



How do the stocks market have performed during the COVID-19 pandemic?

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Overview



Research Questions:

1. Which **economic sectors** have had a better/worse performance during the pandemic?
2. Which **companies** within each sector have had a better/worse performance during the pandemic?
3. Is there a **correlation** between the **COVID cases** and **stocks performance**?



Resources:

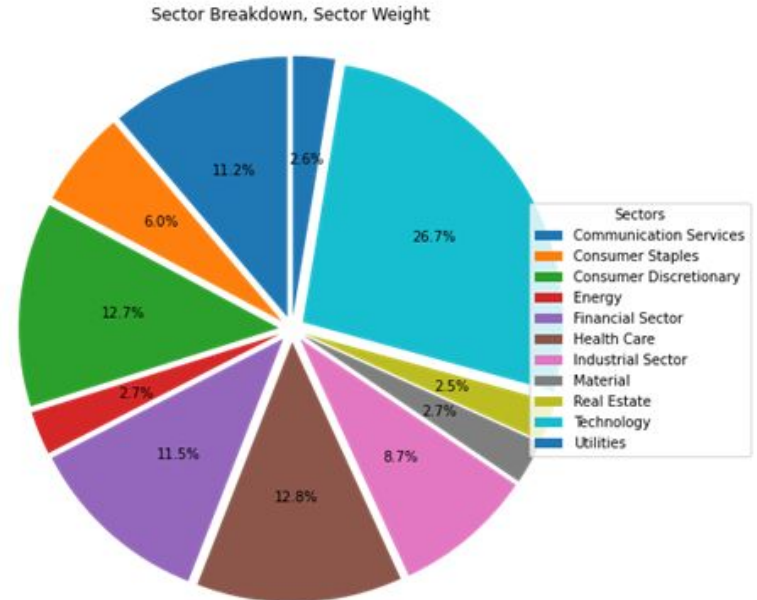
1. **Daily Stocks prices:**
 - Alpha Vantage Inc. stock APIs
2. **Index S&P 500:**
 - 11 Symbols/Tickers by sector
 - 10 Symbols/Tickers companies by sector
3. **COVID-19 Cases:**
 - WHO database
4. **4 events:**
 - 30/01/2020: The W.H.O. declared a global health emergency
 - 11/03/2020: WHO Declares COVID-19 a Pandemic
 - 21/07/2020: Phase I/II vaccines' promise results
 - 08/12/2020: First coronavirus vaccine approved for use in the U.K.

Data cleaning and processing challenges

- **AlphaVantage API**
 - Each json contains 10+ years of data for each ticker
 - An empty search returns code 200 with an empty json
 - Dates are not sequential
- **Data Cleaning**
 - Empty rows and empty columns

S&P 500 Index

- As a leading economic indicator of how well the U.S. economy is doing. If investors are confident in the economy, they will buy stocks.
- A market-capitalization-weighted index of the 500 largest U.S. publicly traded companies.
- Classified in 11 sectors



Stocks by Sectors

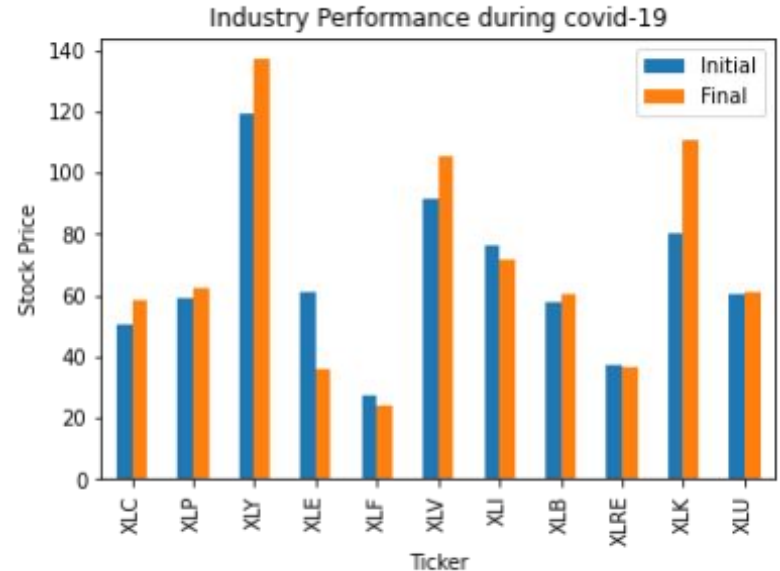


XLK (Technology) clearly was the sector that got **better performance** during 2020, with an **increase of 37.4%** at the end of the year.



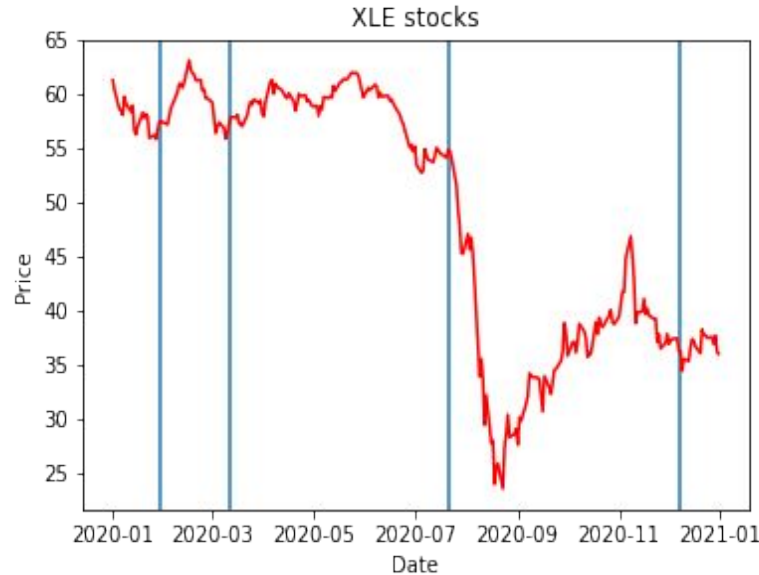
XLE (Energy) is the sector with the **worst performance** during 2020, with a **decrease of 41.2%**

	Ticker	Initial	Final	Percentage Price Change
9	XLK	80.360000	110.430000	37.42%
5	XLV	91.260000	105.530000	15.64%
2	XLY	119.080000	137.000000	15.05%
0	XLC	50.540000	58.130000	15.02%
1	XLP	59.220000	62.700000	5.88%
7	XLB	58.010000	60.360000	4.05%
10	XLU	60.160000	60.830000	1.11%
8	XLRE	37.500000	36.260000	-3.31%
6	XLI	76.310000	71.730000	-6.00%
4	XLF	27.610000	24.030000	-12.97%
3	XLE	61.280000	36.030000	-41.20%



- Healthcare (XLV) got the second highest performance, followed by consumer discretionary (XLY) and communication services (XLC).

↓ The energy sector index drop -41.2%

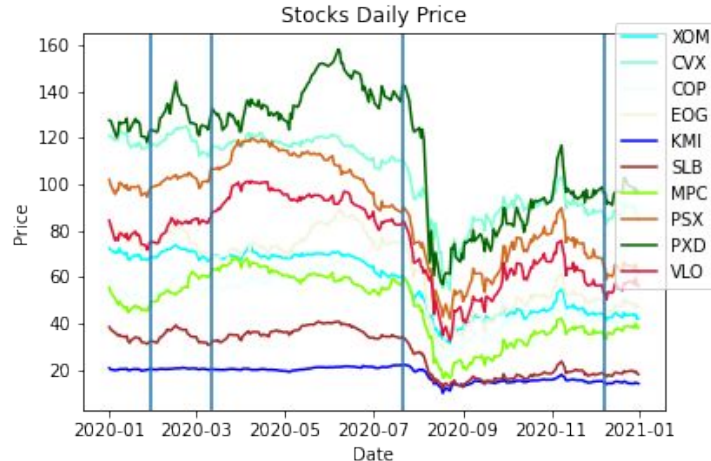
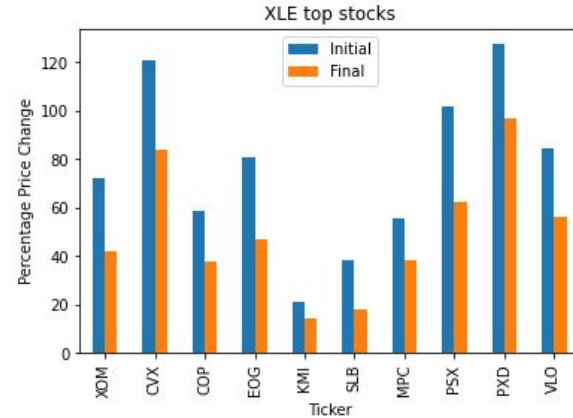


- After the the W.H.O. declared a global health emergency, **the energy prices had a growth peak.**
- When WHO Declares COVID-19 a Pandemic, **the stocks didn't experience a significant variation.**
- However, after the first vaccines' results, energy stocks started to go down for two months until it reach **its worst performance by falling 30 points in september 2020.**
- Once the vaccines started to be applied in UK, the **energy prices didn't return to its pre-covid levels.**



Energy- Companies performance

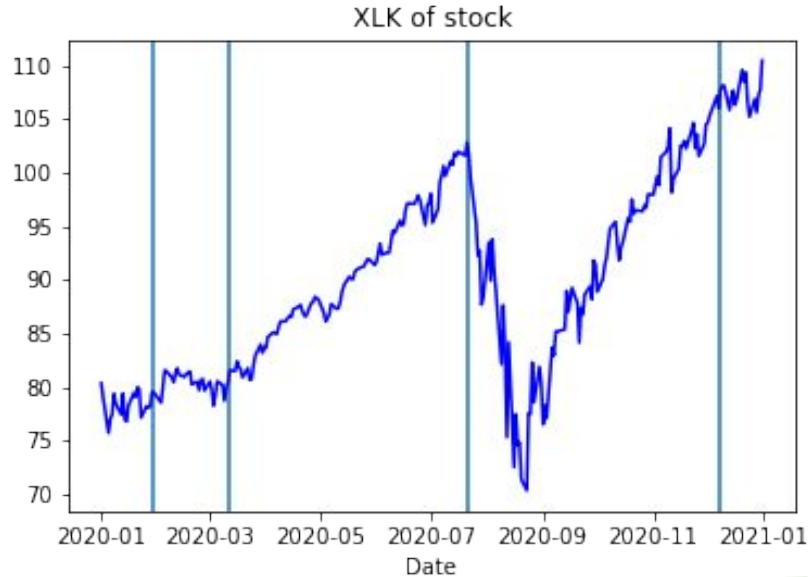
- The **companies stocks had consistent decrease within the sector.**
- Although Chevron Corporation (CVX) and Pioneer Natural Resources (PXD) appear to have a better performance overall.



- WHO Pandemic announcement - slope changes
- Phase I&II Testing - market free fall
- Between **August 18th-23rd market reaches its lowest point**



The technology sector index increased 37.4%



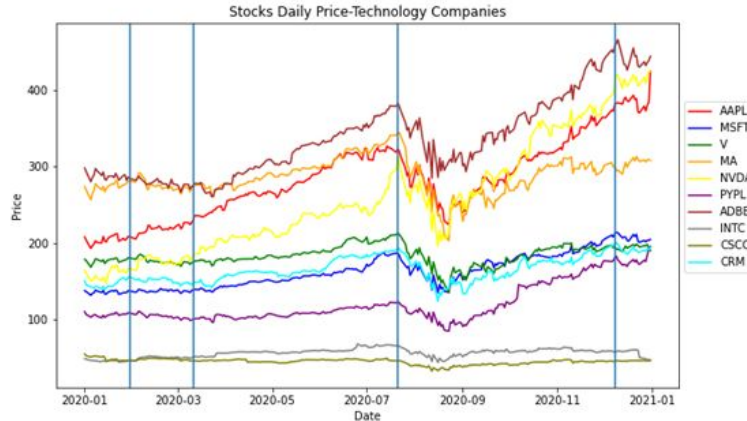
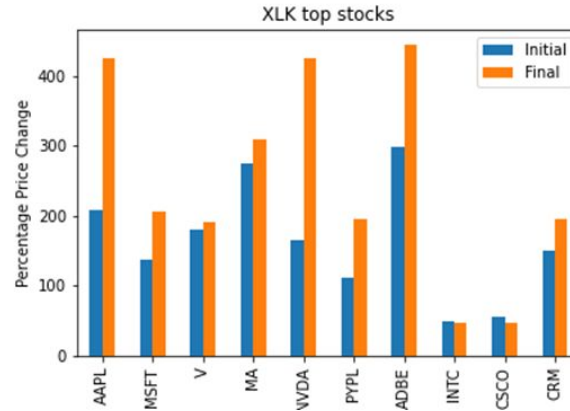
- After the the W.H.O. declared a global health emergency, the technology **prices didn't experience a significant variation**
- When WHO Declares COVID-19 a Pandemic, **the prices started a sustained growth, to reach a peak in July 2020.**
- After the first vaccines' results, technology prices started to go down for two months until it reach **its worst performance by falling 30 points in september 2020.**
- **Technology prices reaches an increase of more than 20 points compare to pre-covid levels.**



Technology- Companies performance

Starting price VS Final price per company

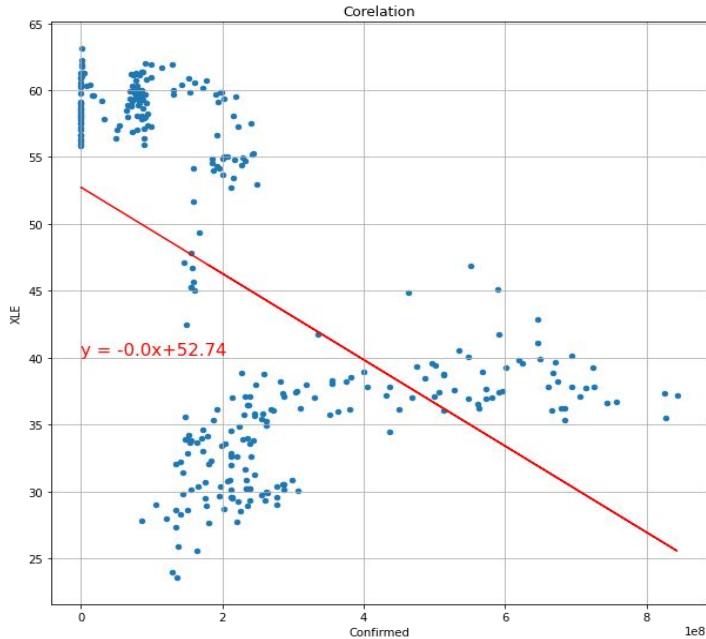
- The final price is greater than the starting price in almost all cases, this means that the sector increased its value during the pandemic



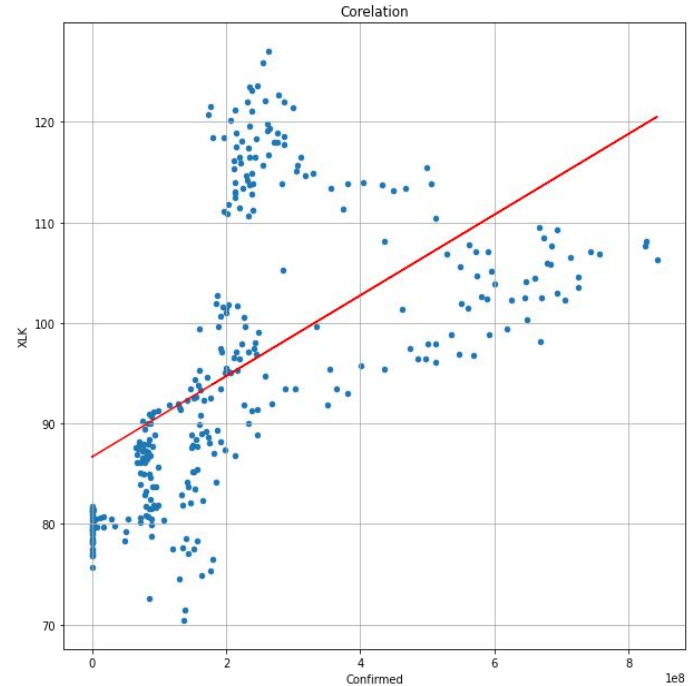
AAPL Apple Inc
MSFT Microsoft Corp
V Visa Inc Class A
MA Mastercard Inc Class A
NVDA Nvidia Corp
PYPL Paypal Holdings Inc
ADBE Adobe Inc
INTC Intel Corporation Corp
CSCO Cisco Systems Inc
CRM Salesforce.Com Inc

Confirmed cases and stock prices

Energy(XLE): $r = .26$



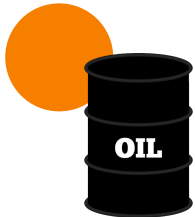
Technology: XLK: $r = .31$



Conclusions



- Not surprisingly, the **technology sector index had the best performance.**
- Even Though a fall of 30 points in mid-July, at the end of 2020, technology companies **prices were around 20 points higher than pre-covid levels.**



- **The energy sector index fall down didn't start at the beginning of the pandemic, but after mid-July.**
- At the end of 2020, energy companies prices were around **20 points lower than pre-covid levels**



- **There is a weak correlation between the stock market and the confirmed cases of covid. By itself, cumulative worldwide cases just explain 26-30% of the variation in stocks markets (XLE $r^2=0.26$, XLK $r^2=0.31$)**