Analysis of the S&P 500 in 2020 and their response to the COVID-19 Pandemic

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Introduction

Objective:

Explore Behavior of S&P500 Stocks in 2020

1. Which stocks were affected the most by COVID-19?
2. Which stocks affected by COVID-19 recovered?
3. Which stocks failed to recover from COVID-19?
4. How well does sentiment agree with traditional stock indicators in 2020?

Data Sourcing and Cleanup

- S&P500 stock tickers scraped off wikipedia using Beautiful Soup and requests

- Used yfinance package to obtain ticker information from Yahoo! Finance

Question #1: Due to the COVID-19 Market Crash on March 16, 2020:

- Which stocks and industries were affected?
- Were any stocks or industries better off after COVID hit?

COVID-19 "Winners" and "Losers" from January 2nd to March 16th

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Ticker              Security Name  Percent Change              Industry
480    WEC          WEC Energy Group       0.303029             Utilities
259    JKHY   Jack Henry & Associates      1.017277  Information Technology
262    SJM              JM Smucker          3.562853       Consumer Staples
212    GILD         Gilead Sciences         5.142687            Health Care
405    SBAC        SBA Communications       6.452415            Real Estate
142    DLR     Digital Realty Trust Inc     6.916086            Real Estate
277    KR               Kroger Co.          7.130553       Consumer Staples
399    ROL             Rollins Inc.         7.551138            Industrials
109    CLX        The Clorox Company       13.893596       Consumer Staples
393    REGN   Regeneron Pharmaceuticals    16.621690            Health Care
       Ticker                Security Name  Percent Change         Industry
345    NCLH   Norwegian Cruise Line Holdings  -81.391394  Consumer Discretionary
340    NBL              Noble Energy        -78.902784                 Energy
44     APA          Apache Corporation      -78.754864                 Energy
402    RCL       Royal Caribbean Group      -77.748049  Consumer Discretionary
218    HAL           Halliburton Co.        -75.941677                 Energy
141    FANG        Diamondback Energy       -74.836636                 Energy
433    FTI               TechnipFMC         -73.286714                 Energy
85     CCL             Carnival Corp.       -71.626095  Consumer Discretionary
157    DXC             DXC Technology       -71.469890  Information Technology
351    OXY         Occidental Petroleum     -71.126591                 Energy
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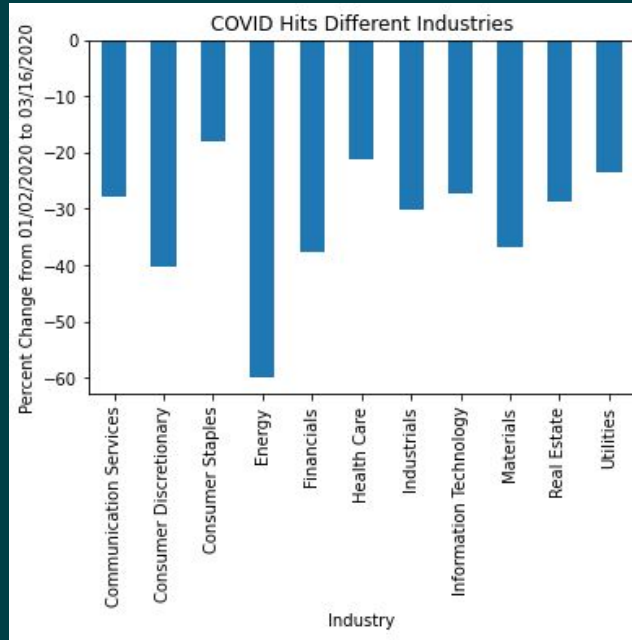
Distribution of Price Changes from Year Start to Black Thursday
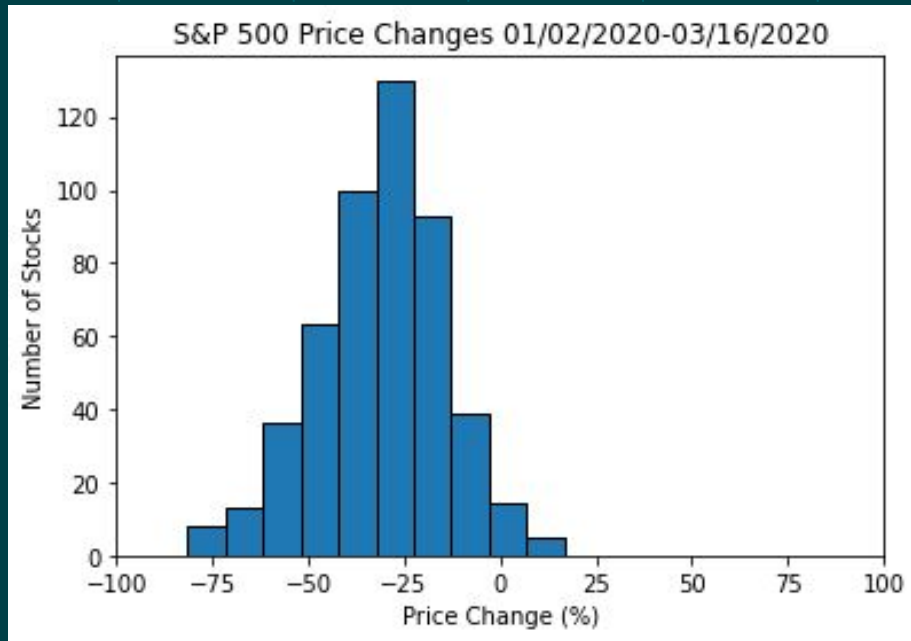
Industry Analysis of S&P 500

COVID Hits Different Industries

Which of the preceding stocks appeared to have recovered?

Sub Question - For March and April which monthly stock percent change suffered in March but recovered in April?

Starting Point

Why start in March ?

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Tickers_Recovered = All_Tables.loc[All_Tables['Symbol'].isin(['A
Tickers_Recovered
```

	Date_x_x	Symbol	Open_x	Date_y_x	Close_x	Percent Change March
44	2020-03-02	APA	25.490000	2020-03-31	4.180000	-0.836014
277	2020-03-02	KSS	39.200001	2020-03-31	14.590000	-0.627806
347	2020-03-02	NCLH	37.099998	2020-03-31	10.960000	-0.704582
353	2020-03-02	OXY	33.580002	2020-03-31	11.580000	-0.655152
356	2020-03-02	OKE	67.650002	2020-03-31	21.809999	-0.677605

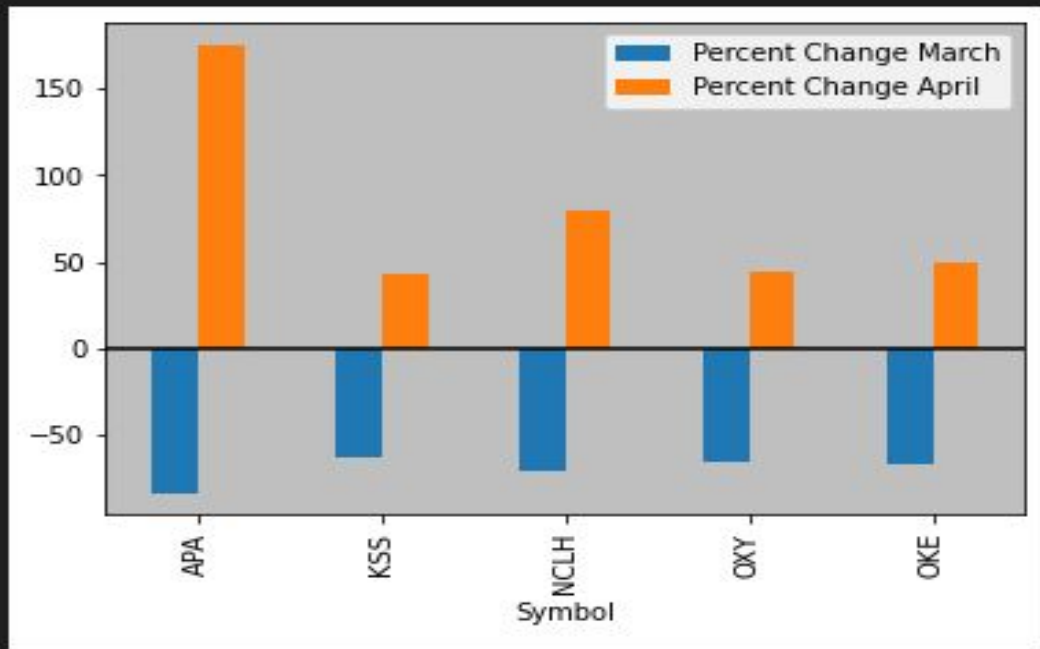# Signs of Recovery in April....what happened during this month?

Date_x_y	Open_y	Date_y_y	Close_y	Percent Change April
2020-04-02	4.75	2020-04-30	13.080000	1.753684
2020-04-02	12.90	2020-04-30	18.459999	0.431008
2020-04-02	9.16	2020-04-30	16.400000	0.790393
2020-04-02	11.48	2020-04-30	16.600000	0.445993
2020-04-02	19.98	2020-04-30	29.930000	0.497998

ROAD TO RECOVERY

I want to see proof!!

Which stocks failed to recover from COVID-19?

Stock Losers:

March - August 2020

10 - Stocks that did not recover based on the analysis

Ticker		Security Name	Percent Change	Industry
128	COTY	Coty, Inc	-48.093844	Consumer Staples
190	FE	FirstEnergy Corp	-25.464191	Utilities
394	REG	Regency Centers Corporation	-19.980311	Real Estate
416	SLG	SL Green Realty	-18.754187	Real Estate
172	EQR	Equity Residential	-17.412861	Real Estate
73	BXP	Boston Properties	-16.943580	Real Estate
186	FRT	Federal Realty Investment Trust	-16.502560	Real Estate
451	UDR	UDR, Inc.	-15.790741	Real Estate
414	SPG	Simon Property Group Inc	-14.338233	Real Estate
121	ED	Consolidated Edison	-14.010891	Utilities

'COTY','SPG','EQR','WFC' 'FE', 'REG', 'BXP', 'FRT', 'UDR', 'ED'
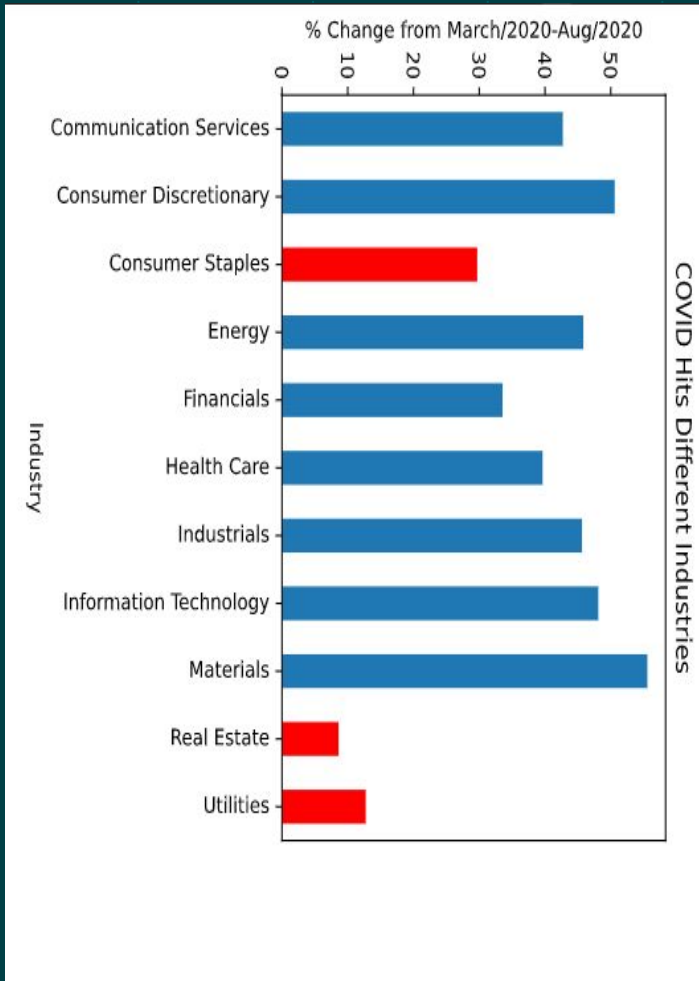
Stocks category by Industries

Chart Analysis

3 Industries that lagged from Mar-Aug

- Consumer Staples
- Real Estate
- Utilities

Bar Plot - determines the stock losers fall in Red category.

Merging Stocks

from June Start to end of June

July Start to end of July

	Date_x_x	Symbol	Open_x	Date_y_x	Close_x	Percent Change June	Date_x_y	Open_y	Date_y_y	Close_y	Percent Change July
74	2020-06-01	BXP	85.809998	2020-06-30	90.379997	0.053257	2020-07-01	90.629997	2020-07-31	89.089996	-0.016992
123	2020-06-01	ED	74.970001	2020-06-30	71.930000	-0.040550	2020-07-01	71.930000	2020-07-31	76.830002	0.068122
130	2020-06-01	COTY	3.990000	2020-06-30	4.470000	0.120301	2020-07-01	4.440000	2020-07-31	3.710000	-0.164414
174	2020-06-01	EQR	60.540001	2020-06-30	58.820000	-0.028411	2020-07-01	58.939999	2020-07-31	53.630001	-0.090092
188	2020-06-01	FRT	80.349998	2020-06-30	85.209999	0.060485	2020-07-01	85.779999	2020-07-31	76.300003	-0.110515
192	2020-06-01	FE	42.130001	2020-06-30	38.779999	-0.079516	2020-07-01	38.869999	2020-07-31	29.000000	-0.253923
396	2020-06-01	REG	42.970001	2020-06-30	45.889999	0.067954	2020-07-01	46.389999	2020-07-31	41.029999	-0.115542
416	2020-06-01	SPG	57.310001	2020-06-30	68.379997	0.193160	2020-07-01	69.800003	2020-07-31	62.349998	-0.106734
418	2020-06-01	SLG	42.009998	2020-06-30	49.290001	0.173292	2020-07-01	49.580002	2020-07-31	46.500000	-0.062122
453	2020-06-01	UDR	36.889999	2020-06-30	37.380001	0.013283	2020-07-01	37.410000	2020-07-31	36.200001	-0.032344

Transition of the Stocks

Stock did better in June but then dropped in July

Ex: COTY going from
   +0.10% to - 0.15%
   : FE doing even worse than
   Previous month -0.25%

Question 4

How well does a traditional stock indicator (MACD) agree with news sentiment for the month of August among S&P 500 stocks?
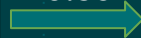
In other words, how well does news 'emotion' compare with stock price behavior?

"Apple (AAPL) Stock Sinks As Market Gains: What You Should Know" → Vader Sentiment Intensity → -0.35 →

Sell!

Approach:

1. Gather news headline abstracts for August for each stock
2. Score sentiment of headline abstracts using Vader, aggregate for each stock and label 'positive' or 'negative'
3. Compute moving average convergence divergence (MACD) in August and determine if there is a net buy (positive) or sell (negative) signal
4. Compare co-occurrences of positive and negative signals for both

MACD Event Time Points for GOOGL
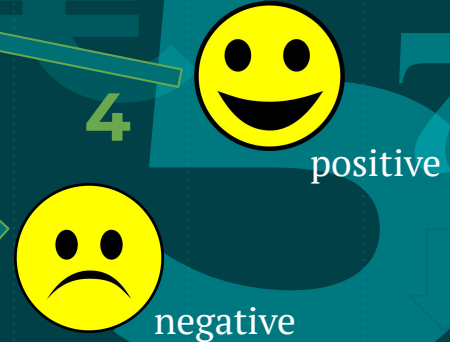
positive

negative

Results

Sentiment

	Positive	Negative
MACD Positive	*103*	*7*
MACD Negative	*185*	*8*

The contingency table is analyzed using a χ^2 test

Null-Hypothesis: MACD outcomes and Sentiment analysis outcomes are independent

$p \cong 0.56 >> 0.05$

We accept the null-hypothesis that these outcomes are independent

Conclusion

- From January 2nd to March 16, the S&P 500 decreased as a whole overall. Stocks that increased in value were consumer staples like Clorox and Kroger, Co. and ones that decreased in value were oil companies from price wars in the Middle East and luxury cruise companies.

- The government has to come up with strategic plans for emergency situations similar to the Covid19 pandemic all the time. We believe the stimulus checks helped aid in the recovery of the stocks that failed for the specified time period. Our recommendation would be to look at those months in particular to see what happened because it helped their businesses recover during a pandemic.

- Throughout covid19 lockdown there 3 industries in the S&P 500 Index, that were negatively affected and in those industries there were 10 stocks were unable to recover
  - Symbols 'COTY','SPG','EQR','WFC' 'FE', 'REG', 'BXP', 'FRT', 'UDR', 'ED'

- In the present study, the label as determined by MACD is independent of that determined by Vader sentiment intensity for S&P 500 stocks
  - Many potential improvements: incorporate more news sources, account for specific MACD signal times, etc.