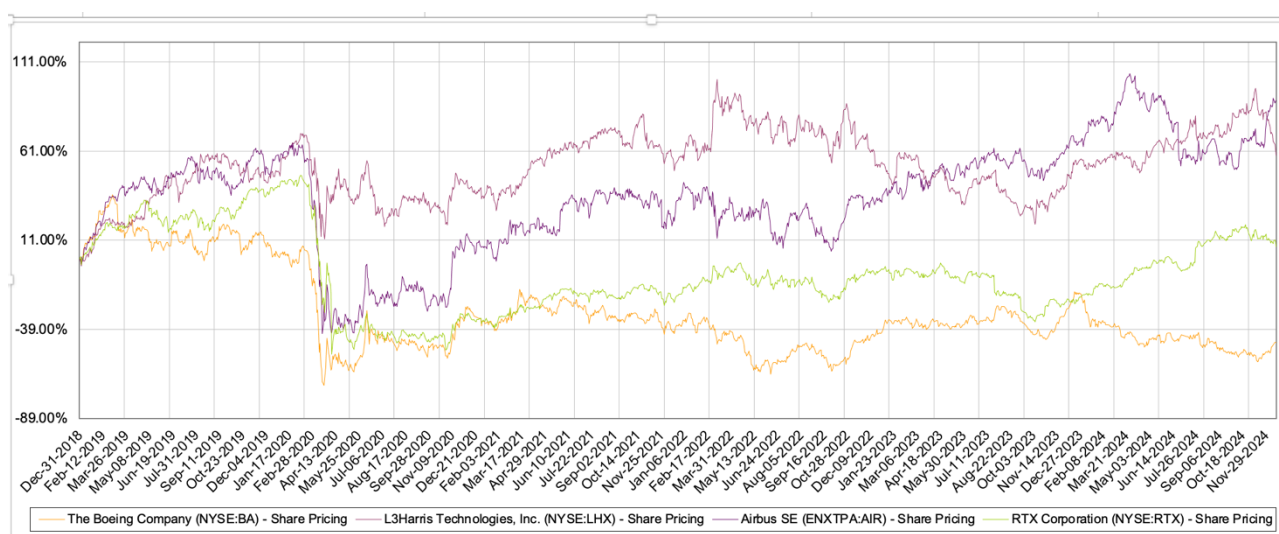
The following table summarizes Revenues:

<i>(Dollars in millions)</i>			
Years ended December 31,	2023	2022	2021
Commercial Airplanes	\$33,901	\$26,026	\$19,714
Defense, Space & Security	24,933	23,162	26,540
Global Services	19,127	17,611	16,328
Unallocated items, eliminations and other	(167)	(191)	(296)
Total	\$77,794	\$66,608	\$62,286

Figure 2: Boeing product share

Competitors

Airbus, L3Harris, and Raytheon, reflecting its ongoing challenges across commercial aviation and defense sectors. Airbus has effectively capitalized on Boeing's difficulties, particularly the 737 MAX crisis, to secure new orders and strengthen its market share, while Boeing struggles to regain trust and resolve production delays. In the defense and aerospace arena, companies like L3Harris and Raytheon have shown robust growth due to their focus on high-demand areas such as advanced defense systems, hypersonic weapons, and autonomous technologies, aligning closely with government priorities and military budgets. Boeing, meanwhile, faces intense competition in these areas while also dealing with setbacks in its space exploration division, particularly against private companies like SpaceX, which have disrupted traditional aerospace models with reusable rocket technology.



Moreover, Boeing's exposure to geopolitical risks, including trade tensions and reliance on international markets like China, adds to its financial uncertainties. While Airbus benefits from strong EU support and expanding global operations, Boeing has faced challenges in leveraging such opportunities, especially in emerging markets where competitors like COMAC are gaining traction. The slow recovery of commercial aviation post-COVID has further dampened investor confidence, as airlines prioritize fuel-efficient fleets—a market where Boeing faces stiff competition.

Despite its efforts to innovate with projects like the 787 Dreamliner and service offerings in maintenance and lifecycle management, these moves have not translated into significant stock gains. However current restructuring processes and aggregate demand changes are increasing speculation for Boeing to show profitability in the future

Boeing supply model:

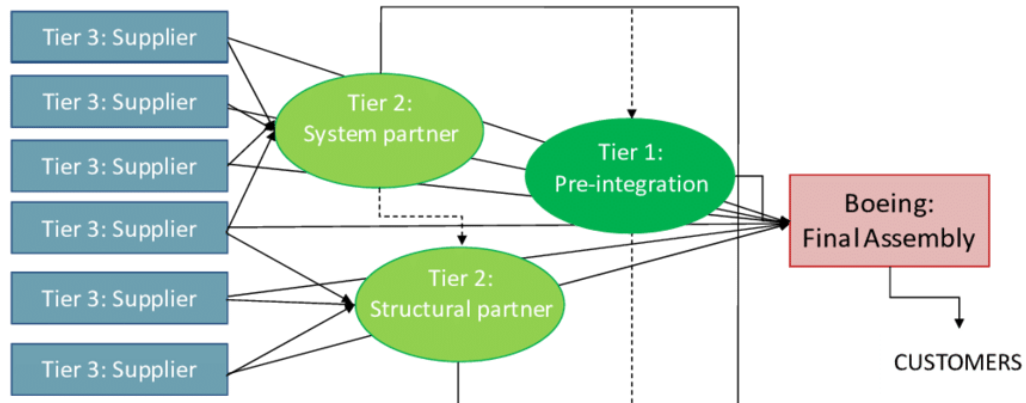
Boeing operates a heavily outsourced, partner-based supply system, which has come under scrutiny due to persistent order backlogs and worker strikes. The company's supply chain is an extensive and intricate global network, encompassing over 2,100 Tier 1 connections and 668 subsidiaries. This system relies on key partners responsible for delivering millions of essential parts required for aircraft assembly. Notable Tier 1 suppliers include Spirit AeroSystems, which provides fuselages and major components, and Mitsubishi Heavy Industries, which contributes to wing assemblies. Additionally, General Electric supplies engines, while Honeywell International delivers avionics and other critical systems. These partnerships enable Boeing to leverage specialized expertise and advanced technologies from various sectors worldwide.

Boeing's reliance on its supply chain is evident in its procurement and production strategies. For instance, the 787 Dreamliner program sources approximately 70% of its parts from external suppliers, underscoring the company's dependence on its global partners. Financially, Boeing's government contract revenue totalled \$98.75 billion over the past three years, emphasizing the pivotal role of its supply chain in fulfilling large-scale orders. Moreover, Boeing's supply chain supports over 150,000 jobs across 65 countries, highlighting the extensive human resources involved. This

global network remains vital for meeting production demands and maintaining Boeing's competitive position in the aerospace industry.

Figure

Problems with the model and comparisons



Boeing has faced significant challenges in recent years, largely due to its reliance on fixed-price contracts. These agreements, while appealing to customers, have proven costly for Boeing as they commit the company to delivering projects at pre-set prices regardless of unexpected cost overruns or delays. This issue was exacerbated by the aftermath of the 2019 737 MAX crashes, which resulted in grounding orders, increased scrutiny, and halted deliveries for months.

The result has been three consecutive years of financial losses, with the backlog of aircraft orders, particularly for the 737 MAX, becoming increasingly expensive to manage. Delays and rising costs have stretched the company's resources, forcing Boeing to navigate a delicate balance between fulfilling past commitments and maintaining future profitability.

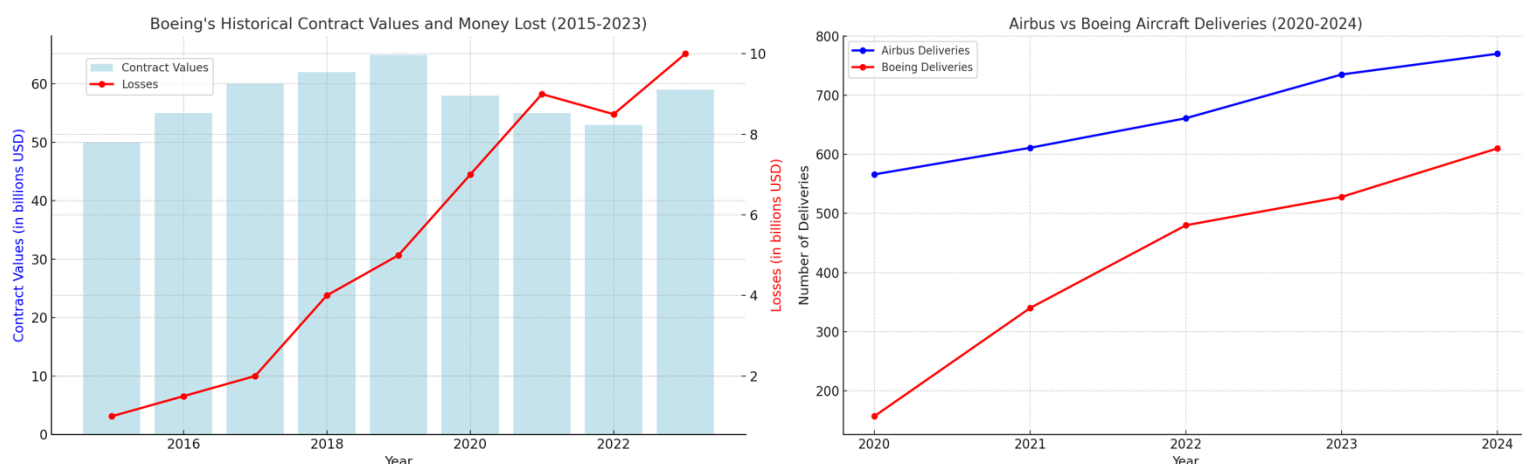


Figure 2: Financial Losses and supply slump for Boeing

At the same time, competitors such as Airbus have capitalized on Boeing's struggles by delivering aircraft more efficiently and strengthening their position in the commercial aviation market. While Boeing's reliance on the fixed-price model has created financial and operational challenges, it also highlights an opportunity for the company to reevaluate its approach to contract management. By focusing on improved cost estimation, strategic partnerships, and innovative production processes, Boeing has the potential to regain its competitive edge and restore stability to its operations.

US Regulation advantages and environment

Boeing has encountered significant financial constraints stemming from labour strikes, production delays, and wavering investor confidence, yet U.S. regulations and government support have played a vital role in stabilizing the company's operations. With a diversified three-sector portfolio—spanning commercial aviation, defense systems, and global services—Boeing leverages the relative stability of the defense market, which contributes approximately 32% of its total revenue. A key example of this support is the \$2.3 billion contract for KC-46 Pegasus Tankers, which underscores the U.S. government's strategic reliance on Boeing for critical defense capabilities. These contracts provide Boeing with predictable cash flows, helping to mitigate risks from its struggling commercial sector.

Boeing's financial position, while challenging, has been bolstered by its ability to raise capital through strategic bond offerings and leverage its indispensable role in the U.S. economy. Despite reporting negative equity of \$-23 billion and a total debt of \$57.65 billion, Boeing raised \$25 billion in a record-setting bond issuance in 2020, showcasing investor confidence in its long-term viability. The funds were pivotal in managing operational cash flows, sustaining production, and addressing negative

EBIT margins. Additionally, regulatory mechanisms like deferred prosecution agreements have shielded Boeing from further financial and reputational damages stemming from issues like the 737 MAX grounding. By combining these financial measures with its strong foothold in the defense and government sectors, Boeing has demonstrated its ability to navigate near-term challenges while positioning itself for long-term recovery and operational stability. This resilience, coupled with growing demand in commercial aviation and innovative investments in defense technology, ensures that Boeing remains a critical player in the global aerospace industry.

Current m&A structure

Boeing has strategically engaged in mergers and acquisitions (M&A) to enhance its operational efficiency, strengthen its market position, and achieve synergies across its business segments. A notable recent example is the reacquisition of Spirit AeroSystems.

Reacquisition of Spirit AeroSystems

In July 2024, Boeing announced its agreement to acquire Spirit AeroSystems in an all-stock transaction valued at approximately \$4.7 billion, with the total enterprise value, including debt, reaching \$8.3 billion.

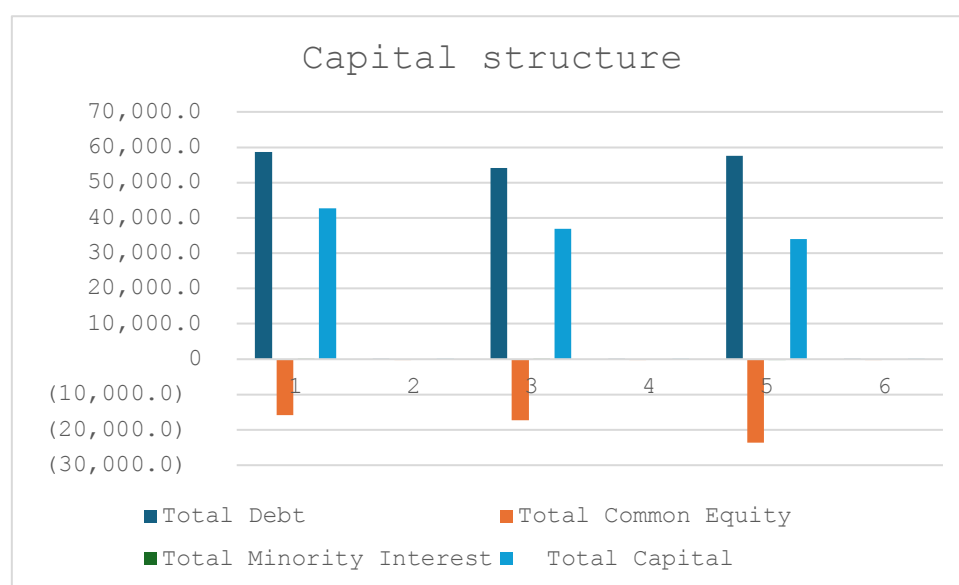
Strategic Rationale and Synergies

This reacquisition is significant for several reasons:

- **Supply Chain Integration:** By bringing Spirit back under its corporate umbrella, Boeing aims to streamline its supply chain, ensuring better coordination and control over the production of critical components, particularly for the 737 MAX series.
- **Quality and Safety Enhancements:** The move is expected to improve manufacturing quality and safety standards, addressing previous issues that led to production delays.
- **Operational Efficiency:** Reintegrating Spirit's operations allows Boeing to achieve cost savings through economies of scale, reduce redundancies, and enhance overall operational efficiency.
- **Market Competitiveness:** With Airbus gaining market share, this strategic move is designed to bolster Boeing's competitiveness in the commercial aviation sector by ensuring timely deliveries and meeting customer expectations.

Capital Structure

Boeing has faced significant operational inefficiencies and reputational challenges, particularly surrounding the 737 MAX program, which have fundamentally impacted its financial structure. As debt has overtaken assets—currently sitting at over \$50 billion in long-term debt—the company has had to resort to substantial reconstruction efforts, raising capital through bonds and other debt instruments to stabilize operations. While these measures have provided the liquidity needed to navigate immediate crises, they have significantly increased Boeing’s leverage, pushing its debt levels to a point where they now weigh heavily on the company’s financial metrics. This shift has directly influenced the company’s Weighted Average Cost of Capital (WACC), with the higher reliance on debt raising its risk profile and, consequently, the cost of equity demanded by investors.



Boeing’s WACC now exceeds the industry average, reflecting the heightened risk premium associated with its current capital structure. This higher capital cost places a tangible strain on the company, particularly in an industry that demands long-term investments in R&D and infrastructure. With debt servicing costs climbing alongside elevated leverage ratios, Boeing finds itself in a position where managing cash flows and ensuring operational efficiency are critical to preserving financial stability and rebuilding market confidence. Further reflections can be made through

[DCF workflow and comps compare stock movements](#)

Boeing’s valuation, incorporating a Discounted Cash Flow (DCF) analysis, reflects a narrow 0.1% upside, driven by conservative assumptions and a challenging operating environment. The valuation is based on forecasted revenues that are averaged out, maintaining the company's historical EBITDA/Revenue ratio of approximately 8%-10%. This assumes a gradual recovery in commercial aviation post-pandemic and stable contributions from the defense sector. However, the

valuation also accounts for CAPEX/Revenue ratios in line with historical benchmarks, reflecting Boeing's ongoing investments in production efficiency and technological advancements.

The EBIT margin remains highly volatile due to lingering impacts from the pandemic and costs associated with 737 MAX recalls and production delays. While defense contracts provide some stability, the commercial segment's recovery has been slower than expected, adding to the margin pressures. The near-flat upside in the DCF valuation suggests that Boeing's current market price largely reflects its future cash flow potential, leaving limited room for significant appreciation unless the company can improve operational efficiencies or capitalize on additional revenue streams. Investors must weigh the modest upside against the potential for margin expansion as Boeing navigates its turnaround

Based on current assumptions, the Discounted Cash Flow (DCF) valuation yields an expected price of \$169.80, reflecting a modest 3% downside compared to the current stock price. However, this valuation is highly sensitive to variations in Boeing's order fulfilment across its core sectors and fluctuations in the broader aviation environment.

Any significant changes in global air travel recovery, defense contract execution, or supply chain stability could lead to extreme fluctuations in the stock's fair value. This makes the DCF price contingent on maintaining the base case environment assumptions, such as steady order deliveries, manageable debt costs, and a favourable demand outlook. Consequently, the valuation underscores the importance of Boeing's operational performance and its ability to adapt to evolving market conditions.

		explicit growth				
WACC	\$194.42	15.00%	16.00%	17.00%	18.00%	19.00%
	6.30%	\$216.75	\$216.75	\$216.75	\$216.75	\$216.75
	7.30%	\$189.96	\$189.96	\$189.96	\$189.96	\$189.96
	8.30%	\$169.80	\$169.80	\$169.80	\$169.80	\$169.80
	9.30%	\$153.70	\$153.70	\$153.70	\$153.70	\$153.70
	10.30%	\$140.29	\$140.29	\$140.29	\$140.29	\$140.29

		WACC				
Terminal Growth Rate	\$194.42	6.30%	7.30%	8.30%	9.30%	10.30%
	1.00%	\$200.07	\$178.99	\$162.13	\$148.09	\$136.04
	1.50%	\$207.54	\$184.00	\$165.69	\$150.71	\$138.04
	2.00%	\$216.75	\$189.96	\$169.80	\$153.70	\$140.29
	5.00%	\$420.76	\$280.07	\$220.72	\$186.20	\$162.65
	6.00%	\$1,395.49	\$402.54	\$267.20	\$210.17	\$177.04

Scenario workflow

In the current volatile environment, a case can be made for both bullish and bearish scenarios regarding Boeing's performance.

In a bull case, Boeing could generate higher revenues by successfully meeting its backlog of contract orders, particularly in the commercial and defense sectors. This would drive consistent yearly growth, supported by improved operational efficiency, recovering global air travel demand, and strong government investment in defense projects. Achieving timely deliveries and regaining customer trust could further bolster investor confidence, leading to a more favourable outlook.

Conversely, in a bear case, challenges such as rising weighted average cost of capital (WACC) due to increasing debt levels and higher interest rates could strain profitability. Persistently delayed contract deliveries, compounded by operational inefficiencies, could exacerbate customer dissatisfaction and weaken cash flow generation. Without tangible improvements in meeting delivery targets, Boeing could face stagnant or declining growth prospects, further amplifying market concerns.

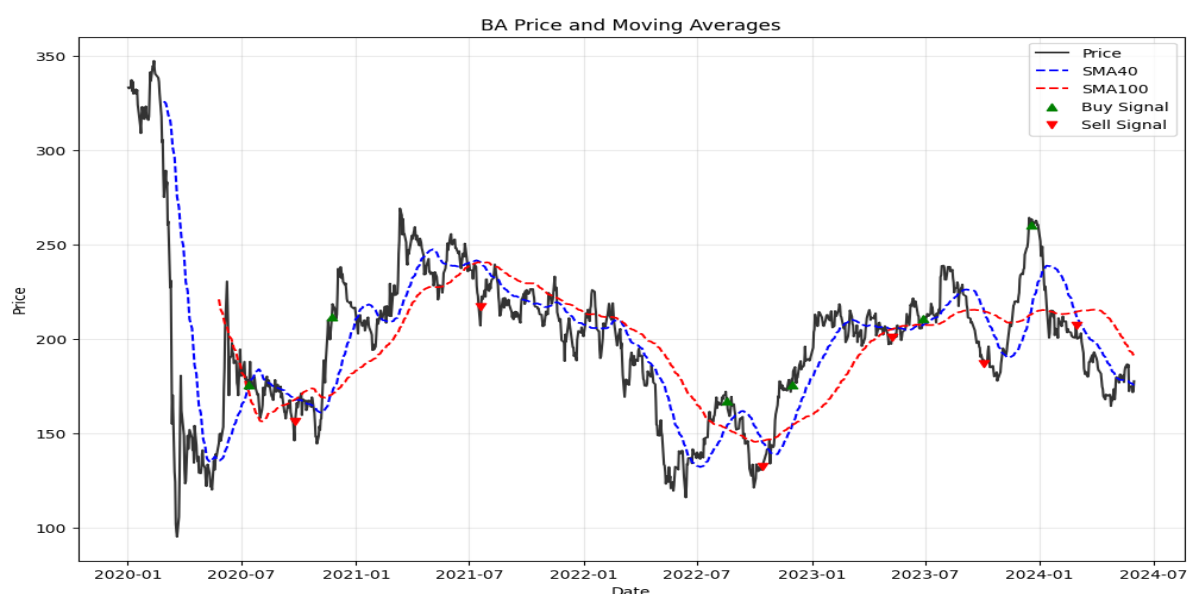
Scenario Summary					
	Current Values:	Base Case	Bull case	Bear case	Base Case 29/12/2024
Changing Cells:					
\$C\$53	169.80	169.80	217.53	137.3049778	169.80
\$C\$93	137.3049778	137.3049778	137.3049778	137.3049778	137.3049778
Result Cells:					
\$J\$68					

The bull case assumed for a 20% explicit growth compared to the base case and the bear case accounted for a higher base year WACC of 10.2%

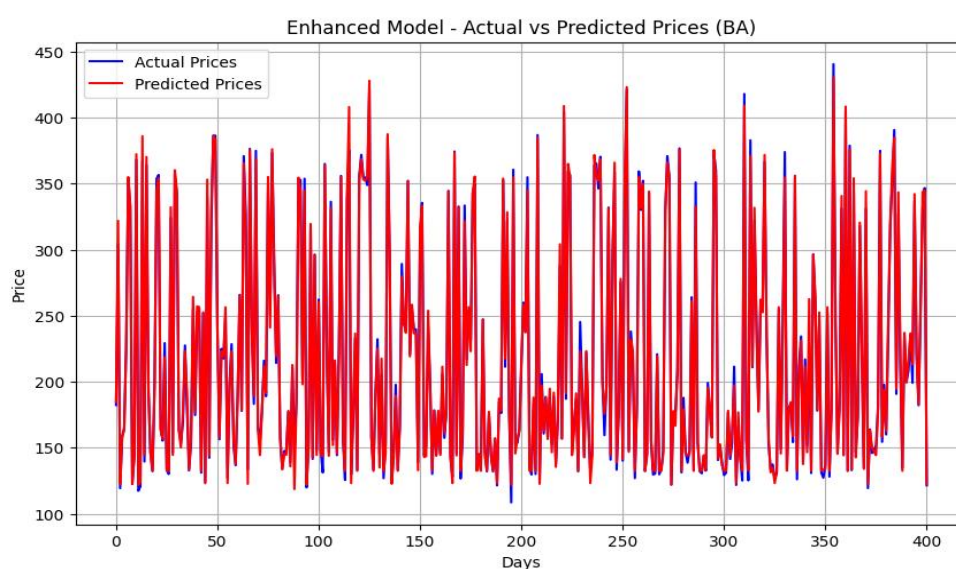
Quant analysis and expected volatility

The quantitative analysis incorporates a dual SMA model to capture both short-term and long-term price trends, using 40-day and 100-day moving averages. The 40-day SMA indicates a range of \$175-\$176, while the 100-day SMA falls between \$190-\$193, with a gradual decline in both averages. This downward trend signals potential weakness in the stock price trajectory, pointing to bearish sentiment.

Back testing the strategy on a hypothetical \$1,000,000 portfolio yielded a marginal return of 1%, suggesting limited short-term profitability under current market conditions. Volatility indicators, such as the Hurst exponent at 0.54, reveal a non-mean-reverting pattern, indicating a persistent and trending market behavior rather than a tendency to revert to an average price.



Further validation using a gradient model reinforces these findings, with a Mean Squared Error (MSE) of 7, reflecting moderate prediction accuracy in a volatile environment. The model indicates a clear downward price trend coupled with significant price variability. These quantitative signals collectively suggest heightened volatility and a potential decline in Boeing's stock price, necessitating caution for investors. However, both models are prone to redundancies in the framework processes



[Investor confidence](#)

With Boeing's issuance of bonds and debt restructuring efforts over the past three years, the company has faced significant impacts on its credit ratings, which have, in turn, influenced investor confidence and its borrowing feasibility. Currently, Boeing holds a Moody's credit rating of BBB-, which is just one notch above junk status. This rating reflects the heightened risk associated with the company's financial health, including its negative equity of \$-23 billion and total debt exceeding \$57 billion.

Company Comp Set				
Company Name	Overall	Operational	Solvency	Liquidity
Howmet Aerospace Inc. (NYSE:HWM)	1	1	2	2
Lockheed Martin Corporation (NYSE:LMT)	1	1	3	1
Textron Inc. (NYSE:TXT)	2	2	1	2
General Dynamics Corporation (NYSE:GD)	2	2	1	3
General Electric Company (NYSE:GE)	2	2	2	2
RTX Corporation (NYSE:RTX)	3	3	3	3
Northrop Grumman Corporation (NYSE:NOC)	3	4	2	3
TransDigm Group Incorporated (NYSE:TDG)	3	4	4	1
L3Harris Technologies, Inc. (NYSE:LHX)	4	3	4	4
Huntington Ingalls Industries, Inc. (NYSE:HII)	4	4	3	4
The Boeing Company (NYSE:BA)	4	3	4	4

The BBB- rating indicates that while Boeing is still investment-grade, its ability to meet financial obligations is increasingly sensitive to economic and operational challenges. For investors, this reduced creditworthiness raises concerns about the long-term sustainability of Boeing's debt and its capacity to generate sufficient cash flows. Moreover, the higher perceived risk has led to increased borrowing costs, which place additional pressure on Boeing's Weighted Average Cost of Capital (WACC), further straining its financial metrics and profitability.

Risks

Boeing's current stock presents clear systematic risks, driven by its high dependency on the broader aviation environment and investor confidence in its commercial products and order placements. The company's reputation has been significantly affected by four recent accidents, which directly led to a 3% decline in stock price, highlighting the vulnerability of its market performance to operational setbacks and safety concerns.

Additionally, Boeing's free cash flow (FCF) stability relies heavily on its aerospace and defense segment, which provides a more predictable revenue stream amid challenges in the commercial sector. However, this reliance introduces competitive pressures, as the defense sector sees increasing participation from well-established players like Lockheed Martin and Northrop Grumman, alongside emerging players. This intensifying competition poses significant threats to Boeing's market share and

contract acquisition potential. Combined with the fragile state of its commercial aviation division, Boeing faces a dual challenge of maintaining stability while navigating a highly competitive and volatile environment.

Amidst these challenges, Boeing has also experienced positive developments that highlight its resilience and potential for recovery. The company has recently secured significant contracts with airline partners, reinforcing confidence in its commercial aviation segment. These deals signal renewed trust in Boeing's ability to deliver on its commitments, even as it works to overcome production delays and safety concerns and have also made progress with the us government for defence production partnerships

Recommendation

Boeing investors should adopt a cautious stance and consider a moderate sell-to-hold decision based on the current market environment. The company's valuation metrics, including a forward EV/EBITDA of 31.05x and EV/Revenue of 2.23x, suggest potential signs of stability and investor confidence in its future recovery. However, these positive signals are tempered by ongoing instabilities, including operational challenges, credit rating concerns, and sector-wide volatility.

While Boeing's valuation reflects expectations of long-term growth and recovery, near-term risks—such as high dependency on backlog fulfilment, competition in the aerospace and defense sector, and investor trust in its commercial aviation products—necessitate a prudent approach. Investors should weigh the company's potential for stability against the high uncertainties currently impacting its financial and operational performance.

APPENDIX:

Selected Financials - DCF (IN MILLIONS)						1	2	3	4	5
	FY2019A	FY2020A	FY2021A	FY2022A	FY2023A	Forecasted		Forecasted		
Revenue	76,559.0	58,158.0	62,286.0	66,608.0	77,794.0	73,293.0	74,759	87,833	103,194	121,241
COGS & Other Expenses	71,738.0	59,631.0	56,882.0	61,325.0	68,543.0	70,641.0	68,036	79,934	93,914	110,338
EBITDA	4,821.0	(1,473.0)	5,404.0	5,283.0	9,251.0	2,652.0	6,723.0	7,898.8	9,280.2	10,903.2
D&A	2,271.0	2,246.0	2,144.0	1,979.0	1,861.0	1,808.0	1,718	1,632	1,550	1,473
EBIT	2,550.0	(3,719.0)	3,260.0	3,304.0	7,390.0	844.0	5,005.4	6,267.1	7,730.1	9,430.6
Taxes	169.0	148.0	147.0	142.0	179.0	177.2	138.9	173.9	214.5	261.7
NOPAT	2,381.0	(3,867.0)	3,113.0	3,162.0	7,211.0	666.8	4,866.5	6,093.2	7,515.5	9,168.8
(+) D&A	2,271.0	2,246.0	2,144.0	1,979.0	1,861.0	1,808.0	1,717.6	1,631.7	1,550.1	1,472.6
(-) Change in NWC	1,523.0	7,851.0	1,830.0	(3,996.0)	(4,745.0)	748.0	784.5	921.7	1,082.8	1,082.8
(-) CAPEX	1,834.0	1,303.0	980.0	1,222.0	1,527.0	2,013.0	1,422.5	1,671.3	1,963.6	2,307.0
Unlevered Free Cash Flow	1,295.0	(10,775.0)	2,447.0	7,915.0	12,290.0	286.2	4,377.1	5,131.9	6,019.2	7,251.6
Discount Factor						8.30%	8.90%	9.50%	10.10%	10.70%
Discounted FCFF						264.3	4,019.4	4,686.7	5,467.0	6,550.7

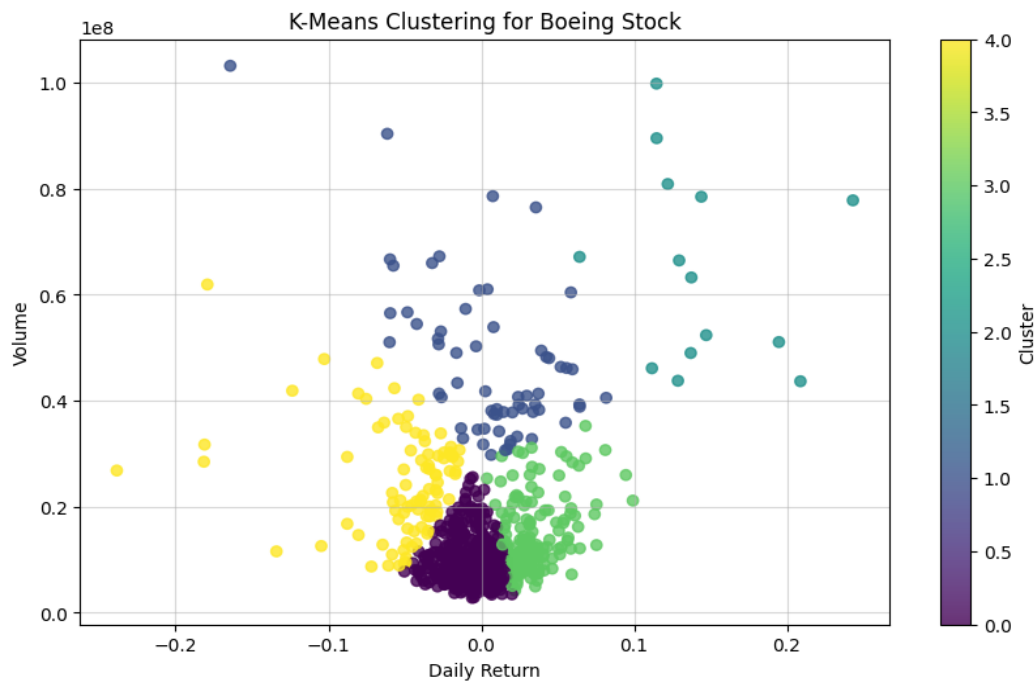
CAPEX	2020	2021	2022	2023
Revenue	58158	62286	66608	77794
CAPEX/revenue	2.24%	1.57%	1.83%	1.96%

Average CAPEX change
1.90%

	2025	2026	2027	2028
Forecasted CAPEX	1422.53523	1671.3183	1963.6103	2307.0204

EBITDA MARGIN CALCULATION					
	2019	2020	2021	2022	2023
revenue	45,349	56,587	64,388	67,074	68,920
EBITDA	4,821	-1,473	5,404	5,283	9,251
	0.12646365	0.0311909	0.1030627	0.1105794	0.078351712

Average: | 0.0899297



```
import backtrader as bt
import yfinance as yf
import matplotlib.pyplot as plt

# Define the Moving Average Crossover Strategy
class MovingAverageCrossover(bt.Strategy):
    short_period = 40
    long_period = 100

    def __init__(self):
        self.short_ma = bt.indicators.SimpleMovingAverage(self.data.close, period=self.short_period)
        self.long_ma = bt.indicators.SimpleMovingAverage(self.data.close, period=self.long_period)

    def next(self):
        if self.short_ma > self.long_ma:
            if not self.position:
                self.buy()
        elif self.short_ma < self.long_ma:
            if self.position:
                self.sell()

data = bt.feeds.PandasData(dataname=yf.download('BA', start='2015-01-01', end='2023-12-31'))

# Set up the backtest
cerebro = bt.Cerebro()
cerebro.adddata(data)
cerebro.addstrategy(MovingAverageCrossover)

# Set initial cash and position size
cerebro.broker.set_cash(100000) # Starting with $100,000
cerebro.broker.setcommission(commission=0.001) # 0.1% commission per trade

# Run the backtest
print('Starting Portfolio Value: %.2f' % cerebro.broker.getvalue())
cerebro.run()
print('Ending Portfolio Value: %.2f' % cerebro.broker.getvalue())

# Plot the results
#Market sentiment
```

CITATION

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