



# FED VS MARKET

The background features a stylized graphic of a classical building facade with four columns and a triangular pediment. In the foreground, there is a faint watermark-like image of a stock market chart with a rising arrow and a bar chart.

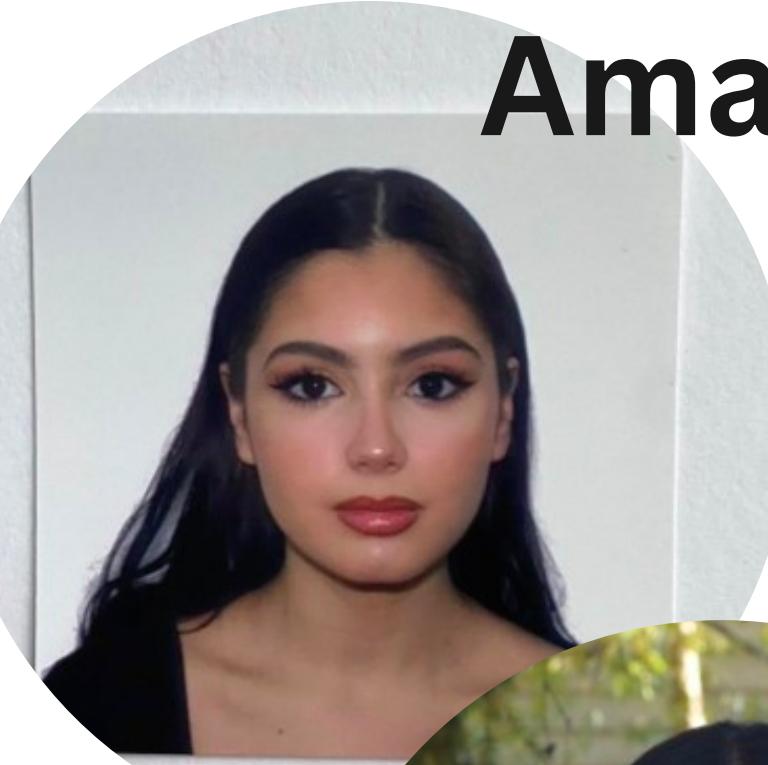
Sahiti Kovvuri, Amaris Efthimiou, Yarema Ganushchak, Taohid Shadat, Andrea Ramirez, Muhammad Megahed

# MEET THE TEAM

**Yarema**



**Amaris**



**Muhammad**



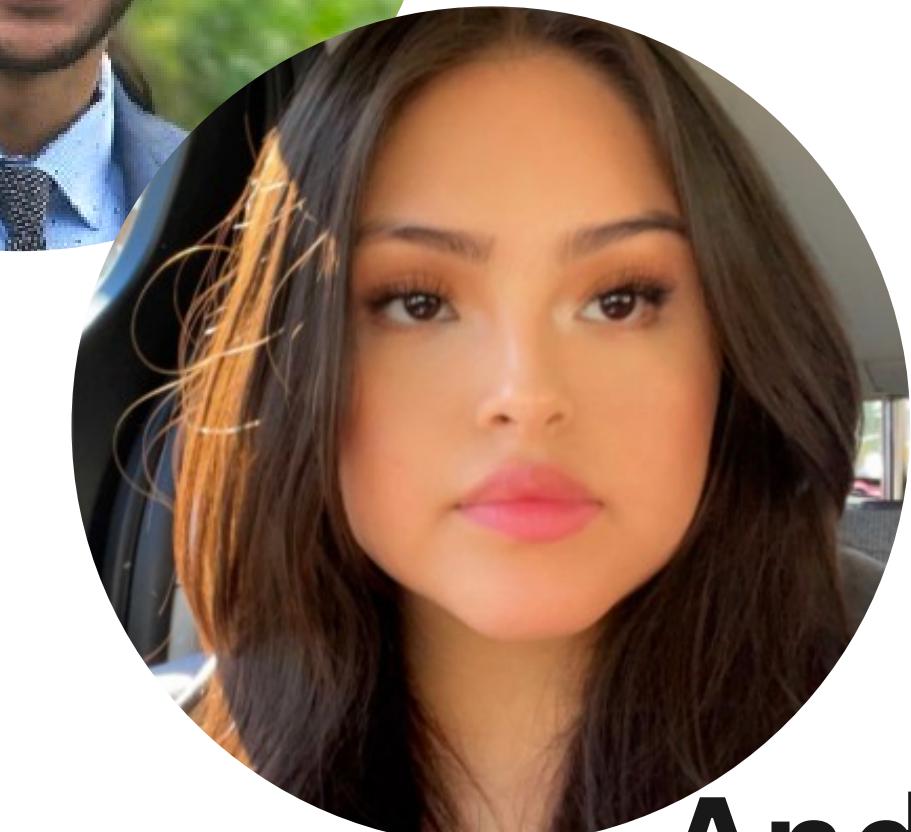
**Taohid**



**Sahiti**

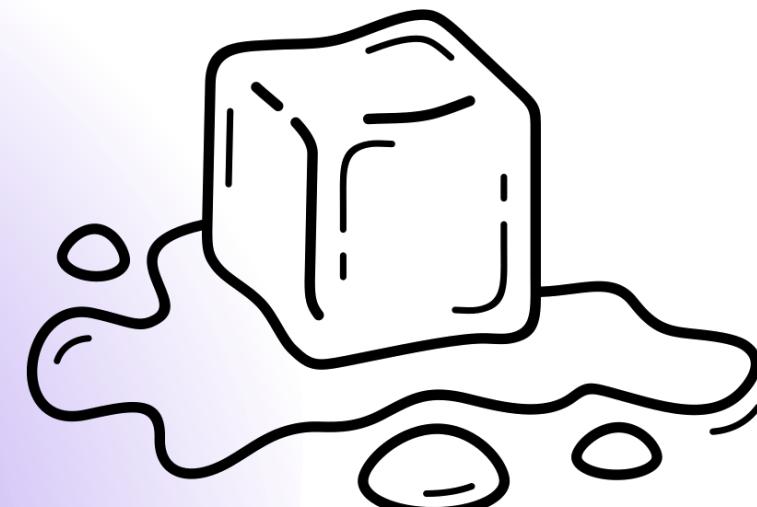


**Andrea**



# Ice Breaker

“The Federal Open Market Committee decided to maintain the target range for the federal funds rate at 0 to 0.25 percent. The Committee also reaffirmed [...] to [...] its full range of tools to support the U.S. economy in this challenging time, [...] promoting its maximum employment and price stability goals.” - December 16th 2020



based on this snippet of speech, will the stock price go up or down?

# Introduction

In this project, we walk through our conducted a sentiment analysis between the Federal Reserve and Stock prices from **SP500** and **NASDAQ** from **2020**.

We will investigate how the communications of the Chair of the Federal Reserve, **Jerome Powell**, impact stock prices by analyzing the sentiment of his speeches.



# What is the "Fed"?

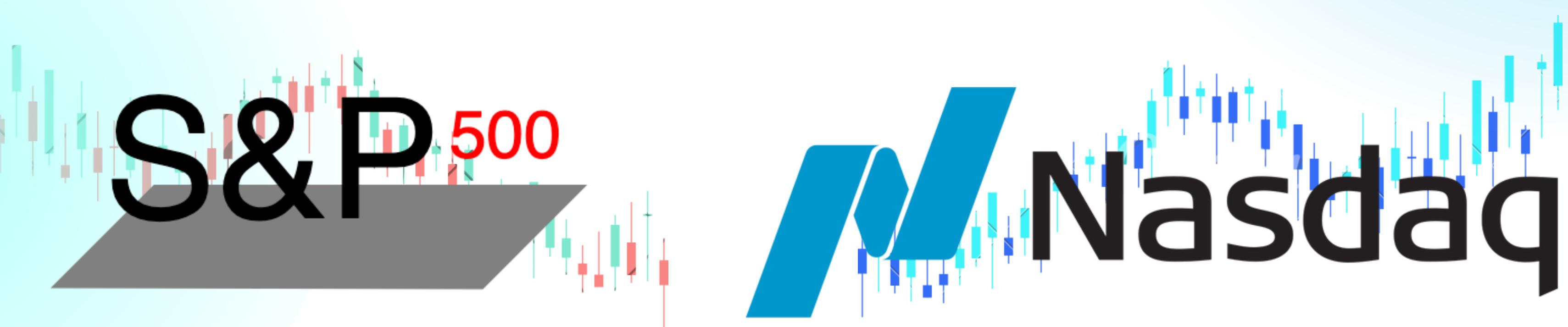
The Fed, short for the Federal Reserve System, is the central banking system of the United States that **regulates the banking system, oversees the payment system, and conducts monetary policy**. Its importance lies in maintaining stability of the US economy.



**Jerome Powell, Current Chair of the Federal Reserve**

# Why Stock Prices?

Some speeches by Jerome Powell have the potential to impact financial markets, including the stock market. The stock market is **a measure of economic performance**, and its performance is influenced by a variety of factors, including economic indicators, corporate earnings, and political events.



# Our Research Question

**Question:** How do the communications of the Chair of the Federal Reserve Chair, Jerome Powell, impact stock prices?  
(case study using SP500 and NASDAQ)

# Hypothesis

**Hypothesis:** The communications of the Federal Reserve Chair, Jerome Powell, can have a significant impact on stock prices, as investors often look to the Federal Reserve for guidance on monetary policy and the direction of the economy.

# Let's look into the data.



# SPEECHES CSV

Contains the date, link, and transcript of 14 speeches delivered by Powell between February and December of 2020.

Date	Link	speech
2/11/2020	<a href="https://www.federalreserve.gov/news-events/testimony/powell20200211a.htm">https://www.federalreserve.gov/news-events/testimony/powell20200211a.htm</a>	<p>Chair Powell submitted identical remarks to the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, on February 12, 2020.</p> <p>Chairwoman Waters, Ranking Member McHenry, and other members of the Committee, I am pleased to present the Federal Reserve's semiannual Monetary Policy Report.</p> <p>My colleagues and I strongly support the goals of maximum employment and price stability that Congress has set for monetary policy. Congress has given us an important degree of independence to pursue these goals based on sound economic analysis.</p> <p><b>Current Economic Situation</b></p> <p>The economic expansion is well into its 11th year, and it is the longest on record. Over the second half of last year, economic activity increased at a moderate pace and the labor market strengthened further, as the economy expanded at a solid rate. Job gains averaged 200,000 per month in the second half of last year, and an additional 235,000 jobs were added in January. The pace of job gains has remained above what is needed to provide jobs for new workers entering the labor force.</p> <p>Gross domestic product rose at a moderate rate over the second half of last year. Growth in consumer spending moderated toward the end of the year following earlier strong increases, but the fundamentals supporting household consumption remain solid.</p> <p>Inflation ran below the FOMC's symmetric 2 percent objective throughout 2019. Over the 12 months through December, overall inflation based on the price index for personal consumption expenditures was 1.6 percent. Core inflation was 1.9 percent.</p> <p>The nation faces important longer-run challenges. Labor force participation by individuals in their prime working years is at its highest rate in more than a decade. However, it remains lower than in most other advanced economies.</p> <p><b>Monetary Policy</b></p> <p>I will now turn to monetary policy. Over the second half of 2019, the FOMC shifted to a more accommodative stance of monetary policy to cushion the economy from weaker global growth and trade developments and to provide support to the labor market.</p> <p>Taking a longer view, there has been a decline over the past quarter-century in the level of interest rates consistent with stable prices and the economy operating at its full potential. This low interest rate environment may limit the effectiveness of monetary policy.</p> <p>The current low interest rate environment also means that it would be important for fiscal policy to help support the economy if it weakens. Putting the federal budget on a sustainable path when the economy is strong would help ensure that we have the resources available to support the economy when it faces challenges.</p> <p>Finally, I will briefly review our planned technical operations to implement monetary policy. The February Monetary Policy Report provides details of our operations to date. Last October, the FOMC announced a plan to purchase an additional \$60 billion in long-term Treasuries each month through the end of the year.</p> <p>Thank you. I am happy to take your questions.</p>

\*Speeches collected from  
<https://www.federalreserve.gov>

# S&P500 CSV

**Provides the prices corresponding to the open, high, low, close, adjusted close, and trading volume of the S&P500 for the day of the speech, as well as the days preceding and following the speech.**

\*Stock data retrieved using Yahoo! Finance

^IXIC

Date	Open	High	Low	Close	Adj Close	Volume
2/10/2020	9,493.63	9,628.66	9,493.63	9,628.39	9,628.39	2,187,520,000
2/11/2020	9,680.89	9,714.74	9,617.21	9,638.94	9,638.94	2,450,070,000
2/12/2020	9,688.60	9,728.77	9,666.69	9,725.96	9,725.96	2,366,510,000
4/8/2020	7975.720215	8114.430176	7901.939941	8090.899902	8090.899902	3,487,440,000
4/9/2020	8169.009766	8227.910156	8072.319824	8153.580078	8153.580078	4,145,460,000
4/13/2020	8127.689941	8200.44043	8035.950195	8192.419922	8192.419922	3,184,660,000
5/11/2020	9054.910156	9241.919922	9053.169922	9192.339844	9192.339844	3,925,450,000
5/12/2020	9225.150391	9250.959961	9000.070313	9002.549805	9002.549805	4,336,510,000
5/13/2020	9006.049805	9074.160156	8752.679688	8863.169922	8863.169922	4,273,210,000
5/14/2020	8788.040039	8945.709961	8705.25	8943.719727	8943.719727	3,965,970,000
5/19/2020	9227.46	9317.25	9183.25	9185.10	9185.10	4,193,550,000
5/20/2020	9305.620117	9392.820313	9304.200195	9375.780273	9375.780273	4,315,500,000
5/21/2020	9375.19043	9405.25	9254.849609	9284.879883	9284.879883	3,745,270,000
5/22/2020	9278.549805	9328.280273	9239.410156	9324.589844	9324.589844	3,668,070,000
6/15/2020	9426.900391	9756.070313	9403	9726.019531	9726.019531	4,476,010,000
6/16/2020	9949.780273	9963.629883	9748.379883	9895.870117	9895.870117	4,669,320,000
6/17/2020	9943.30957	9991.209961	9891.80957	9910.530273	9910.530273	4,279,700,000
6/18/2020	9892.480469	9959.200195	9885.660156	9943.049805	9943.049805	4,335,320,000
6/19/2020	10042.12988	10053.91016	9872.94043	9946.120117	9946.120117	6,093,830,000
6/22/2020	9945.490234	10059.61035	9916.599609	10056.48047	10056.48047	4,506,960,000
6/29/2020	9771.719727	9877.339844	9663.610352	9874.150391	9874.150391	4,336,290,000
6/30/2020	9875.290039	10085.58984	9863.669922	10058.76953	10058.76953	4,510,190,000
7/1/2020	10063.66992	10197.19043	10048.04004	10154.62988	10154.62988	4,624,430,000

# NASDAQ CSV

**Provides the prices corresponding to the open, high, low, close, adjusted close, and trading volume of the NASDAQ for the day of the speech, as well as the days preceding and following the speech.**

\*Stock data retrieved using Yahoo! Finance

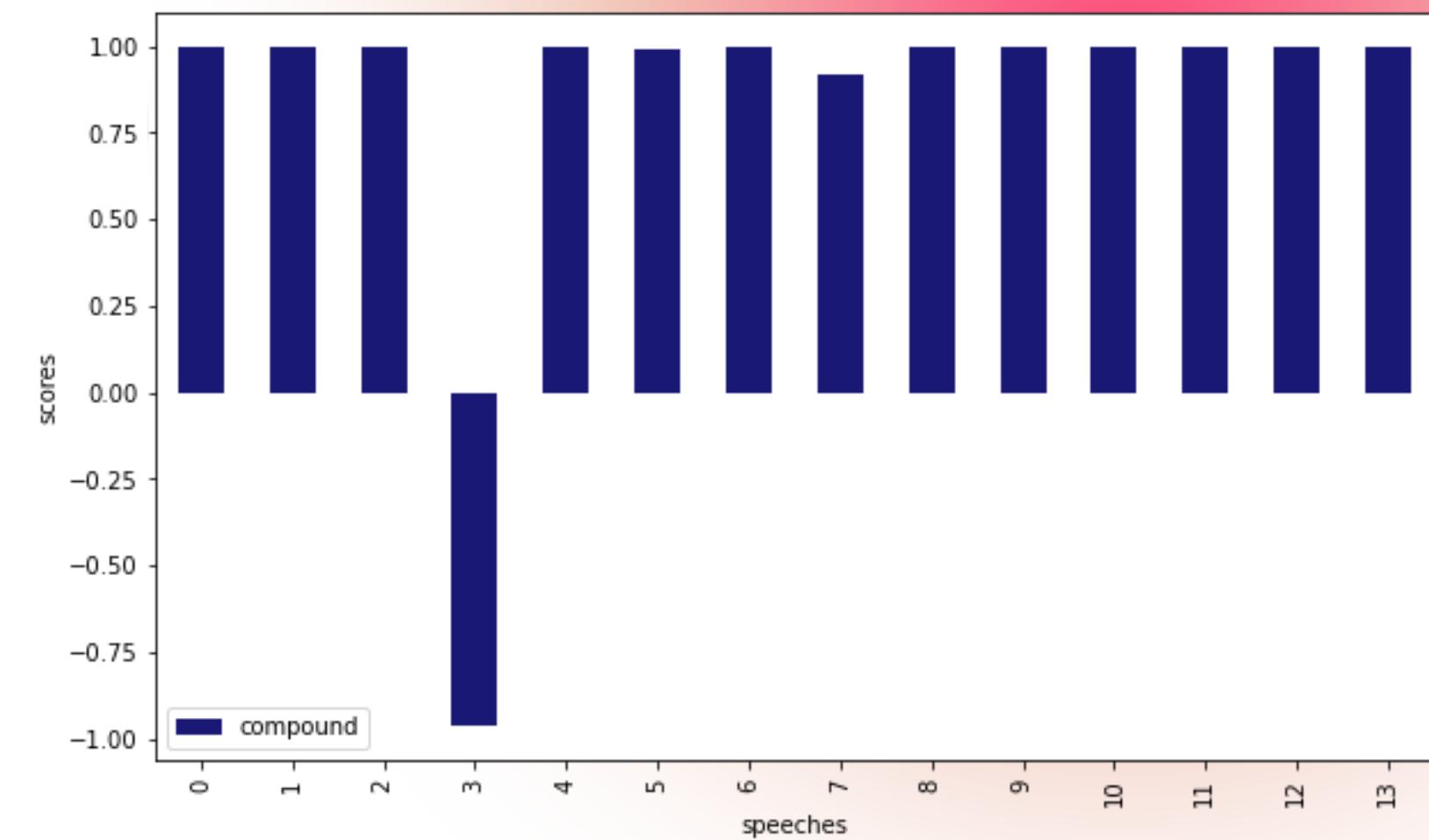
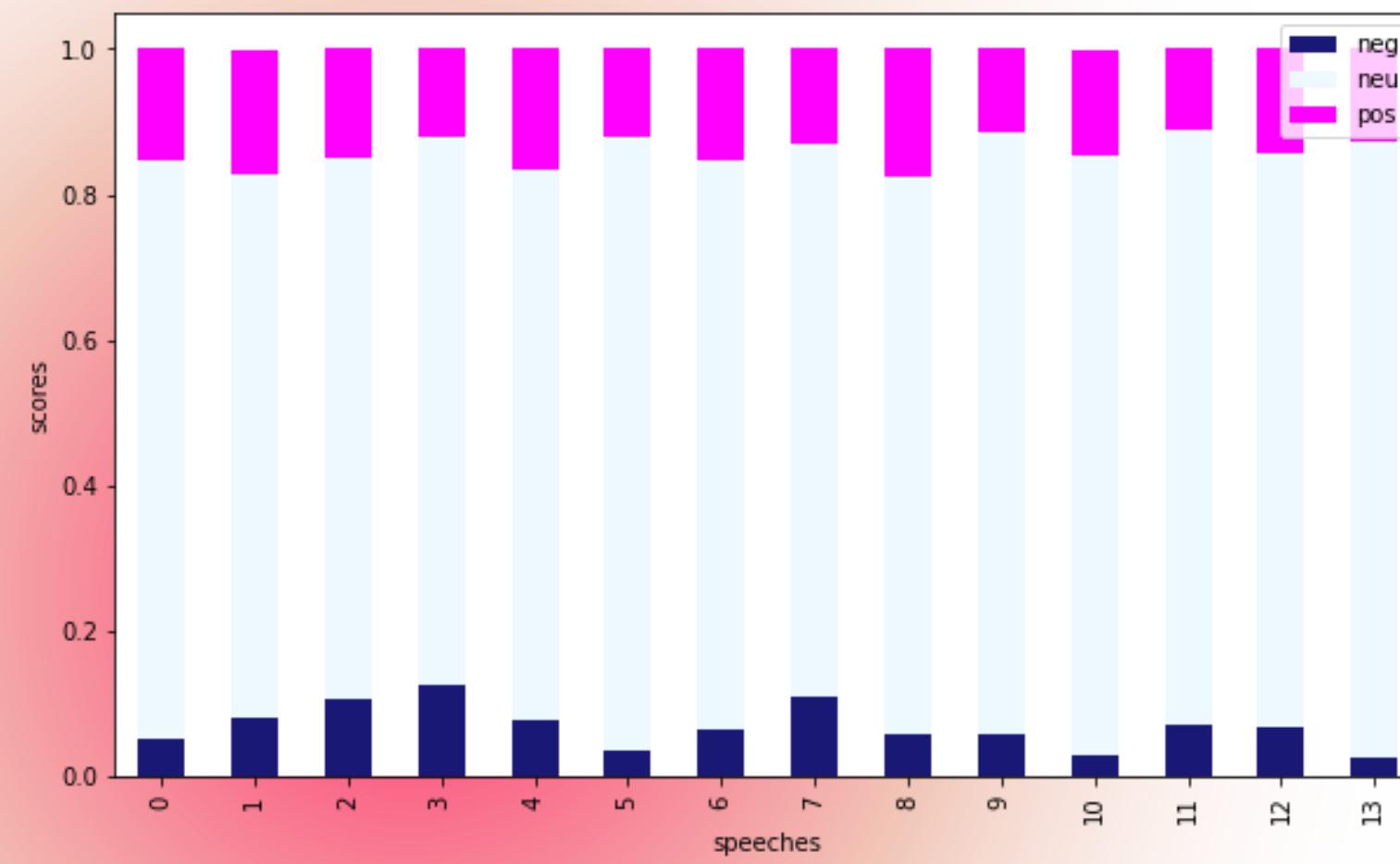
<sup>^</sup>GSPC

Date	Open	High	Low	Close*	Adj Close	Volume
2/10/2020	3,318.28	3,352.26	3,317.77	3,352.09	3,352.09	3,462,730,000
2/11/2020	3,365.87	3,375.63	3,352.72	3,357.75	3,357.75	3,762,940,000
2/12/2020	3,370.50	3,381.47	3,369.72	3,379.45	3,379.45	3,930,910,000
4/8/2020	2,685.00	2,760.75	2,663.30	2,749.98	2,749.98	5,875,710,000
4/9/2020	2,776.99	2,818.57	2,762.36	2,789.82	2,789.82	7,899,550,000
4/13/2020	2,782.46	2,782.46	2,721.17	2,761.63	2,761.63	5,319,530,000
5/11/2020	2,915.46	2,944.25	2,903.44	2,930.19	2,930.19	4,819,730,000
5/12/2020	2,939.50	2,945.82	2,869.59	2,870.12	2,870.12	5,119,630,000
5/13/2020	2,865.86	2,874.14	2,793.15	2,820.00	2,820.00	6,151,650,000
5/14/2020	2,794.54	2,852.80	2,766.64	2,852.50	2,852.50	5,651,130,000
5/19/2020	2,948.59	2,964.21	2,922.35	2,922.94	2,922.94	4,984,330,000
5/20/2020	2,953.63	2,980.29	2,953.63	2,971.61	2,971.61	5,005,380,000
5/21/2020	2,969.95	2,978.50	2,938.57	2,948.51	2,948.51	4,976,620,000
5/22/2020	2,948.05	2,956.76	2,933.59	2,955.45	2,955.45	3,970,860,000
6/15/2020	2,993.76	3,079.76	2,965.66	3,066.59	3,066.59	5,757,480,000
6/16/2020	3,131.00	3,153.45	3,076.06	3,124.74	3,124.74	5,845,810,000
6/17/2020	3,136.13	3,141.16	3,108.03	3,113.49	3,113.49	4,560,450,000
6/18/2020	3,101.64	3,120.00	3,093.51	3,115.34	3,115.34	4,448,690,000
6/19/2020	3,140.29	3,155.53	3,083.11	3,097.74	3,097.74	8,346,650,000
6/22/2020	3,094.42	3,120.92	3,079.39	3,117.86	3,117.86	4,686,690,000
6/29/2020	3,018.59	3,053.89	2,999.74	3,053.24	3,053.24	4,473,970,000
6/30/2020	3,050.20	3,111.51	3,047.83	3,100.29	3,100.29	4,705,850,000

# Our Sentiment Analysis Methodology



# Visualizations



# Final Dataframe

	Date	Link	speech	Speech_Scores	Speech_Sentiment	Most positive sentence	Most negative sentence	Summary	Summary_Sentiment	nasdaq_Pct_Change	sp500_Pct_Change
0	2020-02-11	<a href="https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairman-jerome-powell-testimony-2020-02-11">https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairman-jerome-powell-testimony-2020-02-11</a>	Chair Powell submitted identical remarks to th...	{'neg': 0.001, 'neu': 0.795, 'pos': 0.193, 'co...}	Positive	This low interest rate environment may limit t...	Residential investment turned up in the second...	Over the second half of 2019, the FOMC shifted...	Neutral	-0.433328	-0.241245
1	2020-04-09	<a href="https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairman-jerome-powell-testimony-2020-04-09">https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairman-jerome-powell-testimony-2020-04-09</a>	Good morning. The challenge we face today is d...	{'neg': 0.08, 'neu': 0.747, 'pos': 0.172, 'co...}	Positive	Even more importantly, we have acted to safegu...	The coronavirus has spread quickly around the ...	Many of the programs we are undertaking to sup...	Positive	-0.188881	0.462011
2	2020-05-12	<a href="https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairman-jerome-powell-testimony-2020-05-12">https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairman-jerome-powell-testimony-2020-05-12</a>	Chairman Crapo, Ranking Member Brown, members ...	{'neg': 0.106, 'neu': 0.745, 'pos': 0.149, 'co...}	Positive	Over the past two months, the Federal Reserve ...	More than a decade ago, U.S. banking organiz...	We advised institutions that working construct...	Positive	-2.412975	-2.360265
3	2020-05-13	<a href="https://www.federalreserve.gov/news-events/speeches/federal-reserve-chairman-jerome-powell-testimony-2020-05-13">https://www.federalreserve.gov/news-events/speeches/federal-reserve-chairman-jerome-powell-testimony-2020-05-13</a>	The coronavirus has left a devastating human a...	{'neg': 0.126, 'neu': 0.754, 'pos': 0.12, 'co...}	Negative	And fourth, temporary regulatory adjustments ...	The scope and speed of this downturn are with...	Long stretches of unemployment can damage or e...	Negative	-1.586488	-1.600218
4	2020-05-19	<a href="https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairman-jerome-powell-testimony-2020-05-19">https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairman-jerome-powell-testimony-2020-05-19</a>	Chairman Crapo, Ranking Member Brown, and othe...	{'neg': 0.078, 'neu': 0.756, 'pos': 0.166, 'co...}	Positive	In addition to monetary policy, we took forcef...	By these measures and many others, the scope a...	In addition to monetary policy, we took forcef...	Positive	-0.459065	-0.869907
5	2020-05-21	<a href="https://www.federalreserve.gov/news-events/speeches/federal-reserve-chairman-jerome-powell-testimony-2020-05-21">https://www.federalreserve.gov/news-events/speeches/federal-reserve-chairman-jerome-powell-testimony-2020-05-21</a>	Good afternoon. I just want to say a few words...	{'neg': 0.034, 'neu': 0.844, 'pos': 0.122, 'co...}	Positive	But all of us have our own decisions to make ...	And while the burden is widespread, it is not ...	From an economic perspective, we hope to learn...	Neutral	-0.963293	-0.721898
6	2020-05-15	<a href="https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairman-jerome-powell-testimony-2020-05-15">https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairman-jerome-powell-testimony-2020-05-15</a>	Chair Powell submitted identical remarks to th...	{'neg': 0.064, 'neu': 0.782, 'pos': 0.154, 'co...}	Positive	To support the small business sector, we estab...	I want to end by acknowledging the tragic even...	To provide stability to the financial system a...	Positive	-0.541623	-0.199936
7	2020-05-19	<a href="https://www.federalreserve.gov/news-events/speeches/federal-reserve-chairman-jerome-powell-testimony-2020-05-19">https://www.federalreserve.gov/news-events/speeches/federal-reserve-chairman-jerome-powell-testimony-2020-05-19</a>	Thank you, President Master and Treve Johnson...	{'neg': 0.109, 'neu': 0.759, 'pos': 0.132, 'co...}	Positive	But given the opportunity, I'll always bet on ...	A particular cruelty of the pandemic has been ...	And employers' input has influenced work across...	Neutral	-0.956070	-1.354970
8	2020-06-30	<a href="https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairwoman-lael-clarida-testimony-2020-06-30">https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairwoman-lael-clarida-testimony-2020-06-30</a>	Chairwoman Waters, Ranking Member McHenry, and...	{'neg': 0.059, 'neu': 0.765, 'pos': 0.178, 'co...}	Positive	In addition to these steps, we took forceful m...	In contrast to the 2008 crisis when banks pull...	In addition to these steps, we took forceful m...	Positive	1.857966	1.642187
9	2020-08-27	<a href="https://www.federalreserve.gov/news-events/speeches/federal-reserve-chairwoman-lael-clarida-testimony-2020-08-27">https://www.federalreserve.gov/news-events/speeches/federal-reserve-chairwoman-lael-clarida-testimony-2020-08-27</a>	Thank you, Esther, for that introduction, and ...	{'neg': 0.059, 'neu': 0.826, 'pos': 0.115, 'co...}	Positive	This emphasis on transparency reflected what w...	Having declined significantly in the five year...	For the past year and a half, my colleagues an...	Neutral	-0.637727	-0.016629
10	2020-09-22	<a href="https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairwoman-lael-clarida-testimony-2020-09-22">https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairwoman-lael-clarida-testimony-2020-09-22</a>	Chair Powell submitted identical remarks to th...	{'neg': 0.029, 'neu': 0.825, 'pos': 0.145, 'co...}	Positive	With funding from the CARES Act (Coronavirus A...	Main Street loans have a five-year maturity, n...	The Main Street Lending Program The Federal Re...	Positive	0.800841	0.601381
11	2020-10-06	<a href="https://www.federalreserve.gov/news-events/speeches/federal-reserve-chairwoman-lael-clarida-testimony-2020-10-06">https://www.federalreserve.gov/news-events/speeches/federal-reserve-chairwoman-lael-clarida-testimony-2020-10-06</a>	Good morning. It has been just eight months si...	{'neg': 0.072, 'neu': 0.817, 'pos': 0.111, 'co...}	Positive	On a more positive note, we have seen that the ...	By the end of the month, many important market...	We identified three ways that our tools could ...	Neutral	-1.413598	-1.401398
12	2020-11-10	<a href="https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairwoman-lael-clarida-testimony-2020-11-10">https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairwoman-lael-clarida-testimony-2020-11-10</a>	Vice Chair for Supervision Quarles submitted i...	{'neg': 0.068, 'neu': 0.788, 'pos': 0.144, 'co...}	Positive	Since then, working with our colleagues in oth...	But in light of continuing uncertainty, we too...	We published a set of key principles to guide ...	Positive	-0.580066	0.064065
13	2020-12-01	<a href="https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairwoman-lael-clarida-testimony-2020-12-01">https://www.federalreserve.gov/news-events/testimony/federal-reserve-chairwoman-lael-clarida-testimony-2020-12-01</a>	Chair Powell submitted identical remarks to th...	{'neg': 0.027, 'neu': 0.845, 'pos': 0.128, 'co...}	Positive	With funding from the Coronavirus Aid, Relief,...	In contrast, spending on services remains low ...	The Primary Market Corporate Credit Facility T...	Positive	0.338063	0.454761

# Now, to the trends.



# Trends & Patterns in the Sentiment

NASDAQ

29%

of sentiment scores matched the direction of the NASDAQ's movement

The composition of the NASDAQ Composite is heavily weighted towards companies in the information technology sector.

S&P 500

43%

of sentiment scores matched the direction of the S&P 500's movement

The composition of the S&P 500 includes information technology, healthcare, financials, consumer discretionary, industrials, energy, and communication services.

# Why These Results?

01

## Market inefficiencies

The market may not always respond in a logical or predictable fashion in response to news or events.

02

## Timing

The stock market is extremely volatile and can react quickly to news or events.

03

## Limited Scope

Our model did not take other factors, such as macroeconomic indicators, corporate earnings reports, and geopolitical events into account; these factors play a significant role in market movements.

04

## Model Limitations

Sentiment analysis models are not perfect and can have limitations. Some models may not capture the complexity of language, the nuances of sentiment, or the context of the speech.

IN 2020, THE AVERAGE TRADING VOLUME WAS

**10,900,000,000**

with 19.5% of equity traded by individual investors.

Increased market volatility, low-interest rates, fiscal stimulus measures, and increased retail investor participation were the cause for this explosive growth.

# Analysis

The Federal Reserve Chair's speeches and communications, in addition to economic data, geopolitical events, and earnings reports, can impact stock prices. Sectors may experience varying fluctuations based on the message, and a market drop can indicate broad investor concern stemming from the Federal Reserve's comments.

# Conclusion

Ultimately our project allows us to better understand the situational cause and effect relationships between FED chair Jerome Powells communications on financial markets and stock market prices.

Furthermore, we hope to contribute to a more stable and efficient financial system by shedding light on this connection and its potential implications.



# Thank you!



# References

- <https://finance.yahoo.com/>
- <https://www.cnbc.com/2021/01/22/trading-volume-is-up-so-far-from-2020s-breakneck-pace-as-retail-investors-get-even-more-active.html>
- <https://www.investopedia.com/2020-was-a-big-year-for-individual-investors-5094063>
- <https://www.cnbc.com/2021/01/22/trading-volume-is-up-so-far-from-2020s-breakneck-pace-as-retail-investors-get-even-more-active.html>