Investigating the Impact of the COVID-19 Pandemic on the American Stock Market

Andres Portes, Ella Ndalla, Ridhwaan Ali

Our Objective

Objective: to understand the pandemic's impact on the US stocks performance through the New York Stock Exchange, and advantageously use the lessons learned to better anticipate future stock market performance and leverage economies of scale in case another pandemic is ever declared.

Research & Focus

Our research explored stock performance on the NYSE by sectors based on the The Global Industry Classification Standard.

Our research period spanned from March 2019 to March 2023. This time frame provided coverage of stock performance prior to the pandemic, during the pandemic and the recovery period. The dataset highlighted the impact the pandemic had on the stock market and provided indication on whether or not the US stock market was currently performing under its pre-pandemic conditions.

Initial Analysis and Key Findings

As many of us know, the pandemic ended up having a significant impact on the world economy, leading to unprecedented volatility and uncertainty that lingers to this day. It is undeniable that a few key trends and developments emerged as a result.

We initially took a look at the S&P 500 index, which is widely regarded as a benchmark for the overall performance of the stock market, to get an initial idea of the landscape. It fell more than 34% between its peak in February 2020 and its low point in March 2020.

Some industries, such as healthcare, technology and e-commerce, thrived during the pandemic as consumer behavior was altered and more people most likely turned to online pharmacies, home-based operations and online shopping over traditional stores. As a result, the stock prices of the companies in these sectors soared.

On the other hand, the industries that were hit hard by lockdowns and other pandemic-related restrictions, such as travel, hospitality and retail, saw their prices suffer. Many companies in these sectors were forced to lay off a vast number of their workforce, while others went bankrupt, which most likely lead to the decline in stock prices.

COVID-19 Crash & Recovery

$22,580
$22,580
Feb 2021

$19,044
Jan 2020

$15,244
Mar 2020

20,000
USD
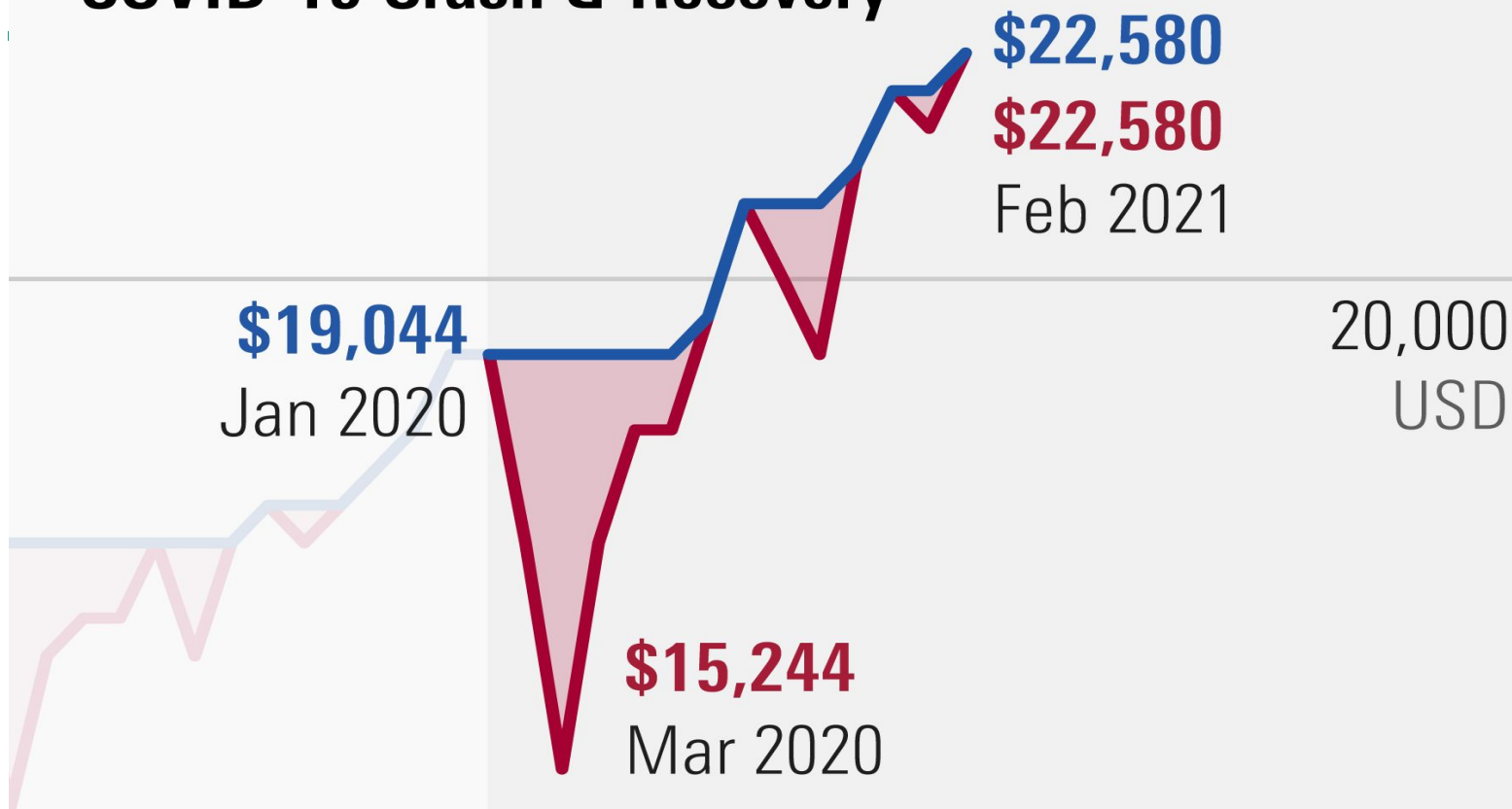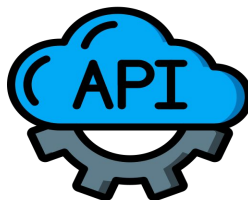
Retrieving Historical Data

	Symbol	Industry	index	open	high	low	close	adjclose	volume	ticker
0	A	Electrical Products	2019-01-01	66.5	76.30999755859380	62.0	76.05000305175780	73.79060363769530	44194500	A
1	A	Electrical Products	2019-02-01	76.16000366210940	79.83999633789060	74.76000213623050	79.44000244140630	77.07988739013670	35941700	A
2	A	Electrical Products	2019-03-01	80.0	82.2699966430664	77.4000015258789	80.37999725341800	77.99197387695310	32806600	A
3	A	Electrical Products	2019-04-01	80.95999908447270	82.23999786376950	73.76000213623050	78.5	76.16780853271480	41866300	A
4	A	Electrical Products	2019-05-01	78.48999786376950	79.55999755859380	66.02999877929690	67.05000305175780	65.19100952148440	77266900	A
5	A	Electrical Products	2019-06-01	67.04000091552730	74.69999694824220	66.41000366210940	74.66999816894530	72.59972381591800	40936700	A
6	A	Electrical Products	2019-07-01	75.5999984741211	76.93000030517580	68.0999984741211	69.41000366210940	67.4855728149414	60671300	A
7	A	Electrical Products	2019-08-01	69.62999725341800	72.7699966430664	65.3499984741211	71.11000061035160	69.29061126708980	56018500	A
8	A	Electrical Products	2019-09-01	70.69999694824220	78.73999786376950	69.4800033569336	76.62999725341800	74.66939544677730	52301200	A
9	A	Electrical Products	2019-10-01	76.5	76.88999938964840	71.7300033569336	75.75	73.970703125	34335000	A
10	A	Electrical Products	2019-11-01	76.51000213623050	81.33999633789060	74.94000244140630	80.7699966430664	78.87281036376950	34217000	A
11	A	Electrical Products	2019-12-01	80.77999877929690	85.68000030517580	79.16999816894530	85.30999755859380	83.30615997314450	33017300	A
12	A	Electrical Products	2020-01-01	85.9000015258789	90.63999938964840	82.3399963378906	82.55999755859380	80.7909927368164	38918800	A
13	A	Electrical Products	2020-02-01	83.29000091552730	86.08000183105470	74.16999816894530	77.06999969482420	75.41864013671880	43628100	A
14	A	Electrical Products	2020-03-01	77.30999755859380	85.0	61.13000106811520	71.62000274658200	70.08543395996090	70839900	A
15	A	Electrical Products	2020-04-01	69.47000122070310	80.3499984741211	68.13999938964840	76.66000366210940	75.20834350585940	44109700	A
16	A	Electrical Products	2020-05-01	75.55000305175780	88.48999786376950	73.41999816894530	88.13999938964840	86.47093200683590	47807100	A
17	A	Electrical Products	2020-06-01	88.04000091552730	93.04000091552730	83.70999908447270	88.37000274658200	86.69657897949220	37447300	A
18	A	Electrical Products	2020-07-01	88.88999938964840	98.08999633789060	87.30000305175780	96.33000183105470	94.70429229736330	32368100	A
19	A	Electrical Products	2020-08-01	96.94000244140630	101.04000091552700	94.52999877929690	100.41999816894500	98.72527313232420	27201000	A
20	A	Electrical Products	2020-09-01	100.91999816894500	103.66000366210900	94.76000213623050	100.94000244140600	99.23650360107420	27415800	A
21	A	Electrical Products	2020-10-01	101.7699966430660	107.62000274658200	99.80999755859380	102.08999633789100	100.36708068847700	22028100	A
22	A	Electrical Products	2020-11-01	103.5199966430660	118.95999908447300	103.29000091552700	116.9000015258790	115.1343765258790	41211400	A
23	A	Electrical Products	2020-12-01	117.58000183105500	120.23999786377000	113.16000366210900	118.48999786377000	116.70036315918000	35544100	A
24	A	Electrical Products	2021-01-01	118.94000244140600	129.33999633789100	117.11000061035200	120.16999816894500	118.35498809814500	33136600	A
25	A	Electrical Products	2021-02-01	120.69000244140600	136.97999572753900	120.18000305176000	122.06999969482400	120.42345428466800	33224600	A
26	A	Electrical Products	2021-03-01	123.05000305175800	128.47999572753900	112.47000122070300	127.13999938964800	125.42506408691400	39710100	A
27	A	Electrical Products	2021-04-01	128.0	137.83000183105500	127.01000213623000	133.63999938964800	131.83740234375	31820700	A
28	A	Electrical Products	2021-05-01	134.2899932861330	139.21000671386700	127.12999725341800	138.13000488281300	136.4741668701170	28547900	A

	Symbol	Industry	index	open	high	low	close	adjclose	volume	ticker
34	A	Electrical Products	2021-11-01	157.3800048828130	165.67999267578100	149.6999969482420	150.89999389648400	149.4729461669920	34255700	A
35	A	Electrical Products	2021-12-01	151.1199951171880	162.6199951171880	147.72000122070300	159.64999389648400	158.14019775390600	33711900	A
36	A	Electrical Products	2022-01-01	159.0	159.44000244140600	131.22000122070300	139.32000732421900	138.00247192382800	40101000	A
37	A	Electrical Products	2022-02-01	140.52999877929700	145.10000610351600	123.05999755859400	130.36000061035200	129.2972869873050	42312800	A
38	A	Electrical Products	2022-03-01	130.8300018310550	140.1999969482420	126.9000015258790	132.3300018310550	131.25119018554700	46251400	A
39	A	Electrical Products	2022-04-01	134.1799926578100	137.0800018310550	117.23999786377000	119.2699966430660	118.29767608642600	43916800	A
40	A	Electrical Products	2022-05-01	118.37999725341800	130.77000427246100	112.63999938964800	127.55999755859400	126.71873474121100	45551500	A
41	A	Electrical Products	2022-06-01	127.86000061035200	131.1999969482420	112.5199996430660	118.7699966430660	117.98670196533200	35110300	A
42	A	Electrical Products	2022-07-01	118.79000091552700	134.5	113.0199966430660	134.10000610351600	133.21560668945300	27261300	A
43	A	Electrical Products	2022-08-01	133.50999450683600	149.0	127.16000366210900	128.25	127.6298599243160	32066400	A
44	A	Electrical Products	2022-09-01	127.62999725341800	140.0	120.5999984741210	121.55000305175800	120.96224975585900	31680800	A
45	A	Electrical Products	2022-10-01	122.7300033569340	139.30999755859400	121.68000030517600	138.35000610351600	137.68101501464800	27011100	A
46	A	Electrical Products	2022-11-01	139.5	157.44000244140600	130.66000366210900	154.97999572753900	154.4975128173830	30737200	A
47	A	Electrical Products	2022-12-01	156.72999572753900	160.25999450683600	145.8800048828130	149.64999389648400	149.18411254882800	25282200	A
48	A	Electrical Products	2023-01-01	151.9600067138670	159.58999633789100	143.00999450683600	152.0800018310550	151.83265686035200	25394900	A
49	A	Electrical Products	2023-02-01	153.30999755859400	157.30999755859400	138.72000122070300	141.97000122070300	141.7390899658200	23987500	A
50	A	Electrical Products	2023-03-01	138.5800018310550	145.44000244140600	128.22000122070300	138.33999633789100	138.114990234375	38085900	A
51	A	Electrical Products	2023-04-01	137.4199981689450	141.47999572753900	128.11000061035200	135.42999267578100	135.20973205566400	27783900	A
52	A	Electrical Products	2023-05-01	136.02000427246100	137.16000366210900	113.27999877929700	115.66999816894500	115.66999816894500	46206000	A

Created a dataset NYSE traded stocks covering a period of 2019 to 2023 using a 2 pronged approach:

1. Obtained a list of NYSE traded stocks with other attributes such as sector, industry ect.
2. Leveraged Yahoo finance API to fetch historical NYSE Stock data.

Using API and Python to Retrieve Accurate Data and Sources

```
In [1]:   #!pip install yahoo_fin
          !pip install --upgrade yahoo_fin
```

```
In [17]:  import pandas as pd
          import numpy as np
          import matplotlib.pyplot as plt
          from yahoo_fin.stock_info import get_data
```

```
In [13]:  ## Import NYSE stock from CSV
          NYSE_stock_df = pd.read_csv('/Users/ellandalla/Desktop/BootCamp/NYSE_Download.csv')
```

```
In [ ]:   ##print (get_data)
```

```
In [14]:  NYSE_stock_df.head()
          ##(NYSE_stock_df.columns)
```

Out[14]:

	Symbol	Name	Last Sale	Net Change	% Change	Market Cap	Country	IPO Year	Volume	Sector	Industry
0	A	Agilent Technologies Inc. Common Stock	$116.26	0.59	0.51%	3.437830e+10	United States	1999.0	3966054	Industrials	Electrical Products
1	AAP	Advance Auto Parts Inc.	$68.03	-4.86	-6.67%	4.043275e+09	United States	NaN	9504583	Consumer Discretionary	Auto & Home Supply Stores
2	AB	AllianceBernstein Holding L.P. Units	$35.21	0.44	1.27%	4.006937e+09	United States	NaN	145118	Finance	Investment Managers
3	ABBV	AbbVie Inc. Common Stock	$133.44	-4.52	-3.28%	2.354070e+11	United States	2012.0	11892220	Health Care	Biotechnology: Pharmaceutical Preparations
4	ABC	AmerisourceBergen Corporation Common Stock	$172.59	2.44	1.43%	3.490774e+10	United States	NaN	1539467	Health Care	Other Pharmaceuticals

Continuation of Processing Data and Sources

```
In [15]: stock_df_results = pd.DataFrame()
         # write a for loop through Symbol column
         for symbol in NYSE_stock_df['Symbol']:
             ##print(symbol)
         #    get the data for that stock ticker
             data = get_data(symbol, start_date="01/01/2019", end_date="05/31/2023", index_as_date = True, interval="1mo")
         #    save the data to stock_df_results
             stock_df_results = pd.concat([stock_df_results, data])
```

```
In [6]: print (stock_df_results)
                     open        high         low       close    adjclose      volume  \
        2019-01-01  66.500000   76.309998   62.000000   76.050003   73.790588   44194500
        2019-02-01  76.160004   79.839996   74.760002   79.440002   77.079895   35941700
        2019-03-01  80.000000   82.269997   77.400002   80.379997   77.991966   32806600
        2019-04-01  80.959999   82.239998   73.760002   78.500000   76.167831   41866300
        2019-05-01  78.489998   79.559998   66.029999   67.050003   65.191002   77266900
        ...               ...         ...         ...         ...         ...         ...
        2023-01-01  21.450001   23.160000   20.100000   21.860001   21.725685   34046400
        2023-02-01  21.780001   25.100000   21.600000   23.000000   22.858677   29633200
        2023-03-01  22.870001   23.379999   19.290001   21.360001   21.292099   29525400
        2023-04-01  21.480000   22.180000   19.830000   21.549999   21.481493   26958400
        2023-05-01  21.400000   23.150000   20.700001   22.510000   22.438442   28416700

                   ticker
        2019-01-01      A
        2019-02-01      A
        2019-03-01      A
        2019-04-01      A
        2019-05-01      A
        ...           ...
        2023-01-01    ZWS
        2023-02-01    ZWS
        2023-03-01    ZWS
        2023-04-01    ZWS
        2023-05-01    ZWS
```

Analysis - Sector Price over Time

COVID-19 IMPACT ON STOCKS Per SECTOR
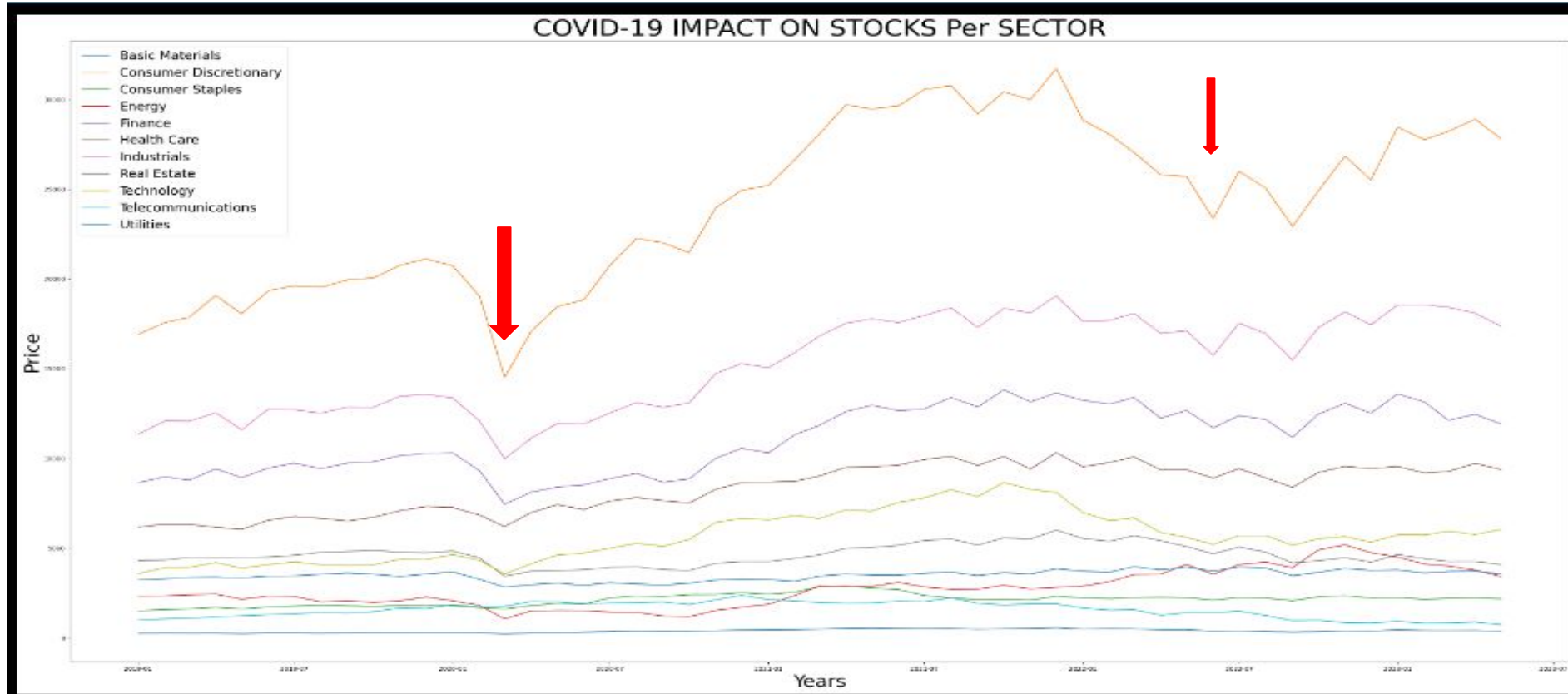
Analysis - Stock Volume over Time

We reduced the data frame to able to plot the data.

The CSV contained all the data from 2019-2023 so we made separate variable data for each year.

We chose to make the index the x axis and the volume the y axis.

```
In [17]: year2019= list(date.loc[0:38807])
         year2019
```

```
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019',
           '1/1/2019'
```

```
In [18]: vol2019= list(vol.loc[0:38807])
         vol2019
```

```
           7143669,
           1270500,
           2036600,
           82769200,
           11087000,
           17847500,
           3774900,
           13886400,
           961100,
           8097300,
           824000,
           12943100,
           4055100,
           8239600,
           5191100,
           2901800,
           4603583,
           13077900,
           5329480,
           3322600,
```

```
In [20]: year2020= list(date.loc[38808:77326])
         year2020
```

```
Out[20]: ['1/6/2020',
          '1/6/2020',
          '1/6/2020',
          '1/6/2020',
          '1/6/2020',
          '1/6/2020',
          '1/7/2020',
          '1/7/2020',
          '1/7/2020',
          '1/7/2020',
          '1/7/2020',
          '1/7/2020',
          '1/7/2020',
          '1/7/2020',
          '1/7/2020',
          '1/7/2020',
          '1/7/2020',
          '1/7/2020',
          '1/7/2020',
          '1/7/2020'
          '1/7/2020'
```

```
In [21]: vol2020= list(vol.loc[38808:77326])
         vol2020
```

```
Out[21]: [425200,
          11868600,
          3805800,
          3946700,
          866400,
          1275800,
          8492200,
          6687400,
          2259200,
          40330900,
          4814000,
          1464400,
          1217000,
          5084900,
          25786400,
          8189200,
          3004100,
          15171000,
```

2020

```python
In [25]: year2021= list(date.loc[77327:116507])
         year2021
```

```
Out[25]: ['1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/4/2021',
          '1/5/2021',
          '1/5/2021',
```

```python
In [26]: vol2021= list(vol.loc[77327:116507])
         vol2021
```

```
Out[26]: [3744300,
          1334700,
          1605700,
          19580100,
          19071000,
          10021400,
          4401300,
          723100,
          2806700,
          6494800,
          22541700,
          13415200,
          1592800,
          2931300,
          274996800,
          40541300,
          14449900,
          9872400,
          5247500,
```

In [30]:
```python
year2022= list(date.loc[116508:155819])
year2022
```

```
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
'1/4/2022',
```

In [31]:
```python
vol2022= list(vol.loc[116508:155819])
vol2022
```

Out[31]:
```
[1225000,
 6199000,
 4168000,
 2785200,
 42431800,
 53649400,
 6285100,
 13068300,
 16802100,
 6280900,
 5413800,
 18445300,
 11958500,
 10629400,
 30830600,
 16249500,
 1782300,
 11217900,
```

```
In [35]: year2023= list(date.loc[155820:159598])
         year2023
```

```
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
              '1/1/2023',
```

```
In [36]: vol2023= list(vol.loc[155820:159598])
         vol2023
```

```
              40568700,
              252908500,
              964100,
              16983000,
              33472800,
              387243000,
              55956200,
              36873100,
              36033800,
              15137000,
              17788300,
              21215700,
              85790200,
              24167600,
              54975000,
              14120000,
              241793600,
              9985300,
              24871500,
```

Visualization of Analysis

After declaring our x and y variables for plotting we were able to create line plots that show trends in the volumes for each separate year.
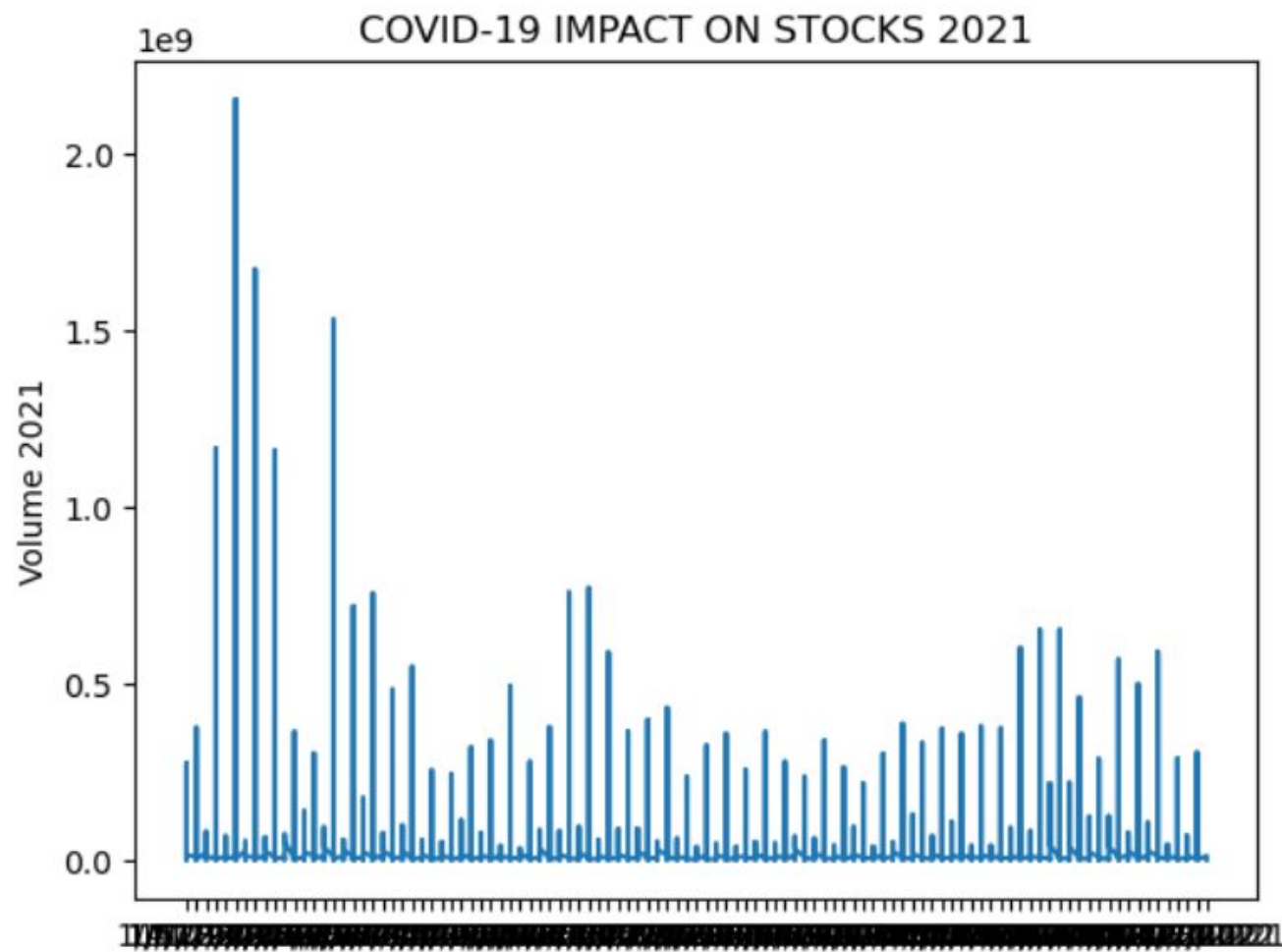
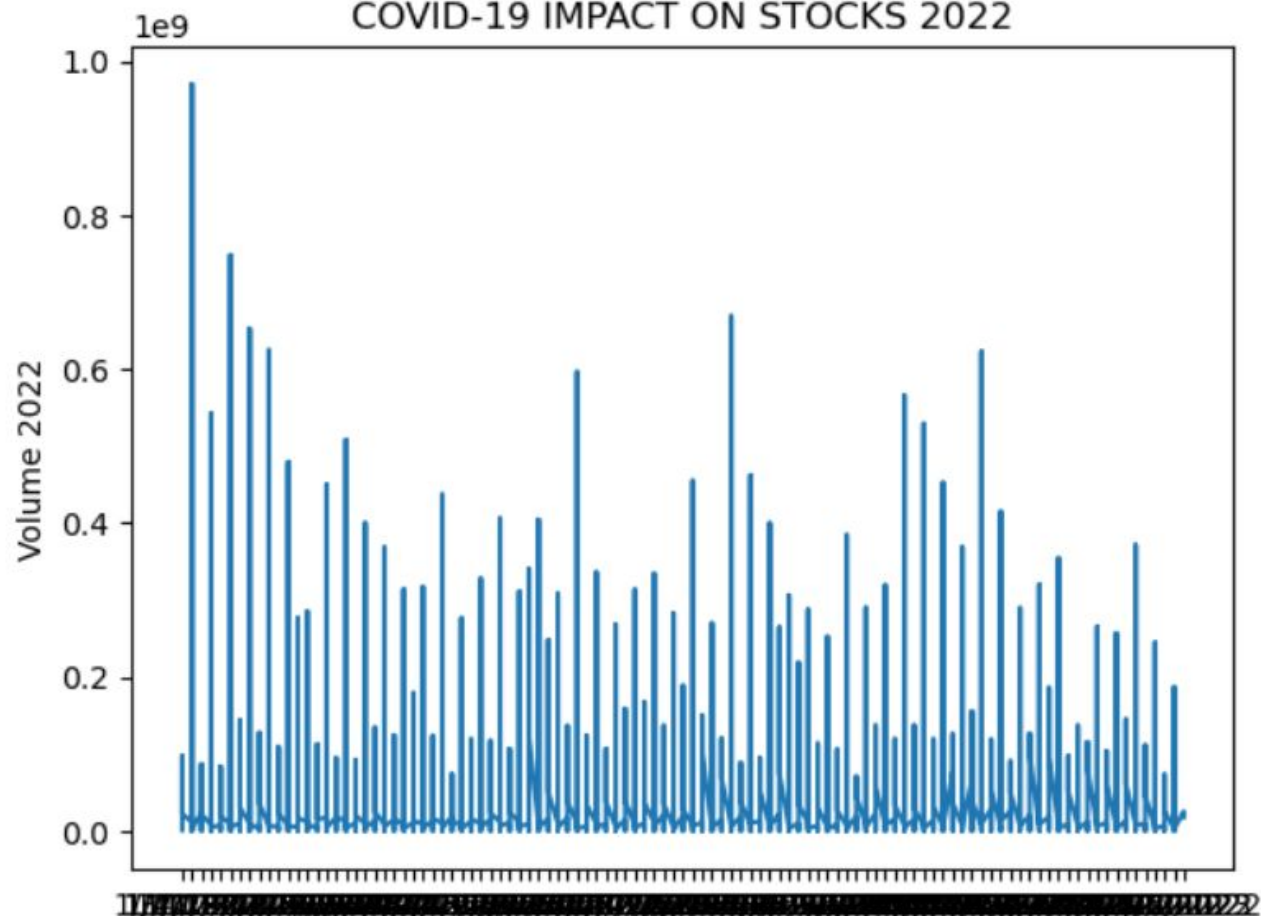We also made another set graph that was grouped by sector and graphed it by year and price
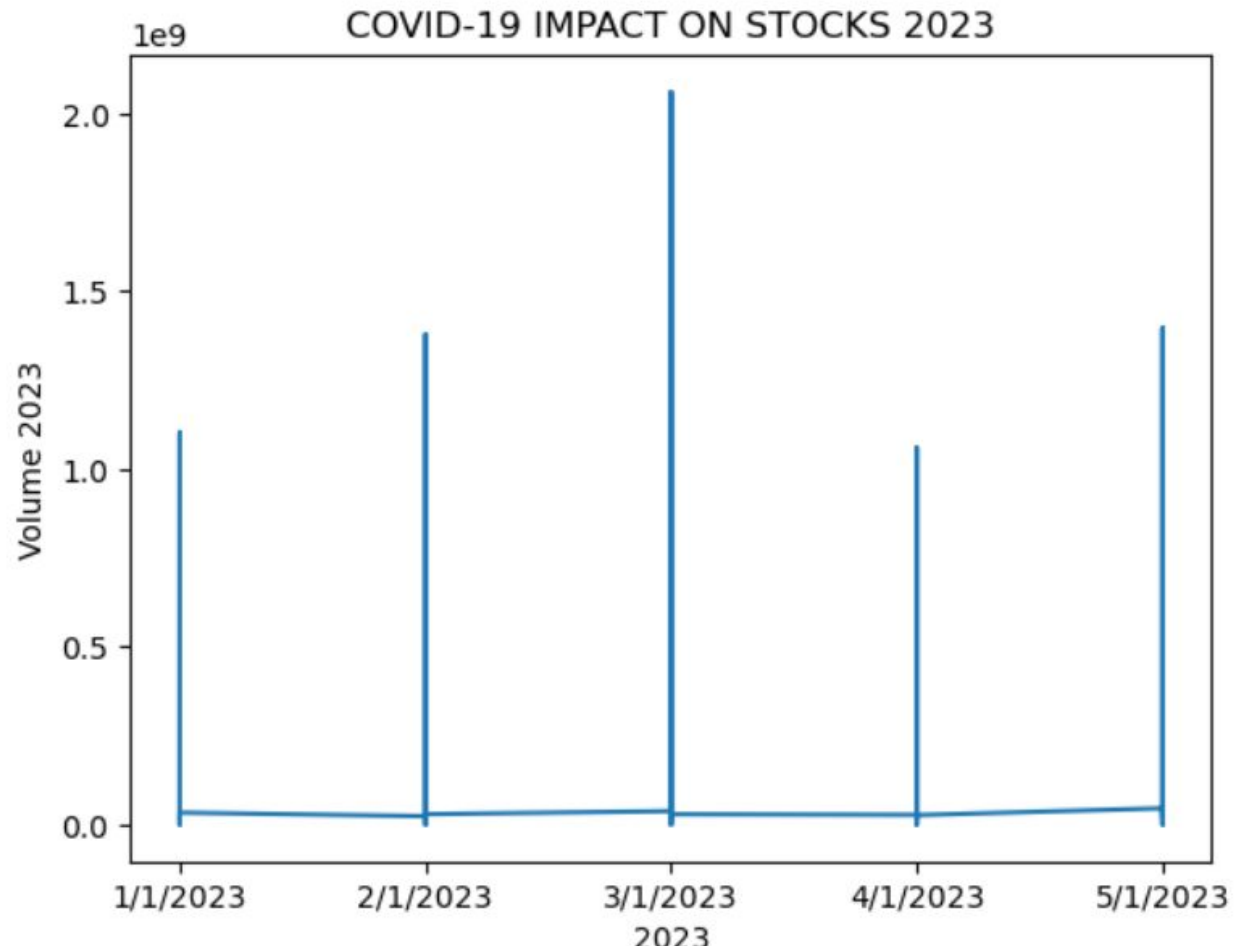
COVID-19 IMPACT ON STOCKS 2019

COVID-19 IMPACT ON STOCKS 2020

COVID-19 IMPACT ON STOCKS 2021

COVID-19 IMPACT ON STOCKS 2022
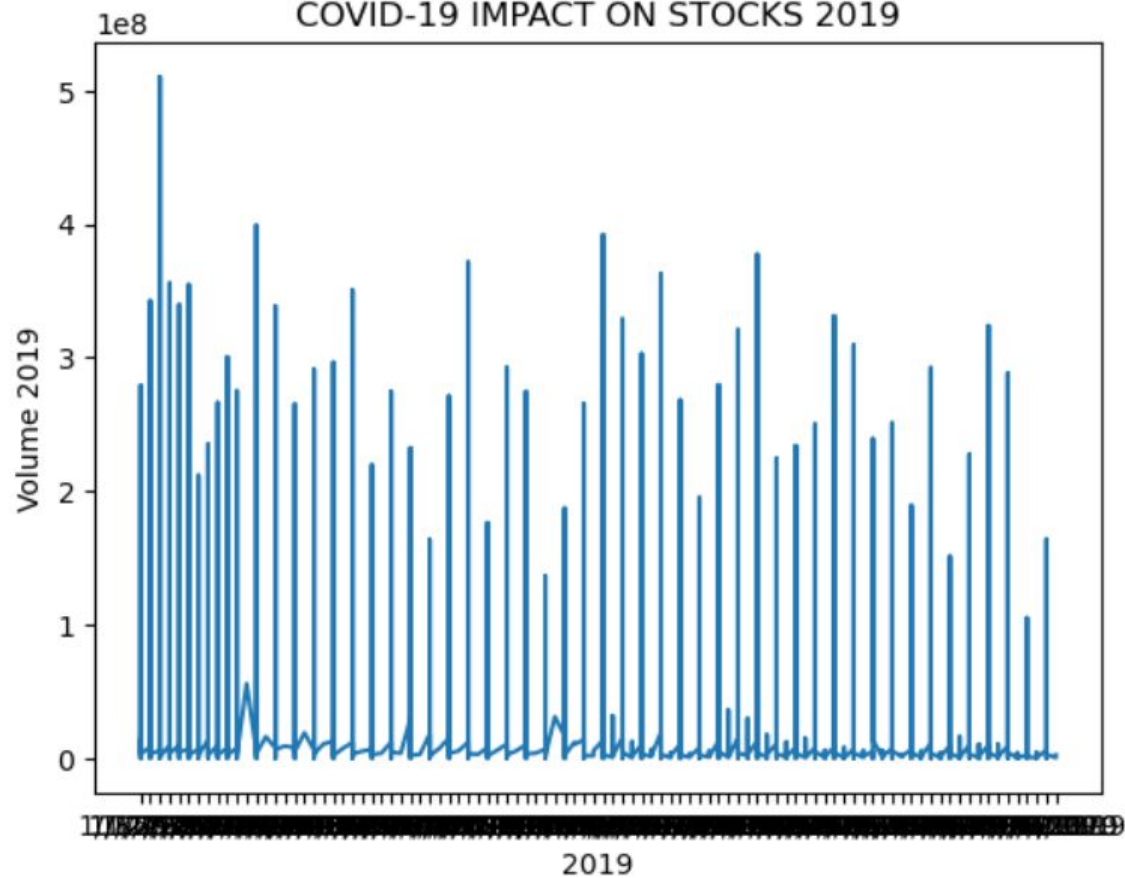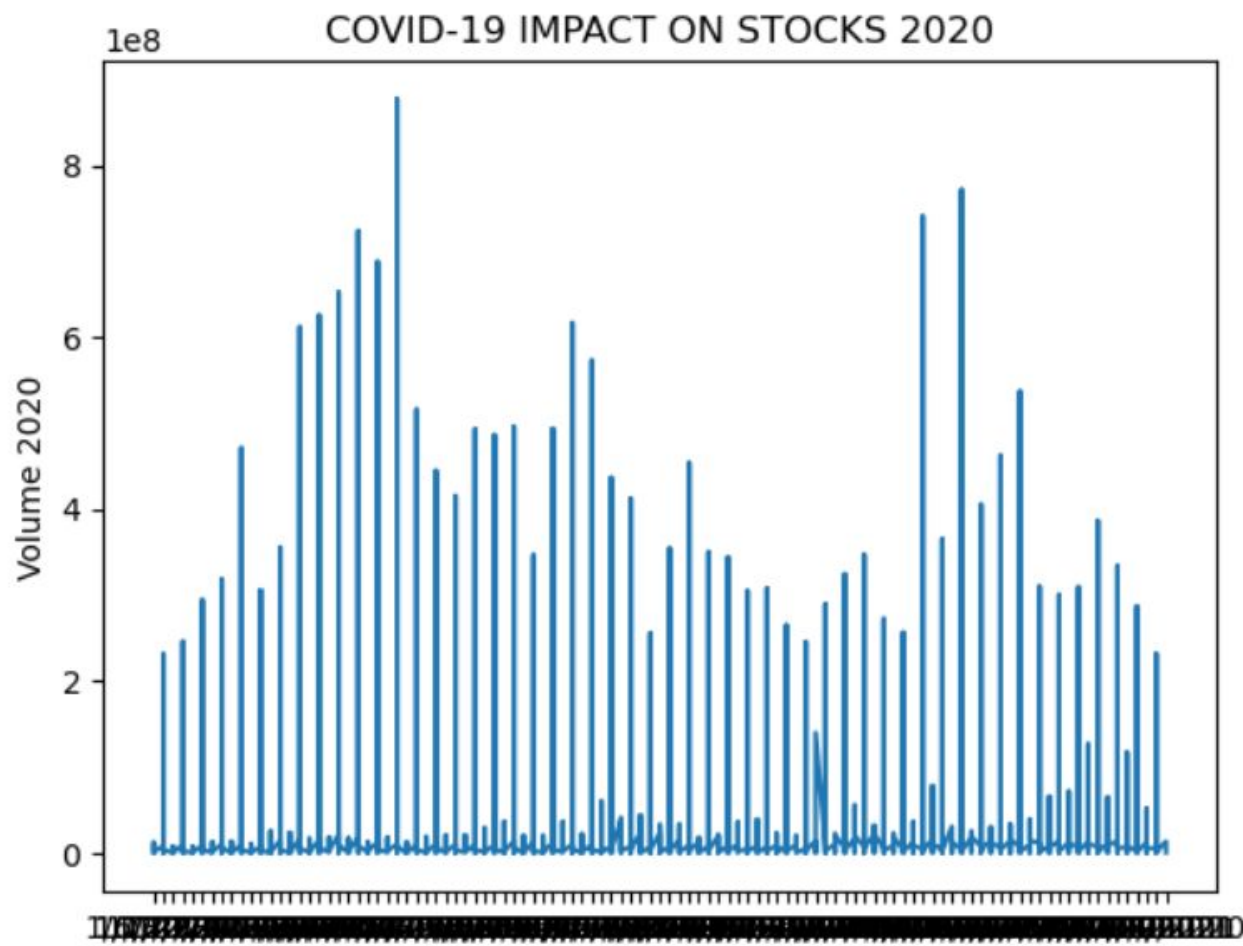
COVID-19 IMPACT ON STOCKS 2023

Results + Recommendations

During unprecedented times like the COVID-19 pandemic, it becomes important for business leaders to focus on maintaining a strong financial position. Businesses now have no choice but to learn how to implement cost-saving measures, diversify revenue streams and invest in new technologies. During the pandemic, It became evident that building a strong, resilient and adaptive culture helps face the challenges and uncertainty of the stock market today, as well as the future.

Overall, it is undeniable that the Covid-19 pandemic had a significant impact on the stock market. It led to unprecedented volatility and changes in the way that stocks were traded around the world. The past few years were certainly a wake-up call for anyone or company who was conditioned to the success strategy of buying in the dip and selling when resources are overvalued. As the world continues to grapple with the impact of the pandemic and its economic impact, it is likely that we will witness the stock market continue to be affected in a variety of ways. The only way to combat this, is to be proactive, not reactive. The companies and sectors that used technology and resources to create a culture that did not solely rely on providing one single service, or services that limited themselves to one way of making contact with the consumer.