ORIGINAL RESEARCH

A Statistical Analysis of Impact of COVID19 on the Global Economy and Stock Index Returns

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Abstract

The outbreak of pandemic COVID-19 across the world has completely disrupted the political, social, economic, religious, and financial structures of the world. According to the data of April 22nd, 2020, more than 4.6 million people have been screened, in which the infection has made more than 2.7 million people positive, in which 182,740 people have died due to infection. More than 80 countries have closed their borders from transitioning countries, ordered businesses to close, instructed their populations to self-quarantine, and closed schools to an estimated 1.5 billion children. The world's top ten economies such as the United States, China, Japan, Germany, United Kingdom, France, India, Italy, Brazil, and Canada stand on the verge of complete collapse. In addition, stock markets around the world have been pounded, and tax revenue sources have fallen off a cliff. The epidemic due to infection is having a noticeable impact on global economic development. It is estimated that by now the virus could exceed global economic growth by more than 2.0% per month if the current situation persists. Global trade may also fall from 13 to 32% depending on the depth and extent of the global economic slowdown. The full impact will not be known until the effects of the epidemic occurred. This research analyses the impact of COVID-19 on the economic growth and stock market as well. The aim of this research is to present how well COVID-19 correlated with economic growth through gross domestic products (GDP). In addition, the research considers the top five other tax revenue sources like S&P500 (GPSC), Crude oil (CL=F), Gold (GC=F), Silver (SI=F), Natural Gas (NG=F), iShares 20 + Year Treasury Bond (TLT), and correlate with the COVID-19. To fulfill the statistical analysis purpose this research uses publically available data from yahoo finance, IMF, and John Hopkins COVID-19 map with regression models that revealed a moderated positive correlation between them. The model was used to track the impact of COVID 19 on economic variation and the stock market to see how well and how far in advance the prediction holds true, if at all. The hope is that the model will be able to correctly make predictions a couple of quarters in advance, and describe why the changes are occurring. This research can support how policymakers, business strategy makers, and investors can understand the situation and use the model for prediction.

Keywords COVID19 · Gross domestic products (GDP) · World economy growth · S&P500 revenue · Crude oil revenue · Gold revenue · Silver revenue · Natural gas revenue · iShares 20 + year treasury bond revenue · Regression model

Background

The coronavirus epidemic has become humanity's largest war of the century against the virus. The damages to human health, wealth, and welfare due to World War II and other epidemics in the world are already very high case fatality rate (CFR) that defined the measures of severity due to disease are fatal within their concern time period (detail in Table 1. In addition, COVID-19 is also causing massive damage to the global economy. According to the WHO report, the first case of human coronavirus pneumonia was reported in the month of December 2019 in Wuhan city of China, which spread very quickly across the country[1] [27].

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[1] Epidemiological information on affected areas. For updated figures of the number of confirmed cases per country, visit the webpage https://coronavirus.jhu.edu/map.html the webpage developed by the Center for Systems Science and Engineering at Johns Hopkins University (Accessed on 23rd April, 2020).

Table 1 Timeline, Confirmed cases, Fatality rate with epidemics, respectively

Epidemics	Timeline	Cases	Fatality rate
Bird Flu (H5N1avian influenza)	2003–2019	628	60%
Ebola	2014–2016	28,616	40%
MERS	2012–2013	2494	34%
Influenza pandemic	1918–1919	500 million (approx..)[a]	10%
SARS	2002–2003	8098	10%
Swine flu (H1N1)	2009–2019	18,500	0.05%
Zika	2015–2016	175,063	2%

[a]www.cdc.gov/flu/pandemic-resources/1918-pandemic-h1n1.html

Table 2 COVID-19 data statistics as on date April 23rd, 2020

S. no.	Country	COVID-19 cases counts	
		Confirmed	Death
1	United States	839,523	46,583
2	China	83,868	4636
3	Japan	11,512	281
4	Germany	150,648	5279
5	United Kingdom	134,638	18,151
6	France	157,125	21,373
7	India	21,370	681
8	Italy	187,327	25,085
9	Brazil	45,757	2906
10	Canada	41,650	2077

Epidemiological information on affected areas. For updated figures of the number of confirmed cases per country, visit the webpage https://coronavirus.jhu.edu/map.html the webpage developed by the Center for Systems Science and Engineering at Johns Hopkins University (Accessed on 23rd April, 2020)

Within a time period of 1 month, it took the form of an epidemic causing a large number of deaths. So far, the epidemic has rocked the world, spreading to more than 190 countries, including all US states [21, 26]. The World Health Organization (WHO) first declared COVID-19 as a World Health Emergency in January 2020 [20]. In early March, the focal point of relocation from China to Europe, particularly Italy, but by April 2020, attention shifted to the United States, where the number of infections has been steadily increasing. According to data from April 22nd, 2020, more than 4.6 million people have been screened, with infection making more than 2.7 million positive, with 182,740 people died due to infection.

Presently the biggest concern in front of the world is to save the lives of people. Lockdown and social distancing are the only solutions to control the spread of the virus, which is strictly followed by many countries around the world as a lockdown. However, because of all this, the declining economy cannot be ignored, due to which many world-class businesses are on the verge of sinking. For example, lockdowns have restricted various businesses such as traveling to contain viruses as a result that this business is coming to an abrupt halt situation on a global scale.

A Glimpse of the COVID 19 on the World's Top 10 Economics Countries

Coronavirus (COV) encompasses a broad spectrum of animal and human viruses. Most people infected with the COVID-19 virus experience mild to moderate respiratory illness. According to WHO[2] research, most infected people are recovering from this virus infection without any specialized treatment. But in some cases of this infection like older people, who are suffering from underlying diseases like heart disease, diabetes, chronic respiratory disease, and cancer, etc. recovering required a proper hospitalization and special treatment. This infection is more likely to turn into serious illnesses with these medical problems. The virus is mainly spread through droplets when an infected person coughs or sneezes. Table 2 shows data for all confirmed and death cases from the first reported COVID-19 infected case to April 22, 2020.

Gross Domestic Product (GDP) Glimpses of Top 10 Economic Countries in the World

Gross domestic product has been standardized as an economic indicator by the national accounts of the United Nations system, which measures the total output of all final goods and services produced by a country during a given period of time (either yearly or quarterly). It is used to compare countries' economic performance, but very often comparisons are widely used to estimate and assess living standards, progress, or social welfare among countries. There are three ways to calculate GDP: the income approach, production approach, and expenditure approach. For this research purpose, we used the expenditure approach to calculate GDP as it best relates to the data used in our analysis. The expenditure method measures the total expenditure incurred by all entities on goods and services within the domestic boundaries of a country. Mathematically inclusion of GDP according to expenditure method is as follows:

$$\text{GDP}_{\text{exp.}} = C_{G\&S} + I_B + G_{P\&S} + \text{Net Export}$$

where $C_{G\&S} + I_B + G_{P\&S}$ denotes the total consumer spending on goods and services, I_B denotes the total investor spending on business capital goods, $G_{P\&S}$ denotes the

Table 3 Top 10 world economies of the world with GDP and contribution of world GDP (%), respectively

	Country	GDP ($ USD)	Share of World GDP (%)
1	United States	$20.49 trillion	23.89
2	China	$13.61 trillion	15.86
3	Japan	$4.97 trillion	5.79
4	Germany	$4.00 trillion	4.66
5	United Kingdom	$2.83 trillion	3.29
6	France	$2.78 trillion	3.24
7	India	$2.73 trillion	3.18
8	Italy	$2.07 trillion	2.4
9	Brazil	$1.87 trillion	2.18
10	Canada	$1.71 trillion	1.99

Table 4 Country wise annual gross domestic product (GDP)

Country	2016	2017	2018	2019	2020
United States	1.6	2.4	2.9	2.3	− 5.9
China	2.2	3.3	2.7	2.7	− 4
Japan	0.5	2.2	0.3	0.7	− 5.2
Germany	2.2	2.5	1.5	0.6	− 7
United Kingdom	1.9	1.9	1.3	1.4	− 6.5
France	1.1	2.3	1.7	1.3	− 7.2
India	8.3	7	6.1	4.2	1.9
Italy	1.3	1.7	0.8	0.3	− 9.1
Brazil	− 3.3	1.3	1.3	1.1	− 5.3
Canada	1	3.2	2	1.6	− 6.2

government spending on public goods and services and net export is the difference between export and import, that is

Net Export = Export − Import

According to the data that appeared in the World Economic Outlook (WEO),[34] that is compiled by the International Monetary Fund (IMF) considered in this research and selected the top 10 largest economies of the world. Besides the largest economies, these countries are the engine of the development and control around 66.49% economy of the world (detail in Table 3 according to the World Bank's update, published in July 2019.[5]

Consumer spending plays a major role in worldwide GDP growth, for example, with the US economy topping the last few years, a major reason being that almost $\approx 70\%$ (two-third) of GDP is contributed by consumer spending, while $\approx 20\%$ more $\approx 15\%$ contribution is government budget and business investment, respectively.[67] According to IMF data, the US GDP is currently at a deficit of 5.9%.

Glimpses of Stock Market Index Worldwide

The stock market is a financial marketplace in which the investor invests their income in the company stocks with the hope of earning some share and extra income. A stock index

or stock market index is an index that measures the performance of a stock market in a given country. It is a subset of the stock market, which helps investors compare current price levels with previous values to calculate market performance. There are various statistical models for calculating stock market indexes. For the purposes of examining the correlation of the stock market with economic growth, this research considers a weighted average market capitalization index, because its movements depend on market capitalization. The most important weighted-average-market-capitalization index in the U.S. is the Standard and Poor 500 or S&P 500.[8] It represents the 500 large-cap U.S. companies by market capitalization and is considered the best representation of the U.S. stock market. Because the S&P 500 considered large, multi-national companies those are highly involve with other countries as well, so GDP of other nations also affected due to influence in S&P 500 considered companies.

Research Work Justification

As Nobel Laureate economist Robert J. Schiller has said: "I've always wondered myself, why do we have to listen to this every night, what the stock market is doing." Worldwide stock market information is continuously reported on all major news stories. Economists also say that the reason is that there is a strong relationship between the stock market and the health of the economy of all the countries of the world [6, 9, 19]. However, some people began to claim a deviation from the typical growth pattern from the last decade. According to the World Bank data, the average economic growth rate of the world's top 10 economic countries over the last 5 years has been, United States: 2.3%, China: 2.725%, Japan: 0.925%, Germany: 1.7%, United Kingdom:

[3] https://www.imf.org/en/Publications/SPROLLs/world-economic-outlook-databases#sort=%40imfdate%20descending.

[4] https://www.imf.org/external/datamapper/datasets.

[5] https://www.imf.org/external/pubs/ft/weo/2019/01/weodata/index.aspx.

[6] https://data.worldbank.org/indicator/NE.CON.TOTL.KD.ZG?end=2018&start=2018.

[7] https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey.

[8] Kenton and Murphy (2019), S&P 500 Index, Financial Analysis, Investopedia, Retrieved January '19 from https://www.investopedia.com/terms/s/sp500.asp.

Table 5 S&P500 stock index annual returns rate

	2016	2017	2018	2019	2020
S&P500	9.54	19.42	− 6.24	28.88	− 12.2

1.625%, France: 1.6%, India: 6.4%, Italy: 1.025%, Brazil: 0.1%, Canada: 1.95%. The detailed statistical data over the last 5 years of real GDP and S&P500 stock are presented in Tables 4 and 5, respectively.

With the analysis of the data in the above tables, the average GDP growth in 2019 was 1.62%, while the S&P 500 index annualized returns were 28.88%, on the other hand, GDP fell by − 5.45% (approximately) in 2020, while the S&P 500 returns are − 12.2%. At this point, a hypothesis arises as to what is the relationship between stock markets and the economy, and how it is being affected by the COVID-19 epidemic. Can the stock market be an indicator for the economy and/or vice versa? What happens to the stock market when there is a sudden shock to the world economy (e.g., COVID-19 epidemic)?

This research paper addresses the historical econometric relationship between the world's top 10 economics GDP and the S&P 500 as the main representation of the world's real economy and the stock market. It aims to explore its current historical relationship and trying to correlate among COVID-19 Pandemic, economic growth, and the S&P stock index.

Related Work

The work of is divided into two main parts. The first part studies previous epidemics. It begins with the influenza pandemic a century ago and escalates with the pandemic H1N1, H5N1, etc. The study covers the effects of epidemics on the revenue-generating regions of different countries which directly or indirectly affect the world economy. The second part of the study is about economic growth or decline that combines finance and economics to help reduce the inevitable uncertainty.

Influence of Epidemics on GDP or Economic Growth

An in-depth study on past epidemics identified several reasons that may account for the economic slowdown. Loss of the productive workforce through mortality and disease which is a major factor is particularly prominent in severe epidemics such as 1918 influenza [2]. But previous epidemiological studies provide useful insights on many of their economic consequences, including costs due to weak consumer sentiment, service providing sections (like, tourism, etc.) under high risk due to the impact of social distancing policies, and potential financial amplification. All these factors are still relevant today, to varying degrees. Table 6 summarizes selected study methods and findings on the economic costs of past epidemics. Many insights emerge.

Some very general lessons from the study of these past epidemics may be relevant to the current COVID-19 epidemic. First, when an epidemic causes a great loss of life and property on a global scale, in that situation the world can suffer a huge economic loss that can lead to a prolonged economic recession. This means that more expensive measures become costly, also have economic benefits in preserving the workforce. These are relevant to the cost–benefit assessment of alternative capacitive policies, in addition to the primary purpose of saving lives. The literature also makes it clear that the interaction between supply and demand broadcast channels is not specific to COVID-19, but is characterized by epidemic shocks in general.

Influence of Economic Uncertainty on the Stock Market (S&P500 index)

The analyses that are currently in place to form a measure model of the economy have proved that percentage change in GDP can help in estimating market uncertainty. The common assumption made by these current models is that the financial structure of an economic market is based on the bank or stock market. In general, this part of the research analysis makes historical changes in GDP and their impact on the stock market. These analyses can be broken down from market sectors to industry and dominate the graph of the current market to help forecast. In support of the economic analysis model, there have been studies that have proved through correlation that the stock markets are key indicators of the economy.

A study conducted by Heiberger in 2018 indicated that the S&P 500 exhibits normal growth of the economy with high correlated numbers [14]. A naïve Bayes classifier was used in this research to estimate the monetary turn of events. The model in this research effectively estimated the duration of all recessions and practically all successes during the recent 28 years. This investigation demonstrates that it is conceivable to build a model that uses monetary markets as driving pointers of economies. Research worked solely in

Table 6 Literature survey of past pandemics impact on GDP and economy growth (*ppt: parts-per-thousands)

Epidemic (s)	Fatalities	Studies	Studies and methods	Economic losses
Influenza pandemic, 1918–19	Up to 50 million	[2]	Cross-country panel regressions	Six ppt lower GDP growth and eight ppt lower consumption growth overall
		[4]	US states data	Mortality significantly lowers growth over following decade
		[10]	US states data	18% decline in manufacturing activity per year; prompter and more aggressive containment helped cushion the impact
SARS, 2003	774	[18]	CGE model	0.1% loss in global GDP in 2003
		[13]	Chinese surveys	1–2 ppt lower GDP growth in China
H5N1 avian influenza, 2003–19	455	[23]	Socio-economic analysis using structured interviewed scheduling process	Nigeria rural and urban communities have caused serious threat on poultry industry, food security and livelihoods. 75% poultry farms found stopped ordering and 80% households stopped purchase and consumption
		[7]	Input–Output (IO) Analysis Model and Computable General Equilibrium (CGE)	The possible damage brought by lowering domestic consumption that impact on real GDP is around $-0.1\% \sim -0.4\%$, and labor demand would decrease 4.9%~6.4%
		[5]	World Bank estimate	0.1% loss in annual global GDP 0.4% for Asia
Ebola, 2014–16	11,323	[15]	reports produced by non-profit or nongovernmental organizations, government, or industry	Loss of GDP, estimated economic burden of the outbreak range from $2.8 to $32.6 billion
		[12]	CGE model	2.1 ppt lower GDP growth in Guinea, 3.4 ppt in Liberia, and 3.3 ppt for Sierra Leone in the first year of the epidemic
H1N1	13	[17]	Ecomod one-country CGE model	GDP losses from the disease of approximately 0.5% of GDP for a mild pandemic to just over 2% for a severe pandemic
		[25]	Single linear regressions	Mexican tourism and pork sectors losses of around $US2.8bn. Pork trade deficit of $US27m with H1N1 incidence ($p = 0.048$, $r = 0.37$)
MERS	780	[16]	Interconnected sector analysis	Approx. 0.2% of GDP fall that estimated US$2.6 billion in lost revenue for the tourism
ZIKA	3489	[22]	Linear regression mode	GDP reach 1.6% and -0.90% average return because of decreasing tourism
Hypothetical influenza pandemics		[3]	A 1918-type pandemic	4.8% loss in annual global GDP
		[11]	A 1918-type pandemic; Includes the intrinsic cost of mortality to GDP loss	0.4–1% of GDP loss per year due to exante prospects of a pandemic, 86% of which is due to mortality and 14% to income loss. For moderate pandemics, the share of income loss is larger at 40%
		[1]	A 1918-type pandemic	4.25% loss in annual GDP 2.25 ppt from the supply side; two ppt from the demand side

Table 7 Summary of stock indexed collected data

	S&P 500	Crude oil	Gold	Natural Gas	Silver	Treasury Bond
Count	173	171	171	171	171	173
Mean	3016.279	49.2317	1547.608	2.153053	17.05253	145.4033
Std	242.8567	13.71511	78.52043	0.335766	1.306676	10.67145
Min	2237.4	− 2.6	1452.1	1.556	11.772	133.849
25%	2919.4	49.59	1488.1	1.8405	16.858	137.9402
50%	3022.55	54.85	1519.1	2.202	17.478	141.4599
75%	3205.37	57.745	1582.8	2.4015	17.8605	147.6084
Max	3386.15	63.27	1769.4	2.862	19.391	171.29

covering specific financial states through the exam of using the Naive Bayes classifier as a test: successor, growth, and recession. Testing on each of the three financial states helped strengthen the model. After the end of his exam, research noticed that using all the accessible highlights, he created an overfed model. To overcome this, he extracted the most presentable highlights of the macroeconomic zone and extended the attack of his model along these lines.

The Keynesian hypothesis validly joined an examination conducted by Selmire in 2013. That examination talks about how banking guidelines can lead to retaliatory financial elements [24]. In this investigation, Selmire finds that the S&P 500 does so, according to monetary guidelines compelled by banks or government increments. The guideline emphasizes assisting with maintaining the macroeconomic situation. Like Chiarella discoveries, a lot of expectation models that are used depend on bank and government guidelines, among the successes, and forecast as well [8].

Materials and Methods

Data Collection Process

Data was compiled from three different publically available sources COVID-19 data compiled from John Hopkins COVID-19 map, GDP data compiled from world economic outlook compiled by the international monetary fund (IMF) and stock market (e.g., S&P 500 index, etc.) from Yahoo Finance using python 3.8 *datareader* library, a data site where information is stored in one location, BEA.gov which is another website that has years of data stored and sorted, and the Bloomberg Terminal which is an up to date portal that has current changes as well as historical data. The raw monthly data was put into excel and sorted into quarterly data so that there were more meaningful data points. It was decided the data would be more useful in quarterly format, because there were larger differences in those data points when compared to the monthly data.

Data Set Description

The first data set was collected from John Hopkins COVID-19 map and compiled with two variables of confirmed cases and death counts of the world's top 10 economic countries. From the beginning of the COVID-19 pandemic to April 22nd, 2020 total counts of variables keep in Table 2. Second data set of the world's top 10 economics countries GDP over the last 5 years as presented in Table 3. The third data set drowns of S&P 500 stock index from yahoo finance from the last quarter of GDP in 2019, i.e., September 2019 to April 2020. In addition, Crude oil, Gold asset, Silver Asset,
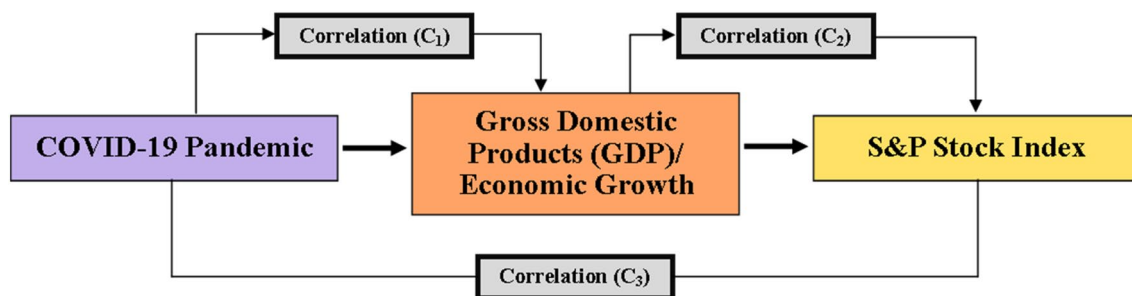

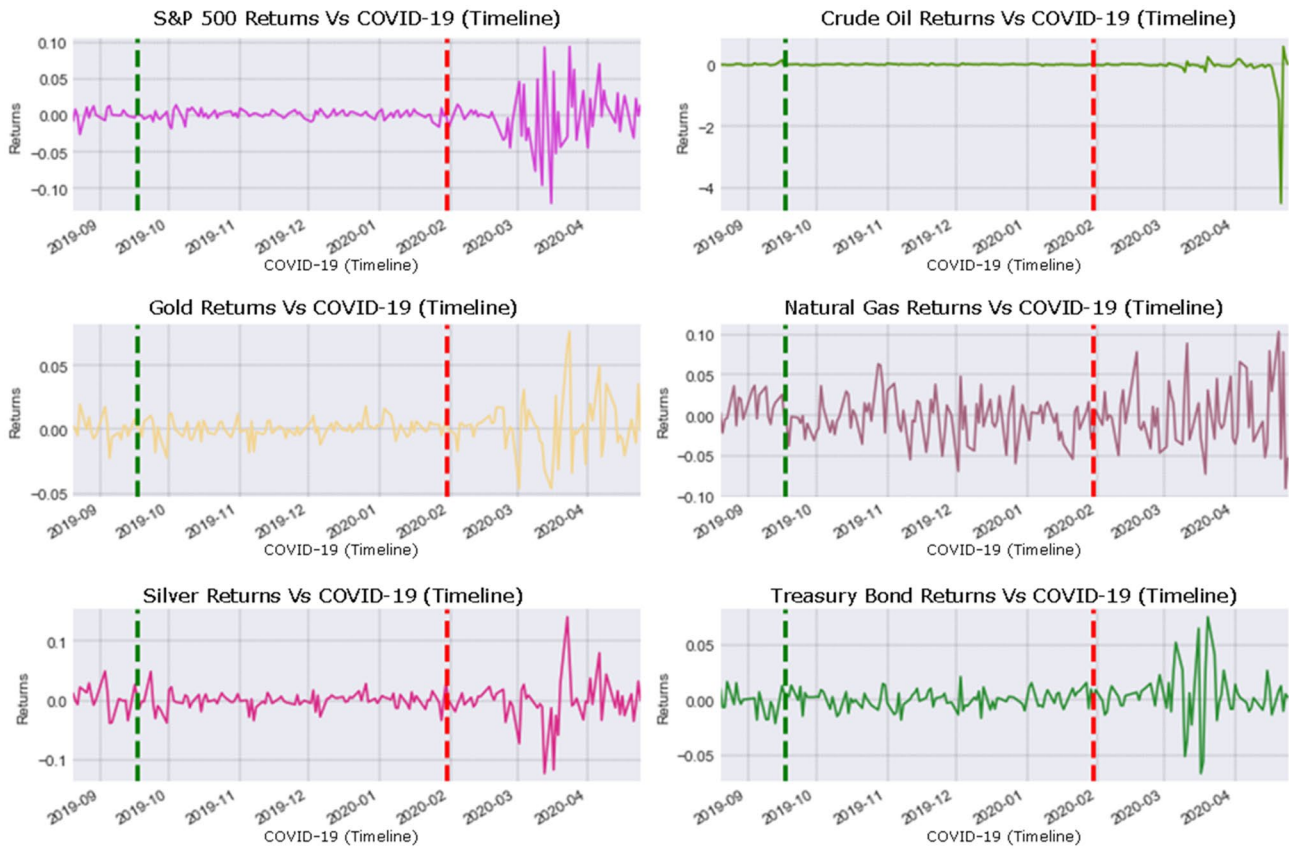**Fig. 1** Working methodology of research

Fig. 2 Impact analysis of COVID-19 on the stock index returns

Natural gas, iShare 20 + year Treasury Bond Assets return value data collected to analyze the impact of the economy on these revenue generated assets that help to clear the picture impact of the economy on the stock market indexes. Table 7 represents the summary of the stock indexed collected data.

Data Pre-processing

Data Cleaning

The extracted data has some missing values, redundant columns, unrecognized symbols of the columns, etc., which may affect the research result. So Python 3.8—*Panda and NumPy* library help to handle the data cleaning process.

Data Normalization

The purpose of data normalization is to rescaling the cleaned data set, because the COVID-19 counts are very high and somehow rapidly increased daily bases, while stock index

data have positive and negative uncertain values. Hence to applying the measure the correlation between COVID-19, economic growth and the stock market require a similar scale.

Model Description

The percentage change was recorded between each quarter, focusing on this research. A change in percentage in the quarter indicated that GDP (balanced for inflation) has gone down by ten quarters since 1957, out of them four were lobbying accident in 2008, just three successively considered as per Yahoo Finance, 2017. This made it an issue with the exam in light of the fact that most of the correlations currently need to be done on increments because of both the opposite of increments and the same low. The forecast model is expected to account for two increments and a decrease in GDP altogether. In the event that it is just ready to manufacture it will not be a supporting model. It may be, the size of the increment can be thought about in any case and may still
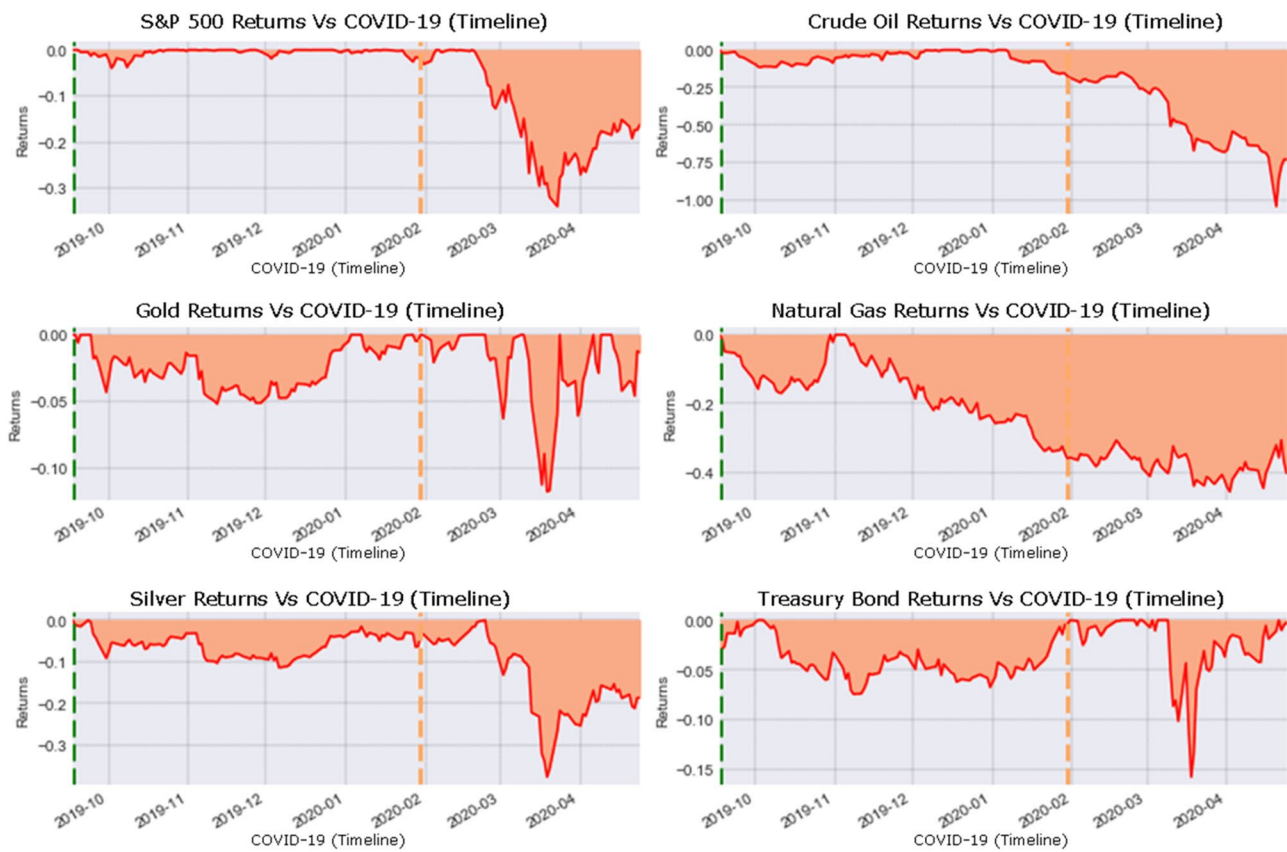
Fig. 3 Stock index with highlighting maximum return during COVID-19 timeline

be helpful. Further information about how the GDP model can be used to estimate GDP growth will be additionally clarified later.

The impractical statics with python 3.0 was used to compile the regression analysis on the percentage change from quarter to quarter between the S&P 500 and annual GDP. The graphical analysis was done with *matplotlib* library that gave a better indication of the actual relationship of information, as stock index prices were opposed on the basis that there would be no correlation between stock costs and the financial qualities used in GDP. Therefore, to test whether the S&P 500 stock index is a key indicator of GDP, the S&P 500 information was cancelled in both quarter one and two with the goal that quarter two of the GDP was replaced by the S&P 500, would be considered the reverse of quarter three and quarter of GDP. When contrasted with the quarters of the S&P 500.

A certain interim must be set before establishing a relationship. The fixed interim was set to 95%, confidence level

that the p-value should be less than 0.05 so that the invalid could be rejected. In practice, the entirety of the results met this limitation and rejected the invalid theory. This shows that there is a relationship between the two systems of information and that a large portion of the parts of the S&P 500 is driving markers of GDP. In order for this information to be factually large, everyone should consider the *t*-value. The *t*-value shows evidence of a relationship. For the results of this investigation to be voluminous, there should have been a *t*-value under 2 or more notables ≈ 2. Each *t*-value for the individual relapses found on this basis, predicts that a result is an average form. This was then run again for each individual part of the S&P 500 to find out if one is higher than the GDP compared to the other. Some parts proved to be more notable relations than others and should be used in contrast to clauses that did not appear as a relation. The exploration was then done to explain why some partitions were more prone to GDP than others.
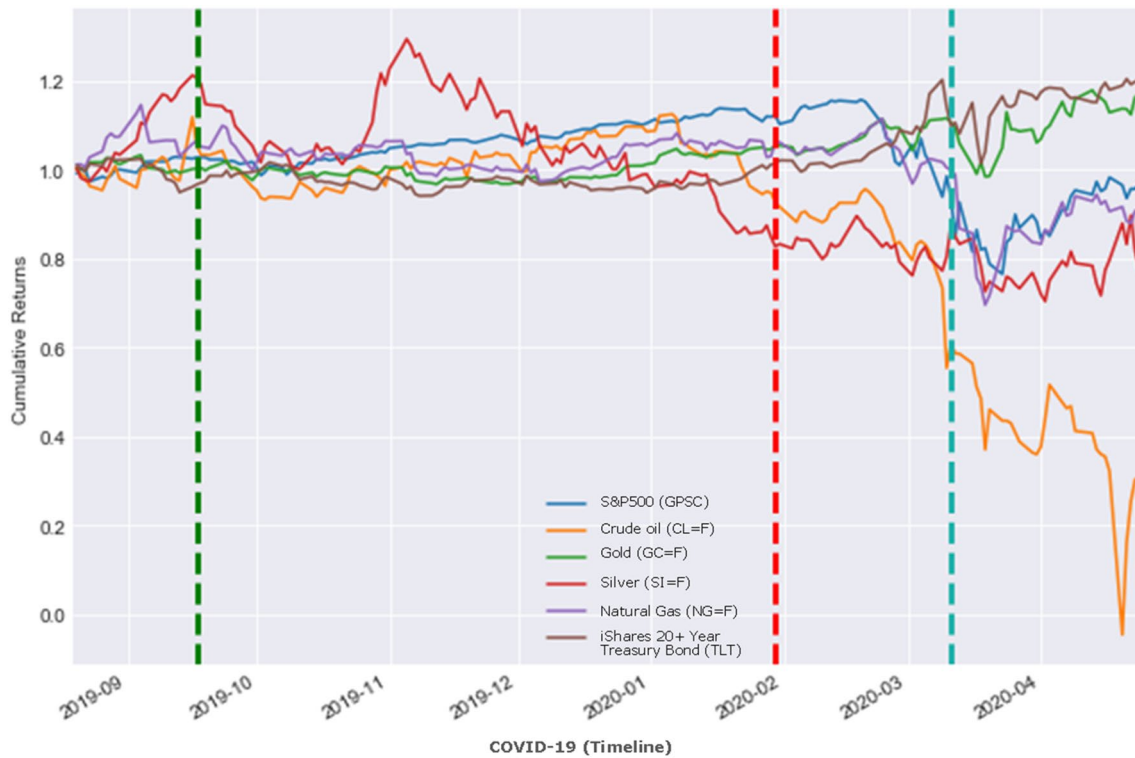
Fig. 4 Cumulative returns during COVID-19 timeline

When all the data was collected and analyzed, it had begun to focus on how this analysis could be used to support policymakers, business holders, and financial experts. Various examinations have attempted comparative investigation and have been filled as a rule or system for the GDP model. These researches cover the approach to managing abundance cash, which organizations are at a disadvantage when the economy is up/down, and why human capital enterprises are important. This data will help with various situations, for example, economy up, economy down, and up/under recruitment and how/when to fix it. The expectation is that the GDP model that was created will help producers, financial experts, and representatives' step out to the plate as opposed to turning out to produce a well-defined decision making process, Fig. 1.

Results and Discussion

The data was structured and visualized with the help of a spyder(Anaconda3)-python 3.8 environments.

Figure 2 represents the impact of COVID-19 on stock indexes that highly responsible for generating tax revenue S&P500 (GPSC), Crude oil (CL = F), Gold (GC = F), Silver (SI = F), Natural Gas (NG = F), iShares 20 + Year Treasury Bond (TLT). As the data of COVID-19 shows, the number of people suffering from the epidemic has increased very rapidly since February 2020, the effect of which is in S&P 500 (±12.20%), Crude oil (−71.80), Gold (+12.90), Silver (+13.72), Natural Gas (−13.37), iShares 20 + Year Treasury Bond (+18.30), etc., as shown in Fig. 1.

The stock index is experiencing high uncertainty during the COVID-19 timeline. Figure 3 shows the last maximum gain of the stock index that was in the month of February 2020. Figure 4 shows the cumulative returns during COVID-19 timeline in last six months from September 2019 to April 2020. Figure 5 analysis the impact of S&P 500 stock index
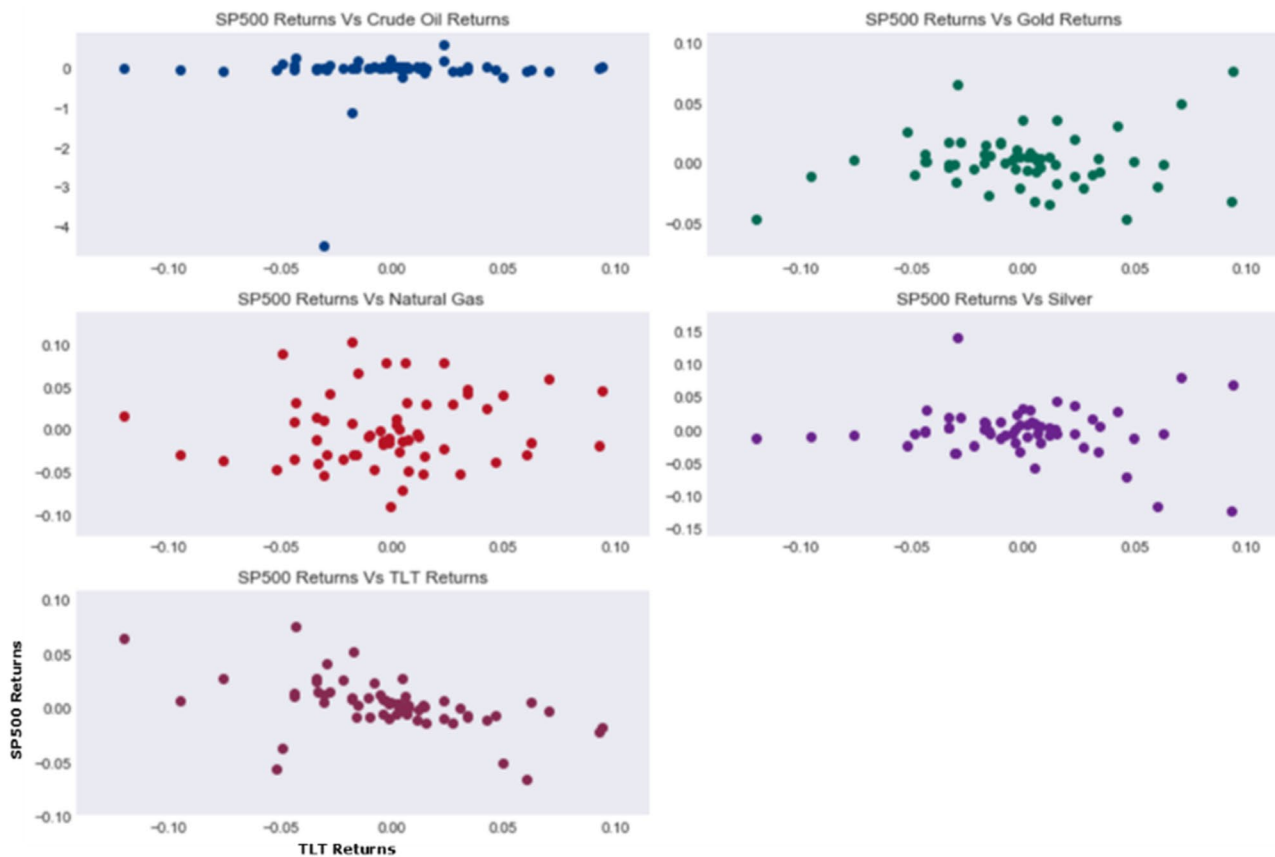
Fig. 5 Impact analysis of S&P 500 stock index over five highly revenue generated sectors

over five highly revenue generated sectors includes crude oil, gold, silver, natural gas, and iShares 20+ year treasury bond. Figure 6 shows the analytical results of stock index return during the pandemic timeline periodically (e.g. one, three and six month), while Fig. 7 shows the impact of pandemic confirmed cases and death counts on the GDP economy growth of top 10 countries.

Conclusion

According to data analysis due to the COVID-19 epidemic, the average economy is down from 1.62 to −5.45. The S&P 500 stock index and other assets are highly influenced during the COVID-19 timeline. In addition, the S&P 500 stock index already touched the mark of -28.67% downfalls. As of April 22, 2020, it is measured at −12.20 below the index value in September 2020. In short, the impact of the virus on world economies would be more devastating in the long run if the virus was not stopped in the short term. Therefore,
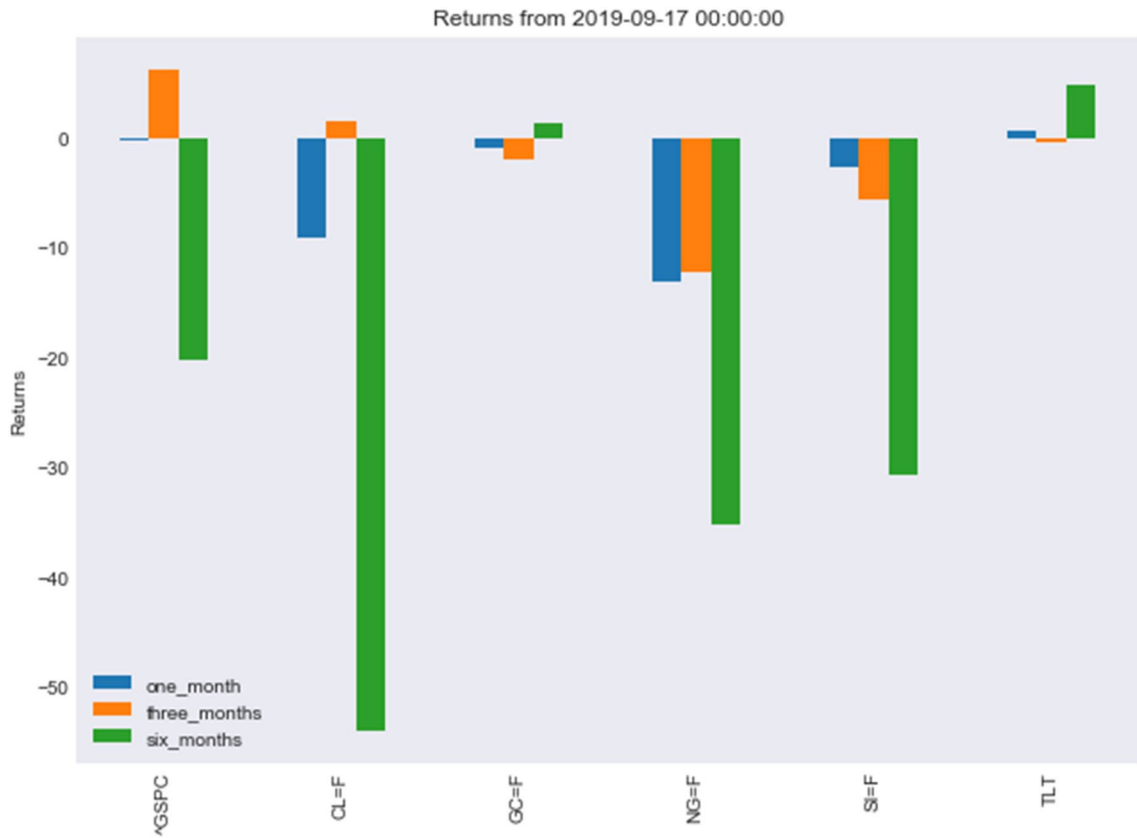
Fig. 6 Stock index return analysis during COVID-19 timeline periodically (e.g., 1, 3, and 6 months)
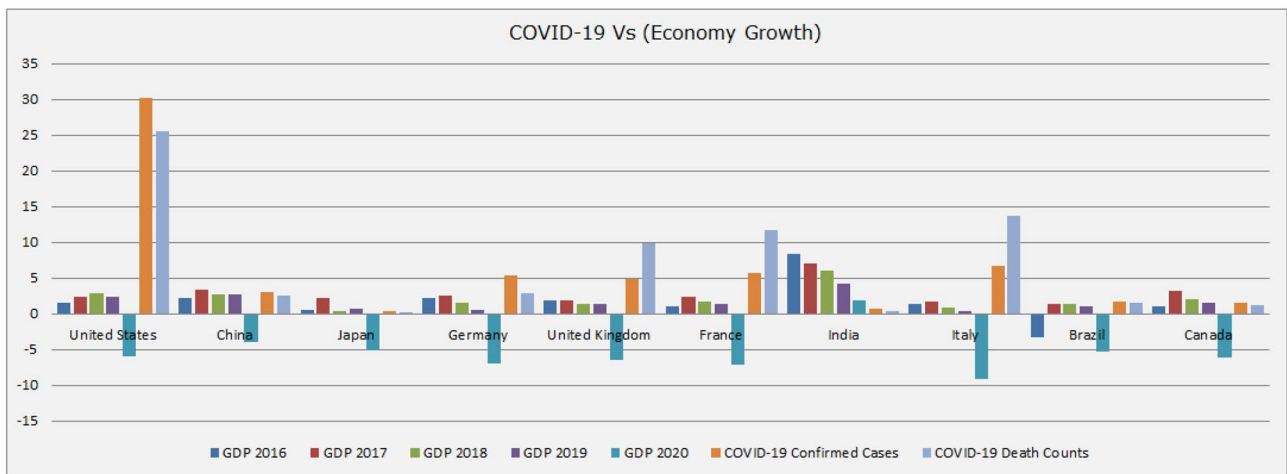

Fig. 7 COVID-19 confirmed cases and death counts impact on country GDP economy growth

it is necessary that the government and international bodies cooperate to reduce the economic consequences of the effects of the virus in the future. As we have considered the top 10 economies in the world in this research paper, these countries have already suffered significant loss of life due to COVID-19 infection. Due to which their governments have already taken action in the form of lockdown (partly and fully) and social distancing, they should be commended for these efforts in preventing the virus. However, a greater contribution from other governments and international bodies is needed to eradicate this deadly virus.

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