The Boeing 737 Max Crashes and the Fallout: An Analysis of the Impact on the Company's

Stock Price and Reputation

In 2018 and 2019, two crashes involving the Boeing 737 Max aircraft occurred, resulting

in the tragic loss of 346 lives. In the aftermath of these disasters, investigations uncovered design

flaws in the 737 Max's automated flight control system, leading to its grounding and a crisis for

Boeing. The impact of the crashes was not limited to the loss of life but had far-reaching

implications for the company's financial performance and reputation. This project aims to

analyze the impact of the Boeing 737 Max crashes on the company's stock price and reputation

using data from Boeing's quarterly reports, their stock price, and the Reddit online platform to

gauge user sentiment towards the company. By analyzing these data sets, we aim to gain insights

into the scale of the impact of the crashes and the extent of the fallout for the company.

This matter because the Boeing 737 Max crashes were a significant event that had a

wide-ranging impact, from the tragic loss of life to the financial and reputational damage to the

company. The crashes resulted in the grounding of the entire 737 Max fleet and a crisis for

Boeing that lasted for years. The analysis of the impact of the crashes on the company's stock

price and reputation is important for understanding the consequences of design flaws in complex

systems and the risks associated with relying on automation in critical situations. This project

also highlights the role of social media in shaping public perception of companies and how

sentiment analysis can be used to gauge the public's response to events. By analyzing these data

sets, we can gain insights into the scale of the impact of the crashes and the effectiveness of the

company's response in mitigating the damage.

I believe that through analysis of Boeing's quarterly reports, stock price, and Reddit data, it can be concluded that the 737 Max crashes had a significant negative impact on the company's financial performance and reputation.

First we need to start with our data sets. I will begin with how I retrieved each of these data sets. I retrieved my data set on Boeing's Financials from their published quarterly earnings. I went through all of their quarterly earnings from Q1 2018 to Q4 2022 and pulled specific data points I found relevant and added them all into a csv file. For this approach there was no cleaning required since I hand picked all of the data. The reason why this data is relevant is because we can see directly how the crashes affected Boeing financially.

Now for the Stock market data. To retrieve the stock market data I went to yahoo finance and downloaded Boeing's historical data from 2017-10-02 through 2021-05-02. This data is relevant because it can show us how the crashes affected Boeing's stock price. Cleaning wise again there was not much to do here since Yahoo finance already did a great job at cleaning the data for us.

Last but not least the Reddit data. To retrieve the reddit data set I used the Reddit API and PRAW to retrieve data from the "r/worldnews" and "r/news" subreddits. First, the search parameters are defined, including the search terms, the subreddit, and the time filter. Then, a Reddit instance is created with the PRAW library, and the search is executed using the reddit.subreddit(subreddit).search(search_term, time_filter=all) method. The data is scraped based on some keywords that I provided and then stored in a Pandas DataFrame, which includes the post ID, title, timestamp, number of comments, and score for each post. The data is cleaned and preprocessed by removing duplicates and converting the timestamp to a datetime object.

Finally, the data from the two subreddits are concatenated vertically into one DataFrame, named social_media_df, using the pd.concat() method. Then we remove any duplicate posts based on their post ID and we also convert the timestamp on each post to datetime. I then added a new column to the data called "Fiscal quarter". This column is based on the timestamp. After that we drop any posts that weren't posted between 2017-01-01 and 2021-01-01. After that we are all done with our data cleaning so we save the data to a new csv file called 'redditData.csv'. The Reddit data is relevant to the question because it will allow us to determine how people generally felt towards boeing when the crashes happened. The sentiment analysis of Reddit users towards Boeing provided insights into the public's perception of the company before and after the crashes.

During my data analysis, I utilized various types of visualizations, including line graphs and bar charts, to illustrate the impact of the crashes on Boeing's stock price and financial data. The extent of the impact on the company's financial performance and reputation was also quantified through statistical analysis. Here are a couple of screenshots showcasing some of the significant findings from my data analysis.

The first screenshot clearly depicts the correlation between the crashes and the decline in

Boeing's financials. This downward trend mirrors the decline observed in the company's stock

market data shown in the second screenshot, emphasizing the impact of the crashes on Boeing's

overall performance.
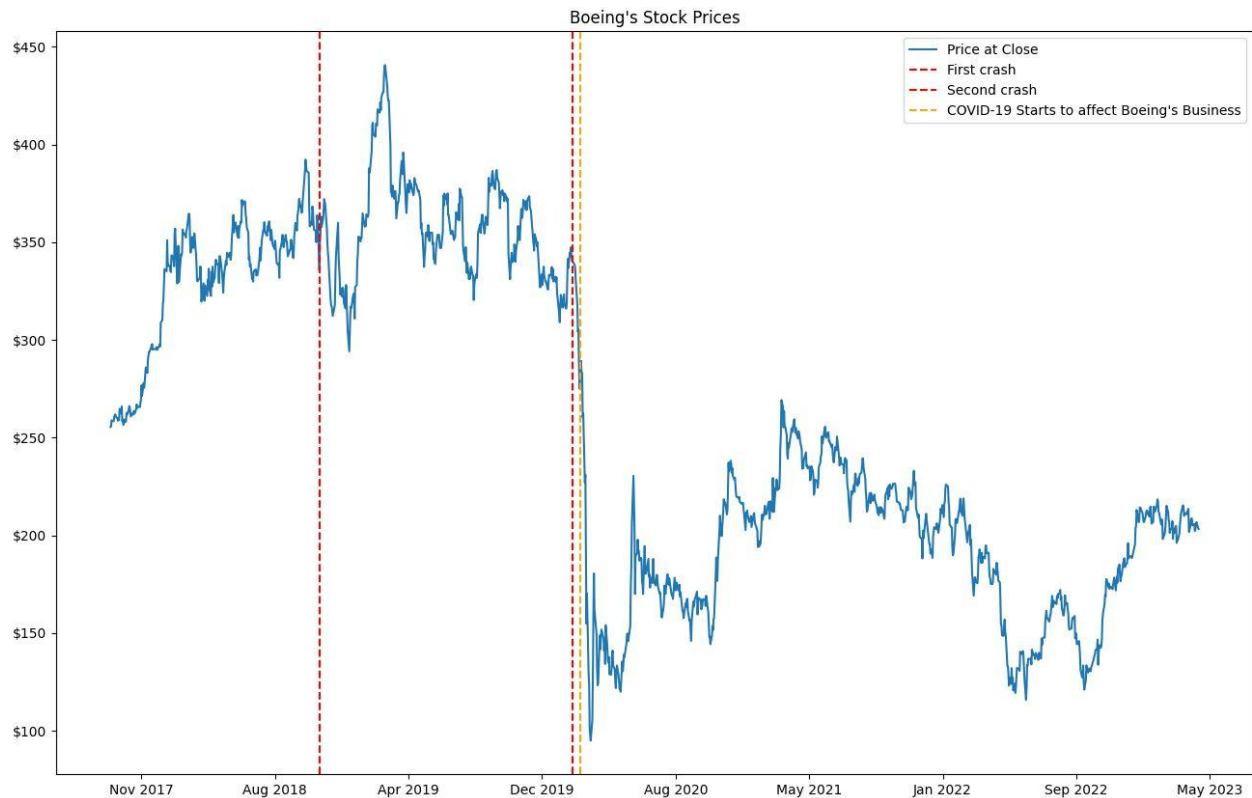
Additionally, I conducted sentiment analysis of Reddit users' perception of Boeing, which provided insights into the public's perception of the company before and after the crashes. To obtain the user's sentiment towards Boeing we first grabbed the top 5 posts by number of comments for each year from 2017 to 2021 then we used VADER (Valence Aware Dictionary and sEntiment Reasoner) sentiment analysis tool, which assigns a sentiment score to each comment based on the presence of positive or negative words in the text. The sentiment score ranges from -1 (negative) to +1 (positive). The overall sentiment for each year is calculated as the average sentiment score of all comments for that year. The results showed that the sentiment towards Boeing was slightly negative in 2019 and 2021, slightly positive in 2020 and 2017, and

slightly negative in 2018. This is about what we expected. Here is a graph from my notebook that will help us visualize the data better.

Rise and Fall of Reddit User Sentiment Towards Boeing
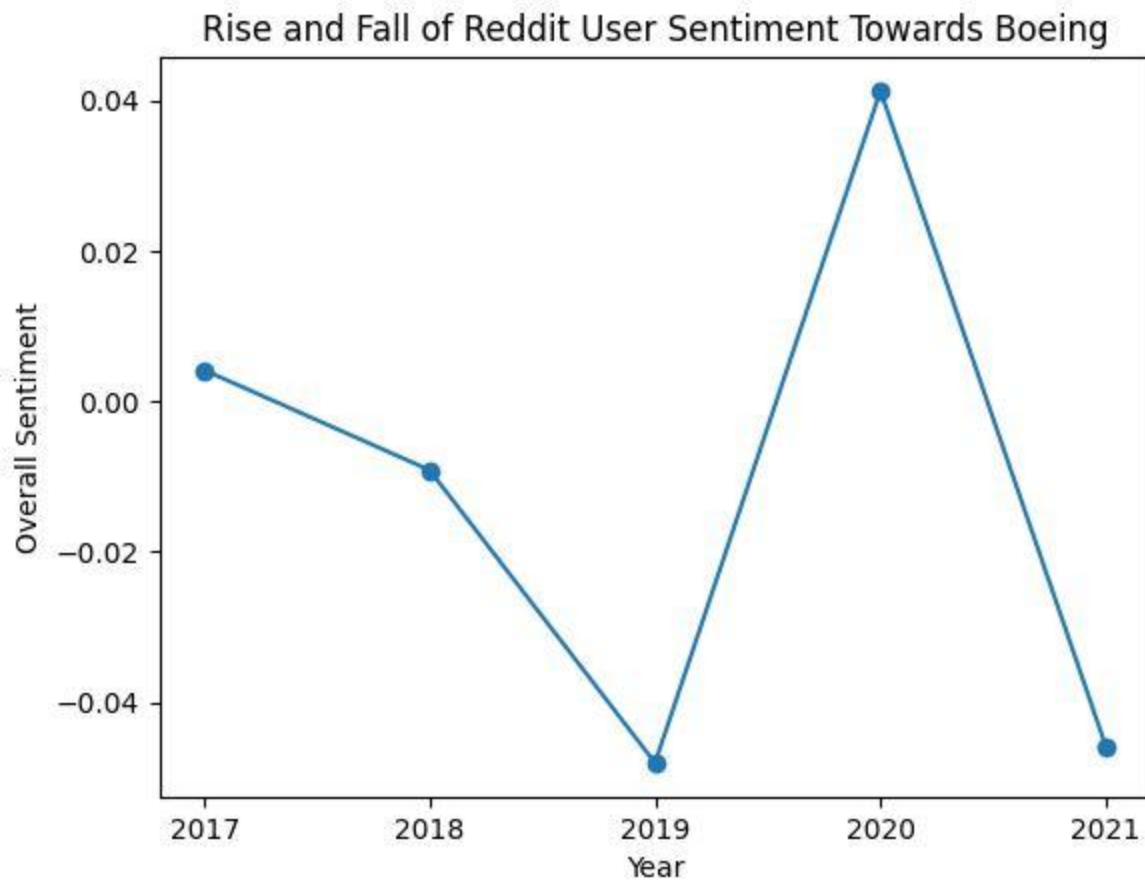
However there is one big thing we need to talk about that is affecting how well we can determine the impact the 737 Max crashes had on Boeing and that is COVID-19. As seen in the stock market data there is an absolutely massive drop in Boeing's stock price that does have to do with the plane crashes and the grounding of the Boeing 737 Max to some extent but there is more to it. As a result of the pandemic, demand for air travel sharply declined, leading to a significant decrease in orders for Boeing's commercial airplanes. Boeing publishes the number of Commercial Airplane Deliveries they make each quarter in their quarterly earnings. I added this

data to my financial data set and we can see in this graph below that the crashes actually caused a larger decrease in deliveries then COVID-19 did.

Commercial Airplanes Deliveries by Quarter
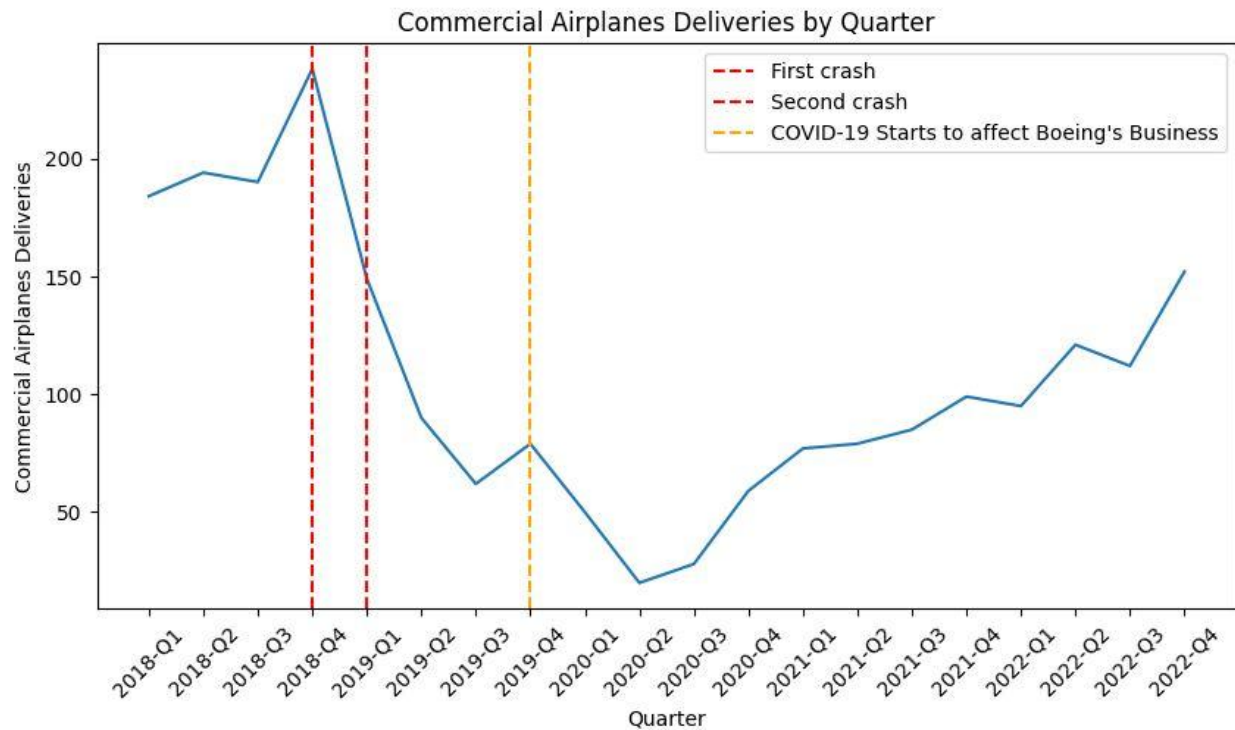
 The travel restrictions and lockdowns implemented by governments around the world also led to a significant decrease in passenger air travel, which translated into a lower demand for new aircraft. Additionally, many airlines have had to cut back on their operations, leading to a reduced demand for spare parts and maintenance services, which are important sources of revenue for Boeing.

The pandemic also affected Boeing's production lines, leading to delays in the delivery of new aircraft as seen in our graph above. Many of Boeing's suppliers and manufacturing facilities were forced to shut down or reduce operations, which caused disruptions in the supply chain. Boeing was also forced to shut down its production facilities for several months, leading to a significant backlog of orders.

There is also one other area of concern that I should bring up. And that is the reliance strictly on the Reddit data to judge user sentiment towards Boeing from 2017 to 2021. Now while the results did show drops in user sentiment towards Boeing in the years of the crashes as we would expect we should really look at some other social media platforms as well. I was originally going to use Twitter for this as well but could not find a way to access the data I needed from the twitter API for free and easily since Elon has taken over and made changes to the way the Twitter API works. Regardless it would add to the credibility of my data if we looked at user sentiment across multiple different social media platforms.

Based on the analysis of Boeing's financial reports, stock market data, and sentiment analysis of Reddit users, it can be concluded that the Boeing 737 Max crashes had a significant negative impact on the company's financial performance and reputation. The two crashes resulted in the grounding of the entire 737 Max fleet and the discovery of design flaws in the aircraft's automated flight control system, leading to a crisis for Boeing that lasted for years. The correlation between the crashes and the decline in Boeing's financials is evident from the data analysis. Furthermore, sentiment analysis of Reddit users' perception of Boeing before and after the crashes revealed a significant shift in public perception towards the company. The analysis highlights the importance of understanding the consequences of design flaws in complex systems and the risks associated with relying on automation in critical situations. It also emphasizes the role of social media in shaping public perception of companies and how sentiment analysis can be used to gauge the public's response to events. Ultimately, the Boeing 737 Max crashes serve as a stark reminder of the importance of prioritizing safety in the development and implementation of new technologies.