Comparison of COVID-19 and Global Financial Crisis of 2008 Effects on Economy and Stock Markets

Faustin Habimana[1], Ge He-ping[2]

[1]*(School of Management Science and Engineering/ Nanjing University of Information Science and Technology)*
[2]*(School of Management Science and Engineering/ Nanjing University of Information Science and Technology)*

Abstract:

Background*: In the past two decades, the global financial market has suffered two major shocks: the economic crisis triggered by low mortgage loans in 2008 and the COVID-19 pandemic in 2020. Though previous studies have been conducted to assess the impacts of COVID-19 on the stock markets, less research have investigated the impacts of the two global crises. Therefore, the present study examines the impact of news and tolerance for variability caused by COVID-19 and global financial crisis (GFC) in the world economy and stock markets.*

Materials and Methods*: To assess the effects of these two types of global crises, the present research used two main datasets, namely Gross Domestic Products (GDP) and stock market. The daily Nasdaq Composite Index and Standard & Poor's 500 Index data from 2007 to 2009 and from January 2020 to December 2020 represent the stock market. In addition, two statistical models i.e., Autoregressive Conditional Heteroscedasticity (ARCH) and General Autoregressive Conditional Heteroscedasticity (GARCH) were used to show changes or trends in variables over time.*

Results*: In the variance equation, both lagged squared error term, and the lagged conditional variance term are individually highly significant. Since lagged conditional variance affects current conditional variance, there is clear evidence that the stock markets return exhibit considerable downturn time-varying and time-correlated volatility whether we use the ARCH or the GARCH model during both crises, where the difference is at the beginning of the crises and the duration the crisis lasted even though the Covid-19 crisis is still appearing up to date to some countries.*

Conclusion*: This study shows a comparison between Covid-19 and the global financial crisis that occurred in 2008. Overall, it was found that the Global financial crisis only affected the financial and real economy while Covid-19 affected all social and economic activities, which is why it is said to be harsh more than GFC.*

Key Word*: COVID-19; Global Financial Crisis; Stock market; Economy.*

I.   Introduction

In the last two decades, the global financial market has suffered two major shocks the economic crisis triggered by low mortgage loans in 2008 and the COVID-19 pandemic in 2020. The 2019 Coronavirus (COVID-19) pandemic has affected general economic activity and the statuses than the global financial crisis at the beginning of the crises. Although the global stock market suffered significant losses for several weeks in the two crises, the literature has so far ignored the ability to study the symmetry and diversity caused by the two events in the two stock disputes in a detailed period. (Ji et al., 2020, Zhang et al., 2020).

In April, the International Monetary Fund predicted that the economic downturn would be worse than the global financial crisis due to the coronavirus outbreak. With total domestic exports expected to set at 4.9 percent in 2020, this economy's depth exceeds that of 11 years ago, while annual GDP growth gained a contract of 0.1%. In particular, the market value of Morgan Stanley Capital International (MSCI)'s global index reached 17.5% from March - 06 to 18. Adam (2020) reported that financial markets are as close to worsening as it was at the time of the financial crisis of 2008. Georgieva (2020) stated that COVID-19 had brought the world closer to the financial crisis than Global Financial Disputes (GFC) 2007-2009. In addition, the Investment Index rose to its highest level over the GFC era, while the United States (US) Treasury Census of 10 years fell at its highest level (Leduc and Liu 2020).

Though previous studies have been conducted to assess the impacts of COVID-19 on the stock markets, less research have investigated the impacts of the two global crises. Therefore, the present study examines the impact of news and tolerance for variability caused by COVID-19 and GFC in the world economy and stock markets. This research may help answer top-level questions from decision-makers, buyers, financial analysts, portfolio managers, and researchers. As a practical example, the study addresses the following questions: (1) will COVID-19 produce a worse crash in the census markets than the GFC? (2) will COVID-19

have a greater impact on revenue than GFC? (3) will the volatility in stocks result from the COVID-19 area unit be higher than GFC? (4) do markets have a large leverage impact? (5) do the disaster in those markets lasted long? (6) what is the usual way to stability the market? The authors believe that these questions' answers can help decision and decision makers to address challenges that may results from COVID-19 pandemic.

II. Theoretical Literature

This section presents a review of the literature on COVID-19 and the global financial crisis catastrophes in each of its eras. The literature discusses the comparison based on the difference between the COVID-19 disaster and the global financial crisis. The COVID-19 pandemic is having a more radical and brutal effect. It is different from the crisis in 2008; the crisis started with the disruption of the American real estate and financial markets and only spread to the financial and real economy of the rest of the world after a certain delay. The COVID-19 pandemic is hitting many industries harder than the 2008 financial crisis, and most industries will take longer to recover from the losses they suffer. It shut down the real economy immediately and completely, simultaneously evaporating supply and demand.

Across the 10 Pew Research Center countries surveyed in 2020 and 2008 or 2009, a median of 80% now believes their country's economy is bad, compared to a median of 72% who said the same in 2008 -2009. However, there are considerable variations between countries.

In G7 countries Economic and Stock markets fluctuate more with COVID-19 than Global Financial Crisis

Many developed countries such as Australia, Spain, Italy, and the United Kingdom, and many others now say that their country's economic situation is worse than during the last recession. In Australia, for example, economic attitudes are twice as negative in 2020 as they were in 2008. In contrast, South Koreans and Americans are now less discouraged by their country's economic situation than in 2008, although with lower margins. In Canada, Germany, Japan and France, the stocks that rated their country's economy as bad in 2020 are roughly the same as those that negatively rated their economy in 2008 (Anghelache 2011).

Among the nine countries where the Pew Research Center has research data for 2007, 2008 or 2009, 2019, and 2020, the median positive assessment of the national economy from 2007 to 2008-2009 fell by 15 percentage points. Between 2019 and 2020, the average decline has dropped to 27 percentage points (Mara Mordecai and Shannon Schumacher 2020).

In five countries, the slowdown in the positive assessment of the economic situation during the coronavirus pandemic has outpaced the decline observed between 2007 and 2008. Between Germany, Japan, Italy, France and South Korea, the country's economic valuation collapsed during the recession. For some of these countries, the observed decline between 2007 and 2008 marked the beginning of a longer downward trend in economic attitudes as many countries were affected by the European debt crisis. For example, between 2007 and 2008, the German stock market, which positively evaluated the country's economic performance, declined relatively moderately, but in 2009 its share fell to an all-time low of only 28%. (Mara Mordecai and Shannon Schumacher 2020).

Key differences between the Global Financial Crisis and COVID-19.

One of the main differences between the global financial crisis and the coronavirus crisis is that the coronavirus crisis arose from an exogenous shock while the global financial crisis emerged from an endogenous shock. Endogenous shocks come from the system. For example, it is generally accepted that problems arose in the case of the global financial crisis in the US mortgage industry. As credit levels deteriorated, as the risk accumulated in the industry and those risks began to decline, the world went through a major credit crisis. Financial markets froze, the money dried up, and the result was a painful recession. Exogenous shocks, including a meteor hitting the Earth, originate from outside the system. The coronavirus is a traditional exogenous shock, a spontaneous public health problem that precipitated a global drop in supply and demand.

Another difference is that the financial sector ended the year relatively well compared to the previous recession. Since the global financial crisis, the prudential supervision of banks has been revised and banks are now better capitalized than in 2007. In addition, recent regulations have also ensured that non-bank institutions, including hedge funds, sovereign wealth funds' investments and bonds and other markets, a higher proportion of subprime loans. As a result, however, banks are less vulnerable to risk than before, which is good for financial stability.

All of this news is historically positive. Endogenous problems such as miscalculated risks, severe maturity mismatches, regulatory arbitrage and concerns about off-balance sheet liabilities have resulted in most global financial crises. In the past, the stability of financial markets quickly absorbed crises precipitated by exogenous shocks, and development resumed without interruption after the end of the crisis. Thus, many analysts have predicted that once the coronavirus threat is over, markets will rebound easily.

Recession comparison

As the lockdowns have seriously hampered anything from factories to utilities, the shock to the global economy in 2020 is very different. In 2007-09, as a result of so much bad debt, the issue was a financial crisis, and there was no comparable crisis in what analysts call the supply side of the economy rolandberger.com (2020). Nonetheless, there are knock-on consequences of the COVID-19 pandemic that display certain similarities to the previous crisis. The financial markets have frozen, and corporate bonds' value has plunged: the gap or spread between the rates of corporate bonds and those of the 10-year US government bond index has now increased further than during 2007-09. A contraction no deeper than last time, when GDP dropped 1.7% in 2009, is potentially the most realistic economic result. However, things might also be a lot worse. According to the article led by distinguished Australian economist Warwick McKibbin, the G7 plus China may be headed for an average decrease of 8% in GDP this year, including 6% in the UK, 8% in the US and 9% in Germany.

III. Material and Methods

Study Design: Study designs are the set of methods and procedures used to collect and analyze data in a study. In this study we used observational stock market data collected from Nasdaq composite index, and Standard & Poor's 500 Index and GDP from World bank.

Study Location: This research was carried out to compare the effect and behavior of Covid-19 crisis and Global Financial Crisis of 2008, by measuring stock markets and GDP of combined most affected countries in the world. **Study Duration:** To investigate the effect of 2008 Global Financial Crisis and COVID-19 crises on global economy and stock markets, this study used two different datasets i.e., daily stock markets and annual GDP from mid-2007 to early 2009 and from January 2020 to December 2020.

Procedure methodology: Disruptions in stock markets, global financial effect between these two aspects, the quarterly growth rate of gross domestic product (GDP), daily stock markets (in millions of dollars and in percentages) of all countries infected with COVID-19 have experienced a large-scale economic recession, and the country that turned out to have no economic recession is China.

The authors calculated the daily returns of the Nasdaq Composite Index using the following approach:

$$R_t = (\log (_1)) *100$$

R_t, CS_t, and CS_{t-1} represent the projected day-sensible returns, the ultimate charge of an inventory at time t, and the ultimate cost of an inventory on a preceding day, respectively. At the same time, ln symbolizes the herbal log.

To seize the non-linear effect of COVID-19 and GFC inside the daily returns and variance of monetary markets, this research utilized an Asymmetric Power GARCH version brought by Ding et al. (1993). The imply and variance equation of the GARCH version may be described as (Ding et al., 1993), the model uses values of the past squared observations and past variances to model the variance at time t and its mathematical equations is expressed as follows:

$$= \alpha_0 + \alpha_1 + \beta_1 \qquad (2)$$

Where the ARCH term is and the GARCH term is . Note: y_t is usually the error term in a time series regression model.

$$\lambda_{ti} = \xi_0 + \xi_1 \, GFC_{ti} + \xi_2 \, COVID_{ti} + \xi_{ti} \qquad (3)$$

$$= \alpha_0 + \phi_1 GFC_{ti} + \phi_2 COVID_{ti} + \mid z_{t-1} \mid + \mid _i \chi \, z_{t-1} \mid) + \qquad (4)$$

In this equation (3), within the mean equation combining weight. λ_{ti} and ξ_{ti} denote the returns and error term of the securities market, respectively. The error term is founded on historical data (ϖ_{ti} data 1) and probable that it follows the student-t density degree of freedom. Moreover, ξ_0, ξ_1, and ξ_2 indicate the constant term, dummy variable of GFC, and COVID-19. Likewise, within the variance equation. Equation (4), βi directs the variations in its variance series, i.e., GARCH result and w denotes the facility term constant. Moreover, α_i and χ_i judge the results of comeback changes on its series, i.e., ARCH result and uneven impact of series i, leverage result. A positive χ_i indicates that negative news contains a bigger impact than positive news on market volatility (Ding, 2011). Besides, φ_1 and φ_2 verify the result of GFC and COVID-19 on variance series, respectively.

Statistical analysis

Excel and EViews 11 are an integrated set of software functions for manipulating, calculating, and graphical display of data. ARCH, GARCH, and line graph are used to show changes or trends in variables over time, either by calculations or by graphs. Descriptive statistics were used to summarizes features from data collected, Volatility index return were used to measure the dispersion of returns with the given market index.

ARCH and GARCH models employed in modeling financial time series that exhibit time-varying volatility and volatility clustering, i.e., periods of swings interspersed with periods of different crisis.

IV.   Result and Discussion

The global financial crises from 2008 to September 2009 led to a sharp collapse of the economies of the countries of the western region and even of the world stock market. However, from January 2010, stock prices resumed their upward trend until the blink of the Covid-19 crisis. The difference between Covid-19 and the global financial crisis is that the GFC lasts a long time and the Covid-19 lasts a short time, but the Covid-19 causes a sharp decline in the economy of the countries in a short time than GFC, but the point is that some countries are still in the Covid-19 crisis so far. Some countries boosted their prices a few months after the emergence of Covid-19, and their savings and stocks returned to their current prices, like China.

Therefore, to capture the changes and impact of crises on volatility and asymmetry of returns, we used different periods to observe the effect, and the selected periods predate the GFC and Covid-19 crisis, that is, from mid-2007 to early 2009 and from 2019 to late 2020. In addition, this study uses secondary data collected from the DataStream of the Nasdaq composite index and the Standard & Poor's 500 indexes to analyse the period selected within one to two years of the two crises.

The data sample used in this study is the daily Nasdaq Composite Index f from June 1, 2008 to early 2009 of GFC and also from November 2019 to June 2020, which includes the crisis period. In the first analysis, the crisis is included and compared due to the result, so a significant change in the patterns can be detected if there is an impact of the crisis. Daily Nasdaq Composite Index to analyze volatility is transformed into daily returns as below:

$$R_t = \log ()*100$$

R_t represents the daily returns of the Nasdaq composite Index

CS_{t-1} represents the daily prices of the Nasdaq composite Index

Table 1. Descriptive Statistics Table of Stock Returns of Covid-19 and Financial Analysis.

Summary Statistics	COVID-19	GFC 2008
Mean	-0.005093	-0.001060
Median	0.000104	-0.000848
Max	0.089346	0.111594
Mini	-0.131490	-0.095877
Std. Dev.	0.044266	0.024942
Skewness	-0.393534	0.015909
Kurtosis	3.869699	5.391728
Jarque-Bera	834.5973	89.15808
Probability	0.326972	0.000000

Figure 1: Global Financial and Covid-19 Crises Volatility Index Returns
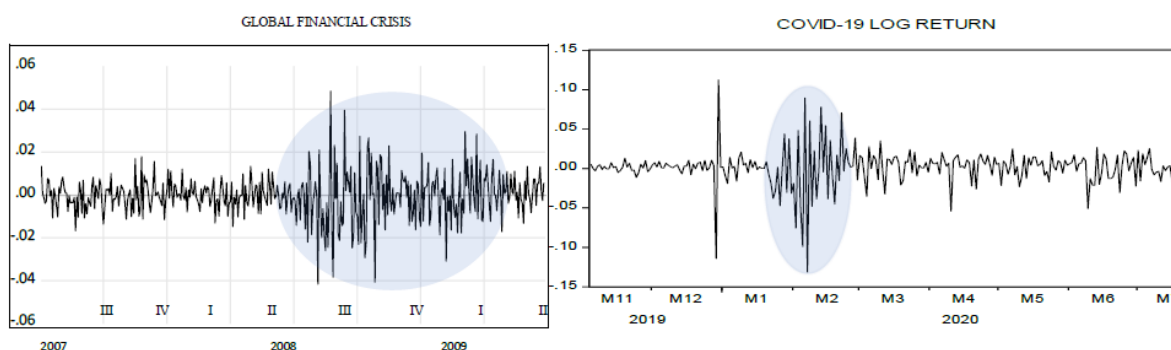
The graphs above represent the Nasdaq Composite Index Returns from September 2007 to April 2009 of the Global Financial Crisis and the Covid-19 Crisis from November 2019 to July 2020. Note: The x-axis is the month and year, while the y-axis represents the returns of the Nasdaq Composite Index in the log value return.

As shown in the table above, the standard deviation of the Global financial crisis is 0.025 smaller than that of Covid-19, which is 0.044266. This shows that a higher standard deviation value indicates greater spread in the crises, which clearly shows that the Covid-19 crisis affected the stock market and Economy deeper, but

for a short period of time as for Covid-19 we have analysed only from January 2020 to March 2020 while for GFC which lasted for so long we analysed from December 2007 to March 2009.

The EViews descriptive statistics outputs shown in the table above indicate that the histogram's observation showed that it was not symmetrically bell-shaped. If the returns were normally distributed, then the skewness and kurtosis coefficients should be equal to zero. This indicated that the data did not fit into a normal bell-curve. The Jarque-Bera test value of 834.5973 and 89.15808 indicated significant departures from normality for the index for both crises. The statistics showed that the indices had a negative return of about -0.005093 (-0.5%) of Covid-19 and -0.001060 (-0.01%) per day. The skewness coefficient of -0.39 means that Covid-19 has negative, which means the left tail is long relative to the right tail compared to 0.016 of GFC indicated that the distribution was positive skewed means that the right tail is long relative to the left tail. The kurtosis coefficient measures of thickness of the tails of the distribution were calculated to be 3.87, which is light-tailed, and 5.39 was considered to be very high or heavy-tailed and implied very extreme deviation from normality.

Figure 2: Covid-19 stock markets by Nasdaq composite Index

The above figure shows the labelled part of the Covid-19 crisis by Nasdaq stock markets indices; the figure shows that it has dropped significantly in the short term and has the potential to keep it down. Mixed up this pandemic would ease the world's economy and rise faster than GFC recovery. The NASDAQ Composite is a stock market index that includes almost all stocks listed on the Nasdaq stock market. The composition of the NASDAQ Composite is heavily weighted towards companies in the information technology sector. The NASDAQ-100, which includes 100 of the largest non-financial companies in the Nasdaq Composite, accounts for over 90% of the NASDAQ.

Table 2: Result of the mean and variance equations of Covid-19 estimation (GARCH Model)

Dependent Variable: COVID-19
Method: ML - ARCH (Marquardt) - Normal distribution
Sample (adjusted): 2 49
Included observations: 48 after adjustments
Convergence achieved after 275 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.004634	0.002607	1.777502	0.0755
COVID-19(-1)	-0.171410	0.171522	-0.999345	0.3176

Variance Equation

C	6.81E-06	1.81E-05	0.376541	0.7065
RESID(-1)^2	0.785069	0.364627	2.153075	0.0313
GARCH(-1)	0.504092	0.136608	3.690071	0.0002

R-squared	0.103239	Mean dependent var	-0.002582
Adjusted R-squared	0.083745	S.D. dependent var	0.042435
S.E. of regression	0.040620	Akaike info criterion	-3.879622
Sum squared resid	0.075898	Schwarz criterion	-3.684706
Log likelihood	98.11094	Hannan-Quinn criter.	-3.805963
Durbin-Watson stat	2.511596		

The above table shows the results of what we have estimated, and the dependent variable is Covid-19, with 275 observations during the crisis. In this table, we have a lower and upper part. The upper part as the main equation, if we look at the coefficient, we have positive and negative coefficient means having negative coefficient on our dependent variable suggests that the independent variable increases as the dependent variable tend to decrease, the C 0.004634 in the upper part represent the average stock return of the Covid-19 crisis stock. The mean equation.

$$\beta_1 = 0.004634 + (-0.17)$$

The coefficients of the results are positive and negative, the average stock return is 0.004634 and its past value shows the negative sign of -0.17141, which means the decline of stock values in the period of the crisis.

ii. The variance equation

$\lambda_{ti} = 0.00000681 + 0.504092\,\lambda_{t-1} + 0.785069$Coefficients of the constant variance term, the ARCH and GARCH parameters are positive and statistically significant. This gives the result of the GARCH model. The time-varying volatility includes a constant (0.0000068) plus its past (0.504092 λ_{t-1}) and a component that depends on past errors (0.785069).

The Negative Effect of the Global Financial Crisis

This section assesses the effects of the economic leakage from the 2008 global recession on the rest of the global economy. The financial crisis of 2007-2008 was a severe global economic crisis. Before the COVID-19 recession of 2020, it was considered by many economists to be the most severe financial crisis since the Great Depression. Predatory loans targeted at low-income homebuyers, the excessive risk from global financial institutions (Williams, Mark, 2010) and the bursting of the US housing bubble have all resulted in a "perfect storm". Mortgage-backed securities (MBS) linked to US real estate, as well as a vast network of derivatives linked to these MBS, have collapsed. Financial institutions around the world have suffered serious damage (Vasile, Dedu 2011).

The combination of a recession that reduced tax revenues and increased social-welfare payments for unemployment really weighed on government budget balances. And governments around the world, in one form or another, have provided financial support to the banking system and other critical industries. All of this has made governments more in debt than ever. But at the same time, companies were borrowed almost as much money as governments. As a result, globally, non-financial corporate debt has grown even larger than sovereign debt, reaching $ 66 trillion (Lund and London 2018).

Looking back, we can say that the crisis started with a bubble in the real estate market, and that's bad. It has already happened. But what made it different is that there were a lot of financial innovations that went beyond regulation and, to some extent, beyond the ability of banks to manage risk, and there was not enough capital. So, the shock absorbers were not there in the global financial system.

Figure 3: Global Financial Crisis stock markets by Nasdaq composite index.

The 2007-2009 US bear market was a 17-month bear market that lasted from October 9, 2007, to March 9, 2009, during the 2007-2009 financial crisis. The Nasdaq Composite Index fell by about 50%, but due to the unusual intervention of the government and central bank to support the stock market, the duration of the bear market was slightly below average. The bear market was confirmed in June 2008 when the Dow Jones Industrial Average (DJIA) had fallen 20% from its October 11, 2007 high.

Table 3: Result of the mean and variance equation of GFC estimation (ARCH Model)

Dependent Variable: GFC_RETURN
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 08/08/21   Time: 19:02
Included observations: 260 after adjustments
Convergence achieved after 20 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.001608	0.001218	1.320656	0.1866
GFC_RETURN(-1)	-0.055597	0.071748	-0.774895	0.4384

Variance Equation				
C	9.51E-07	1.58E-06	0.600304	0.5483
RESID(-1)^2	0.028820	0.017434	1.653091	0.0983
GARCH(-1)	0.959404	0.019226	49.90092	0.0000

R-squared	0.004519	Mean dependent var		-0.000385
Adjusted R-squared	0.000661	S.D. dependent var		0.027472
S.E. of regression	0.027463	Akaike info criterion		-4.710385
Sum squared resid	0.194585	Schwarz criterion		-4.641911
Log likelihood	617.3501	Hannan-Quinn criter.		-4.682858
Durbin-Watson stat	2.098636			

i. The mean equation
$$\alpha_1 = 0.001608 + (-0.055597)$$

The above table is also showing the Arch model results from EViews software. As is estimated in the table above, the results show that the GFC also has a positive and negative coefficient. The average stock return is 0.001608 and its past value significantly predicts the current series by -0.055597. This value explains how lower the stock was fluctuating during the crisis period than the Covid-19 crisis (-0.171410).

ii. The variance equation
$$\lambda_{ti}= 0.000000951 + 0.96\lambda_{t-1} + 0.0288$$

In the conditional variance equation, the coefficient of GARCH (-1) (0.96) was found to be significant at 1% level. Meaning that the market takes some time to digest the full information into the prices, and shocks to conditional variance take a long time to die out.

Figure 4: Combined effect of GFC+COVID-19 crises.
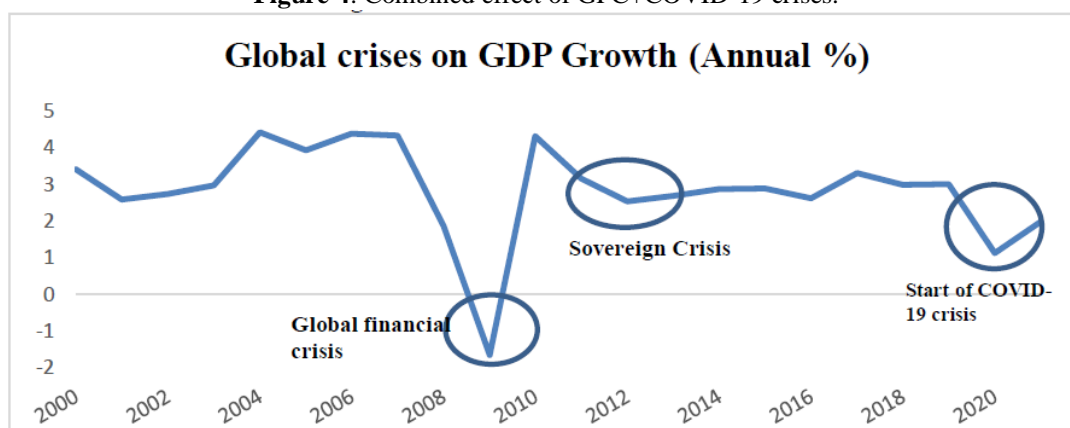
As shown above, the figure narrates both crises. GFC reveals a deep downturn than the COVID-19 Hence, the Covid-19 crisis was for a short period, while the global financial crisis lasted for a long time from 2007-2009. Also, GFC was affected much in America and European countries while Covid-19 affected almost all countries globally.

The crisis, which began in 2008 with the turmoil in US real estate and financial markets, spread to the rest of the global financial and real economy after a period of delay. The Covid-19 Pandemic has a more radical and catastrophic effect. It evaporated supply and demand at the same time, shutting down the real economy quickly and completely. The supply line was exhausted due to the factory closure from China in the early days. Unemployment meant that workers lost their income as consumption declined, and most stores were further atrophied by orders to close doors. The COVID-19 pandemic has hit more industries more than the 2008 financial crisis, with most industries taking time to recover from the losses they suffered.

V. Conclusion

This study shows a comparison between Covid-19 and the global financial crisis that occurred in 2008. The research examines the similarities and differences through various analyzes, mean, standard deviations, variances, kurtosis variability, created using model EViews software called the ARCH and GARCH model. Data on the stock market were collected using the asymmetric Nasdaq composite index performed during the crisis period. The results we've seen show that COVID-19 started more aggressively than GFC. So, the Covid-19 crisis has spread all over the world fast, and for a short period of time, GFC has more impacted the US and European countries, not damaging many African and Asian countries. Differences in mean coefficients for Covid-19 (0.171410) and GFC (0.055597) show behavioral changes that occurred between crises. The Global financial crisis only affected the financial and real economy while Covid-19 affected all social and economic activities, which is why it is said to be harsh more than GFC. In the variance equation, both lagged squared error term, and the lagged conditional variance term are individually highly significant. Since lagged conditional variance affects current conditional variance, there is clear evidence that the stock markets return exhibit considerable downturn time-varying and time-correlated volatility whether we use the ARCH or the GARCH model during both crises, where the difference is at the beginning of the crises and the duration the crisis lasted even though the Covid-19 crisis is still appearing up to date to some countries.

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