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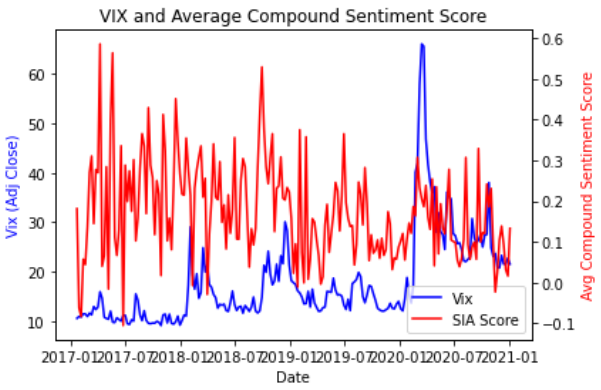
Question and Hypothesis:
President Trump has been quite controversial, often using Twitter to tweet out his emotional opinions, affecting market volatility. Thus, my question is, "During Trump's Presidency, how did his tweets (and its sentiment) affect market volatility?", from January 20, 2017 to January 8, 2021 (last tweet before Twitter suspension). My hypothesis is that there is a negative correlation between the sentiment of Trump's tweets and market volatility. If his tweet was positive, then volatility should decrease and vice versa. This is because positive sentiment should indicate that the market will perform well, hence decreasing volatility.

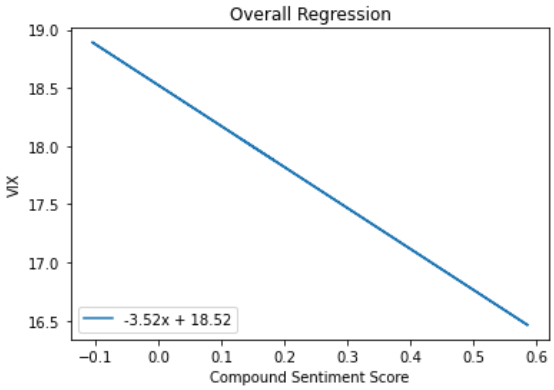
Data and Analysis:
VIX (adjusted closing) is used as a proxy for market volatility as it measures the volatility of the S&P 500, a benchmark in the financial market. The data is scraped using yfinance (data from Yahoo Finance). For Trump's tweets, the data is downloaded from Trump Archive, an unofficial database of his tweets. The CSV can be found here and downloaded.

VIX market opens between Monday and Friday, at 8:15 AM. Since the market closes at 3:15 PM, any tweet after was converted to the next day. If anything was tweeted during the weekends, it was converted to next Monday. Trump's tweets had to be cleaned of specific characters i.e., "RT" (Retweet) and any words connected to "@", "...", "http", or "#".

Sentiment analysis was conducted on each tweet individually rather than grouping them up into a weekly tweet paragraph since it would be more accurate. VADER sentiment analysis was used because it was more effective for social media, analyzing emojis and "!". After, the average compound sentiment score by week was calculated.

The weekly VIX values were then matched with the average compound sentiment score by week. As seen in 2017, when tweets were relatively positive, volatility was quite low. However, as sentiment decreased (but still greater than zero, neutral), the VIX increased a bit, peaking when the sentiment was quite neutral, around 0.19. However, there then seems to be a close positive correlation starting April 2020.





After running a regression, the regression formula comes out to be VIX = -3.52(Sentiment Score) + 18.52. This means that every time the sentiment score of Trump's tweet increases by 1, the VIX decreases by 3.52. In other words, if the sentiment score increases by 0.1, the VIX decreases by 0.28. Although I could accept my hypothesis, that as Trump's tweet sentiment score increases, volatility decreases, the effect seems to be rather limited especially starting April 2020. In fact, the regression formula becomes VIX = 19.4(Sentiment Score) + 25.05, completely negating my hypothesis.

Conclusion
In conclusion, as President, Trump has tweeted many things with both positive and negative sentiment. Overall, it was more neutral but did affect market volatility. In fact, the more positive a tweet, the lesser the volatility. However, starting April 2020, the correlation was quite positive, and it indicates that other forces have a stronger impact than the sentiment of his tweets. Further study should be done to control outside factors. All data files can be found here.