



ANALYSIS ON SP500 INDEX & BIG TECH STOCKS GROWTH FOR THE PAST 5 YEARS

BY EMMA T. (8 AUG 2023)

OBJECTIVES:

1. Identify top sectors contributing to S&P500 performance
2. Determine the growth of top sectors over 5 years and the rate of return
3. Investigate Big Tech stocks performance over time

1. TOP SECTORS CONTRIBUTING TO S&P500 INDEX PERFORMANCE

- Latest company stocks tickers in S&P500 was extracted from [Wikipedia](#).
- Index performance is studied using historical returns.
- Historical returns data was extracted from January 1st, 2019 to the market's close on December 31st, 2022 to provide the annual return and extended to August, 6th, 2023 (the most current data available at the time of analysis). Source: Yahoo Finance.
- Sectors were aggregated according to GICS standard and the top 5 sectors with the most companies within sector were identified as Top sectors in S&P500.

Disclaimers:

To note that an average historical return doesn't mean that the stock price didn't correct lower in any of those years. The stock could have experienced price declines, but in the other years when the stock price rose, the gains more than offset the declines so that the average historical return was positive.

To note that past results do not necessarily predict future returns. The older the historical return data, the less likely it'll be successful at forecasting returns in the future.

1. TOP SECTORS CONTRIBUTING TO S&P500 INDEX PERFORMANCE – CONT.

LATEST RAW DATA EXTRACTED

	Symbol	Adj Close	Close	High	Low	Open	Volume
Date							
2019-01-02	A	63.616905	65.690002	66.570000	65.300003	66.500000	2113300.0
2019-01-03	A	61.273285	63.270000	65.779999	62.000000	65.529999	5383900.0
2019-01-04	A	63.394173	65.459999	65.949997	64.089996	64.089996	3123700.0
2019-01-07	A	64.740311	66.849998	67.430000	65.610001	65.639999	3235100.0
2019-01-08	A	65.689369	67.830002	68.209999	66.699997	67.589996	1578100.0
...
2023-07-31	ZTS	188.089996	188.089996	190.089996	186.440002	189.179993	1500800.0
2023-08-01	ZTS	185.509995	185.509995	188.770004	184.789993	187.460007	1535300.0
2023-08-02	ZTS	182.000000	182.000000	185.869995	181.660004	184.229996	2284800.0
2023-08-03	ZTS	180.880005	180.880005	183.259995	179.759995	180.610001	1688000.0
2023-08-04	ZTS	178.630005	178.630005	182.460007	178.339996	180.139999	1827500.0

575937 rows × 7 columns

Dataset: sp500_stockprice2019_23.csv

Historical returns data was extracted from January 1st, 2019 to the market's close on Aug 4th, 2023.

Key:

Adjusted close: The closing price after adjustments for all applicable splits and dividend distributions.

Close: The closing price of the stock

High: The highest price of the stock

Low: The lowest price of the stock

Open: The opening price of the stock

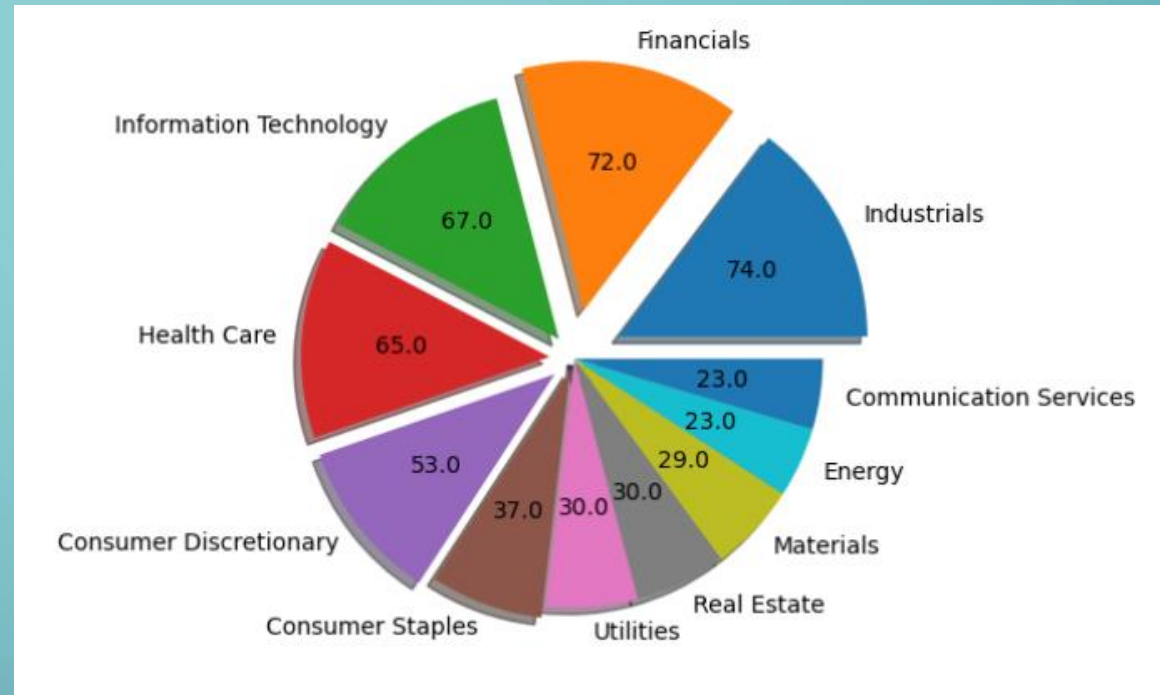
Volume: The total number of shares traded in a single day

1. TOP SECTORS CONTRIBUTING TO S&P500 INDEX PERFORMANCE – CONT.

	tickers	names	gics_sector
0	MMM	3M	Industrials
1	AOS	A. O. Smith	Industrials
2	ABT	Abbott	Health Care
3	ABBV	AbbVie	Health Care
4	ACN	Accenture	Information Technology
...
498	YUM	Yum! Brands	Consumer Discretionary
499	ZBRA	Zebra Technologies	Information Technology
500	ZBH	Zimmer Biomet	Health Care
501	ZION	Zions Bancorporation	Financials
502	ZTS	Zoetis	Health Care

500 companies were aggregated according to GICS standard into 11 sectors.

Refer Appendix 1 for more info on GICS.



Dataset: sp500_sectorcount.csv

Assuming the index performance is heavily dependent on majority performance, we will classify the 5 sectors with highest number of companies as Top 5 Sectors.

Among the 500 companies, 15% are from industrial and financial sectors, followed by Information Technology and Health Care (~13%) and Consumer Discretionary (10%). Overall, these 5 sectors make up to 66% of the index.

2. DETERMINE THE GROWTH OF TOP SECTORS OVER 5 YEARS AND THE RATE OF RETURN

- Average daily return was calculated using adjusted closing price daily, according to sectors.

	m_industrial	m_financials	m_infotech	m_healthc	m_consumerd
date1					
2019-01-02	91.181620	79.832870	82.037837	124.108827	175.019870
2019-01-03	88.510124	78.096261	78.581298	120.718783	172.014207
2019-01-04	92.013966	80.733547	81.791674	124.607095	175.863052
2019-01-07	92.524445	80.933418	83.149961	125.695130	178.594608
2019-01-08	93.727887	81.296899	84.043969	127.373960	179.309774
...
2023-07-31	189.586031	144.571252	232.017041	230.643690	392.334002
2023-08-01	189.677052	144.650561	231.827787	229.817539	391.078123
2023-08-02	187.623149	143.710496	224.344278	230.216461	387.237253
2023-08-03	186.817162	143.372958	224.394850	229.111845	385.294527
2023-08-04	185.693243	142.740563	222.431495	228.024308	389.515662
[1156 rows x 5 columns]					

Key: m = mean
Dataset: sp500_sectormean.csv

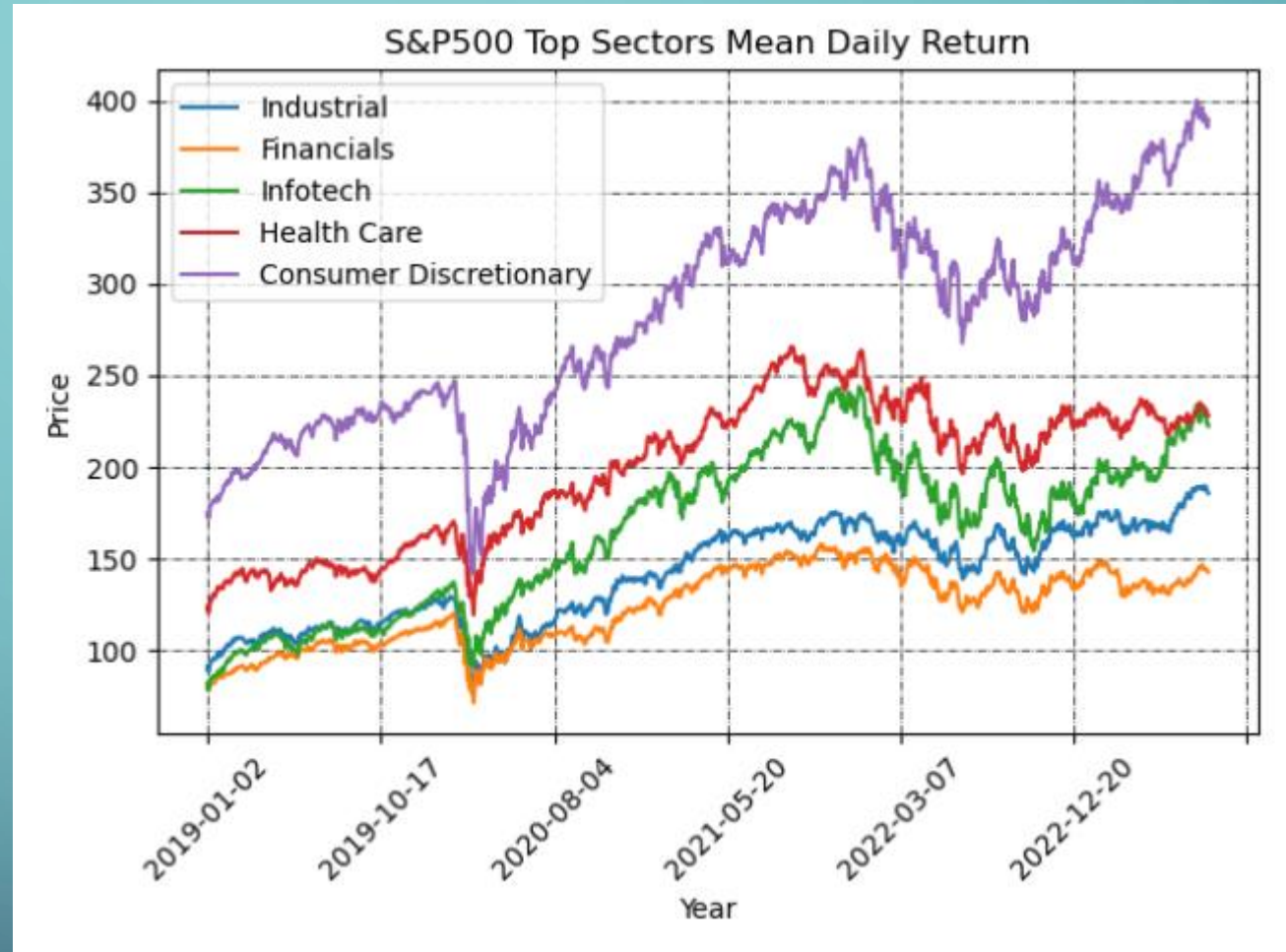
Notes:

Adjusted closing price is the closing price that adjusts for event after market closes such as stock splits and dividend,

hence deem a more accurate measure of stocks' value.

2. DETERMINE THE GROWTH OF TOP SECTORS OVER 5 YEARS AND THE RATE OF RETURN – CONT.

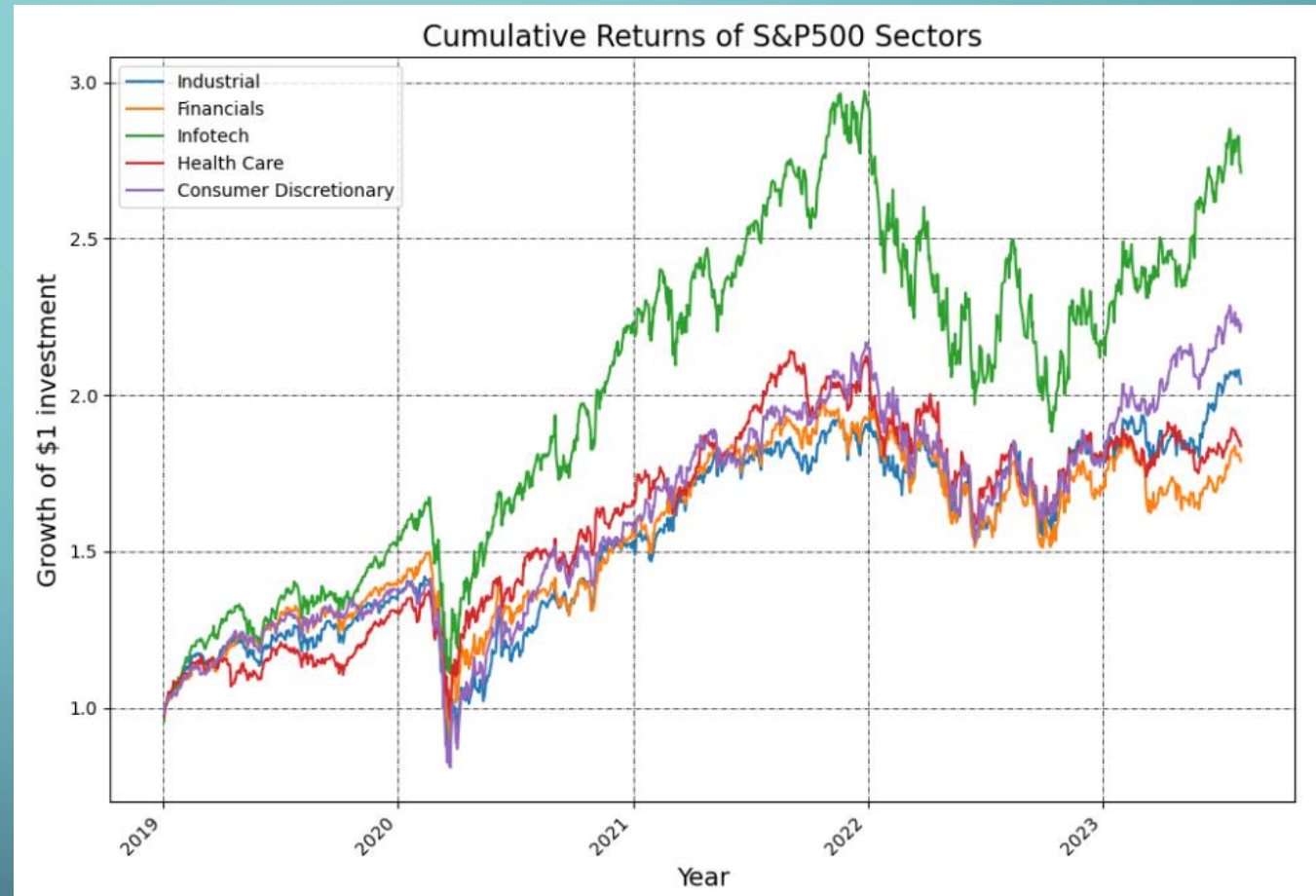
- Analyzing the 5 Top Sectors, we can see shares from Consumer Discretionary require the highest capital to invest in, followed by shares in Health Care and Information Technology.
- The growth of Consumer Discretionary is significantly higher compare to other sectors.
- Investing in Financial sector's stock on the other hand are less risky, with lower price growth.



Dataset: sp500_sectormean.csv

2. DETERMINE THE GROWTH OF TOP SECTORS OVER 5 YEARS AND THE RATE OF RETURN – CONT.

- Cumulative returns are calculated by multiplying the successive growth factors.
- With the power of hindsight, one could have made more nearly \$3 on a \$1 investment from Information Technology's sector since 2019, and make a minimum of \$1.7 if invested on any of the other 4 sectors.

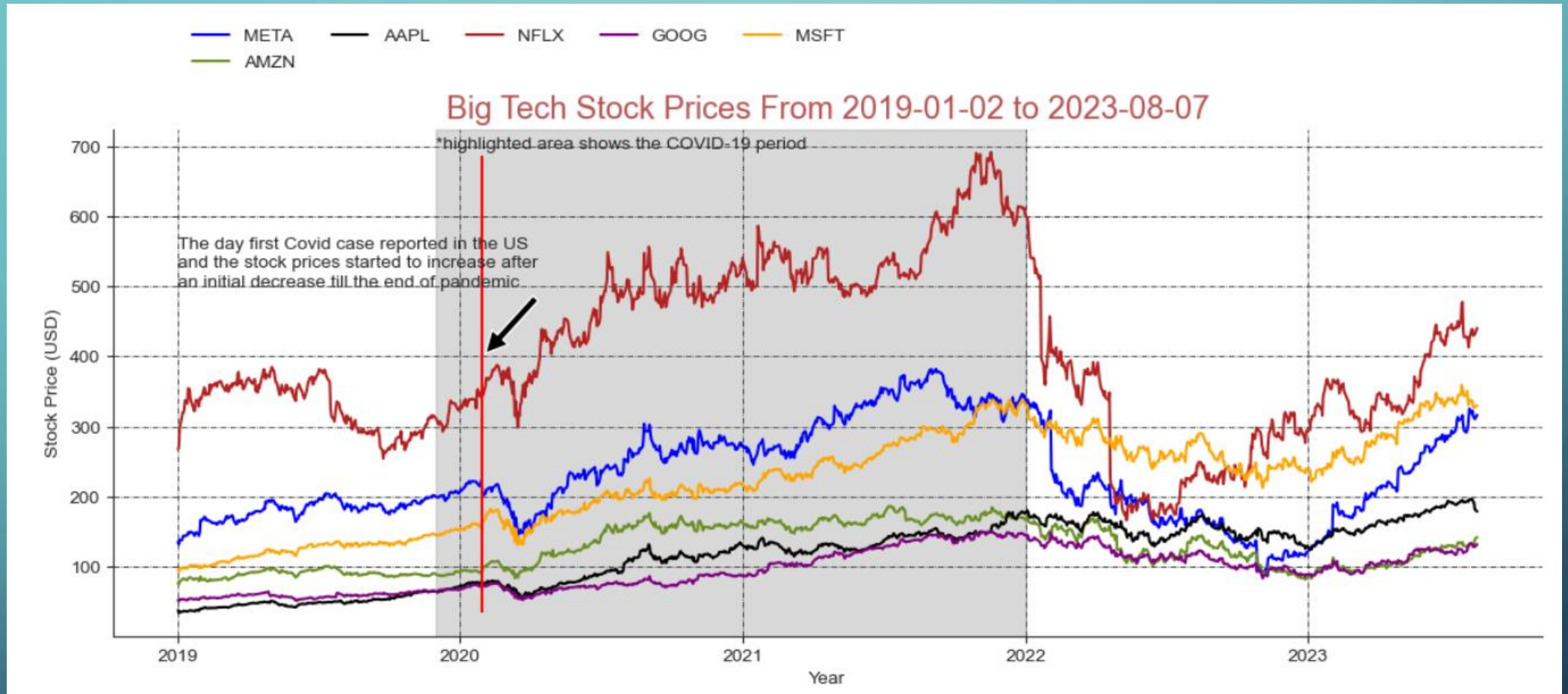


Dataset: sp500_sectormean.csv

3. INVESTIGATE BIG TECH STOCKS PERFORMANCE OVER TIME

- Analyzing sectors growth within S&P500 and using the index performance as benchmark, we find shares within the Information Technology (IT) sectors are more likely to give a higher rate of return per dollar invested.
- Now, we will take a deeper look into the shares from the IT sector.
- The term 'Big Tech' began to appear in media reports around 2013, referring to American technology companies notably the five largest from the United States: Alphabet (Google), Amazon, Apple, Meta (Facebook), and Microsoft. Big Tech can also include smaller tech companies with high valuations such as Netflix.
- In following slides, we will look at the Big Tech's share price growth over time and how they fare during Covid period.

3. INVESTIGATE BIG TECH STOCKS PERFORMANCE OVER TIME – CONT.



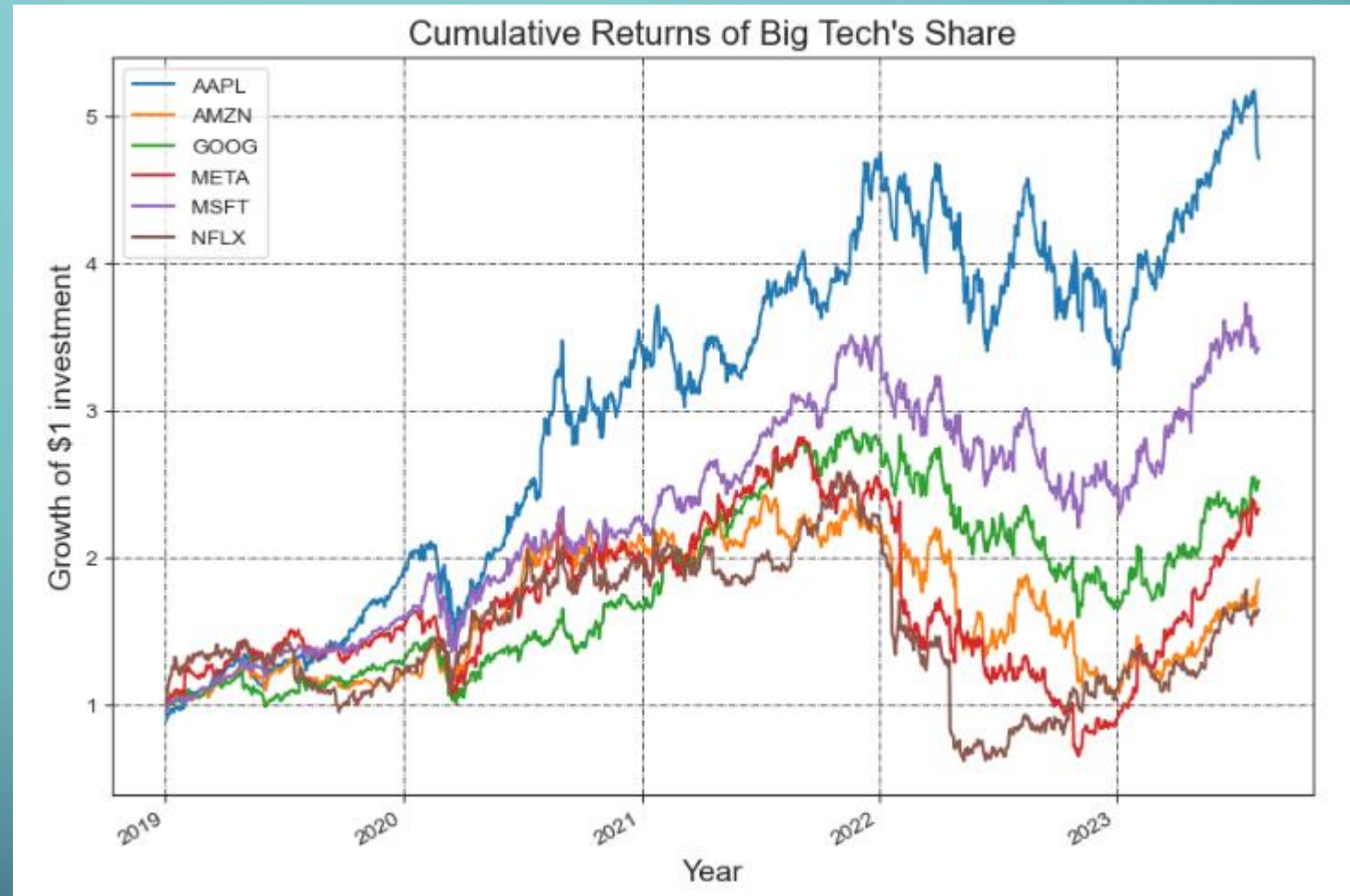
Dataset: bigtech_stock.csv

- After the initial drop in early 2020, Big Tech's shares price has been bullish till end 2021. In Year 2022 shares price begun to drop and hit bottom in April – May. A slow recovery can be observed since mid 2022 to current with Netflix and Facebook (META) showing higher price recovery compare to others.

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3. INVESTIGATE BIG TECH STOCKS PERFORMANCE OVER TIME – CONT.

- Comparing among Big Tech's shares, Apple (AAPL) showed the highest rate of return of \$5 for every \$1 invested since 2019.
- Interestingly, for Netflix and META, despite showing higher price growth over time gave a lower rate of return of \$1.5-\$2 for every \$1 invested.
- Food for thought: Are prices and returns inversely related?

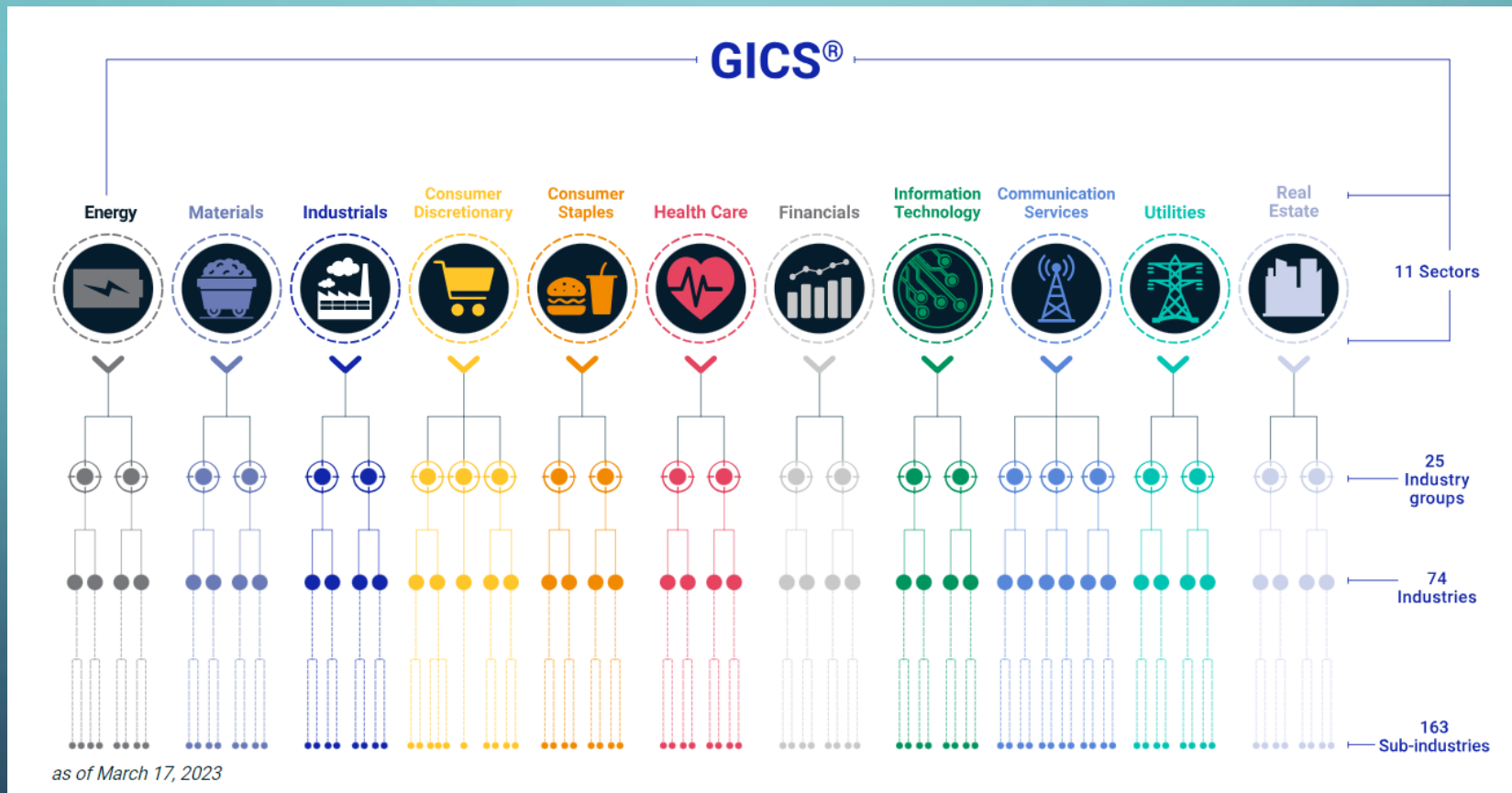


Dataset: bigtech_stock.csv

- End of Presentation – Thank you! -

THE GLOBAL INDUSTRY CLASSIFICATION STANDARD (GICS®)

GICS® is an industry analysis framework that helps investors understand the key business activities for companies around the world. MSCI and S&P Dow Jones Indices developed this classification standard to provide investors with consistent and exhaustive industry definitions.



REFERENCES

- <https://medium.com/the-handbook-of-coding-in-finance/a-quick-guide-to-calculating-stock-returns-with-python-ec5afac71bde> by Bee Guan Teo
- <https://github.com/teobeeguan/Python-For-Finance/tree/main/Stock%20Returns> by Bee Guan Teo
- <https://levelup.gitconnected.com/how-to-plot-stock-prices-using-python-87ba684d126c> by Umair Akram
- <https://www.kaggle.com/code/muhammadumairab/impact-of-covid-on-big-tech-s-stock-using-yfinance?kernelSessionId=117570693> by Umair Akram
- <https://towardsdatascience.com/historical-stock-price-data-in-python-a0b6dc826836> by Ishan Shah
- <https://towardsdatascience.com/calculate-and-plot-s-p-500-daily-returns-2ce359e014d6> by Jose Manu
- <https://www.codingfinance.com/post/2018-04-03-calc-returns-py/> by DD