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CORONAVIRUS: AN EVENT STUDY OF POSITIVES, DISCHARGES AND FATALITIES AND THEIR EFFECTS ON STOCK MARKET CAPITALISATION IN NIGERIA

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Abstract

Nigeria barely came out of the economic crisis of 2016, that the novel coronavirus disease (COVID-19) greeted the soil of Nigeria in February, 2020 like a thief in the night. As at September 27, 2020, while there were 32,730,945 cases of COVID-19 globally, and Nigeria had total confirmed cases of 58,324. Besides the health risk posed by the pandemic, the Nigeria stock market indices such as the market capitalization has been affected too. In a 30-week event study, beginning from 2nd March 2020 and ending on 27th September, 2020, this paper examined the impact of cumulative and new confirmed, discharged and fatal cases of coronavirus on stock market capitalization in Nigeria using Autoregressive Distributed Lag (ARDL) technique. This study reveals the existence of a long run relationship between COVID-19 measures and stock market capitalization in Nigeria. It is also established from the ARDL analysis that except for discharged cases (cumulative and new) which are positively signed with stock market capitalization, both confirmed (positive) cases and fatalities are negatively signed with stock market capitalization in Nigeria. However, only total (cumulative) fatalities and total confirmed cases are statistically significant in explaining the reduction in stock market capitalization in Nigeria. Thus, this study concludes that the cumulative confirmed and fatal cases of coronavirus have significant negative impacts on stock market capitalization in Nigeria. Therefore, there is a need to curtail further spread of the disease in order to reduce the panic created in the stock market. Government's palliatives targeted at bringing succour to the market in this era of coronavirus, is another step in a good direction.

Keywords: Coronavirus, Confirmed cases, Discharges, fatalities, Stock market capitalization

Introduction

Nigeria barely came out the economic crisis of 2016 which was due to the sudden fall in oil price in the global market, that the novel coronavirus (COVID-19) greeted the soil of Nigeria like a thief in the night. The virus was reported in China on 31st December 2019 and subsequently spread to others countries including Nigeria, with her first recorded case on 27th February 2020 (Nigeria Centre for Disease Control [NCDC], 2020). Statistics also shows that as at September 27, 2020, the virus has spread to all the 36 states including Federal Capital Territory, in Nigeria. The total confirmed cases in the country stood at 58,324 of which 126 was the total new cases on September 27, 2020. Globally, in 216 countries, there are 32,730, 945 cases of the virus while the fatalities (deaths) stood at 991,224 persons. This is unlike on the same date in Nigeria, where there were 1108 deaths (wherein only 2 fatalities for the day). Given the total males infected (37,102) and females infected cases (21,222) in Nigeria, it can be seen that the male gender (constituting 64% of the total confirmed cases) is more hit by the virus than the female gender (constituting 36% of the total confirmed cases) in Nigeria as at September 27, 2020. With total discharges (recovers) of 49,794 (and 72 new discharges for the day), 72 % of the total confirmed cases have recovered from the virus in Nigeria as at September 27, 2020(NCDC, 2020). The coronavirus does not only constitute a health threat but an economic threat which has ravaged the various economic indicators like the exchange rate, inflation rate, employment rate, per capita income, financial markets (money and capital section) (AC-Ogbonna, 2020; Kajo et al., 2020; Ozili, 2020). Given the information-driven tendency of the stock market, information on health pandemic such as the coronavirus, is perceived to exert influence on the performance of the market. As a barometer of the health of the economy and a catalyst to a nation's economic growth (Ologunwa & Sadibo, 2016; Abina & Lemea, 2019; Acha & Akpan, 2019; Babarinde et al., 2020), the stock market is a cardinal institution in the Nigerian economy.

Olubiyi (2020) observes that despite the ease of lockdown for economic reasons, coronavirus-induced uncertainty continues to heighten and no economy is spared from the fall-out from the COVID-19 outbreak. According to the

author, many African capital markets are bearish, Namibia, South Africa, Mauritius, Egypt, Morocco, Kenya, Ghana, Malawi, and a few others. What is the behavior of the capital market capitalization in Nigeria in the era of coronavirus? In Nigeria, the first quarter of the year 2020 in terms of performance closed in the red with a negative return of (20.65 percent), as against a negative return of (1.24 percent) in the first quarter of 2019 (Olubiyi, 2020). In the same vein, statistics shows that as at the close of business on Friday, September 25, 2020, the Nigerian Stock Exchange [NSE] market capitalization (the market value of all listed securities) appreciated by 2.92% to close the week at ₦13.755 trillion (NSE, 2020). Further statistics from NSE shows that the Nigerian capital market shrinks in terms of its market capitalization standing at ₦13.657trillion on 28th February, 2020, to gain about ₦98billion as at September 25, 2020, when the market capitalization was ₦13.755trillion. Furthermore, as at March 27, 2020, when the market capitalization was ₦11.393trillion, the market lost ₦2.264trillion or 16.57% of the market capitalization, compared with February 28, 2020 (₦13.657trillion). This is against a loss of ₦1.66 trillion (or 12.15%) as at 30th April 2020, when market capitalization stood at ₦11.997trillion. Moreover, the market still lost ₦0.489trillion (or 3.58%) on May 29, 2020 (when market capitalization was ₦13.168 trillion). The same experience of loss was witnessed by the market as at June 26 and July 29, 2020 with ₦0.705trillion (or 5.16%) and ₦0.775trillion (or 5.67%) respectively when the market capitalization was ₦12.952trillion and ₦12.882trillion respectively. Even up till 28th August, 2020, when the market capitalization was ₦13.203trillion, the Nigerian capital market still lost ₦0.454trillion (or 3.32%) in terms of market capitalization.

However, further analysis of market situation in the Nigerian capital market shows that beginning from the first week in September, 2020, when the cases of coronavirus were reducing in terms of daily index of confirmed and death cases in Nigeria, the market started showing some signs of recovery. First instance, as at the end of the first week in September (4th September, 2020), the market capitalization increased to ₦13.358trillion, indicating a 1.17% appreciation from the previous week. In the second week of September, however, when the market capitalization stood at ₦13.351trillion, there was a slight decline in the capitalization of 0.05% from the previous week capitalization. As at 18th September, 2020, the market capitalization stood at ₦13.365trillion, representing a 0.10% improvement over the previous week's capitalization. It is largely unsettled empirically whether the changes in stock market capitalization are accounted for by the incidence of the coronavirus disease. To contribute to this burning issue, and ultimately ensure that the market continue to contribute its quota to the nation's economy, it is considered empirically expedient to investigate the effect of coronavirus disease on the Nigerian capital market in order to ameliorate any negative impact and or encourage the market resilience to the ravaging effect of the virus. Therefore, it is the central aim of this study to investigate the effect of coronavirus disease on stock market capitalization in Nigerian between 27th February 2020 and 27th September 2020.

This study has the following specific objectives:
i. To determine the effect of COVID-19 confirmed cases (both new and cumulative) on stock market capitalization in Nigeria;
ii. To assess the effect of COVID-19 discharged cases (both new and cumulative) on stock market capitalization in Nigeria;
iii. To evaluate the effect of COVID-19 fatal cases (both new and cumulative) on stock market capitalization in Nigeria.
This paper is outlined as follows. First, the introduction provides background information on the subject matter while review of literature constitutes the subject matter of section two. In section three, the methodology of the study is described while results and discussion of findings is the subject matter of section four. In section five, the conclusions as well policy recommendations are documented.

Literature Review
Theories are still evolving on the link between stock market and coronavirus disease, perhaps due to the fact that coronavirus disease is a novel disease. This study reviews two theories, namely the Black Swan theory and the Efficient Market Hypothesis, because of their relevance to the subject of study. The Black Swan theory describes a black swan is an unpredictable event that is beyond what is normally expected of a situation and has potentially severe consequences. According to Taleb (2007), the events are characterized by their extreme rarity, their severe impact, and the widespread insistence they were obvious in hindsight. A Black Swan event could be anything from a natural disaster to a war, a financial crash or the outbreak of a virus. In other words, Black Swan events are outliers, have severe and extreme impacts on society or the world, and the events are only predictable after the event has occurred. Therefore, the Black Swan theory tries to portray event events which are uncommon but only explainable

by hindsight as capable of ravaging the society including its economic and financial system. This tends to suggest that the capital market could not be left out by the ravaging effect of the event such as the novel coronavirus disease. The Efficient Market Hypothesis emphasizes the role of information (financial and non-financial) in capital market. Therefore, a market is efficient if stock prices reflect all provided information fully and quickly. The efficient market concept considers how the market responds to information and affects security prices. Fama (1970) described three levels of an efficient market, based on information absorption, to be weak, semi-strong and strong form efficient market. A market is classified as a weak form if stock price fully reflects all information based on past data on price, sales volume and profit; and as such past stock prices cannot be used to predict stock price in the future. A semi-strong efficient market is one where all publicly available information (such as past price, company fundamental data, profit forecasting) are impounded in the market price. According to the author, a market is classified as strong form if the price fully reflects all information, including historical data, public information, and private information.

Empirically, Alade et al. (2020) investigated the connection between COVID-19 confirmed cases and Nigerian stock market capitalization. The results of the Vector autoregressive model show that the confirmed cases of COVID-19 have mixed association with the Nigerian stock market equity capitalization, while the global announced confirmed cases demonstrate inverse relationship with the market capitalisation but are both statistically insignificant. In a related study, Ikwuagwu et al. (2020) assessed the Covid-19 100thday information effect on health firms' stock returns in Nigeria. The result of the study shows a positive abnormal return for health firms in Covid-19 100th day. Based on the results, the authors explained further that investors reacted positively to the information of Covid-19 100th day, but this positive reaction was not significant. Furthermore, Zaky et al. (2020) analysed stock prices of customer goods before and after the COVID-19 pandemic using event study and the comparison test. The study confirms the existence of a significant difference between daily closing stock price and volume of stock trade before and after the COVID-19 pandemic. In another study, Ahmed (2020) determined the impact of COVID-19 positive cases, fatalities, recovers on the performance of Pakistani stock market, (PSX 100 index). The study suggests that only COVID-19 recoveries are influencing the performance of the index and the daily positive cases and fatalities are insignificantly related to the performance of the stock market. Based on panel data analysis, Ashraf (2020) investigated the impact of growth in COVID-19 confirmed cases and deaths on the stock market returns of 64 countries. The results of the study show that stock market returns declined as the number of confirmed cases increased, however response to the growth in deaths is not that statistically significant. In summary, being a burning issue, coronavirus disease nexus with stock market empirics are still evolving though still largely inadequate. This study contributes to the empirical literature by examining both the nature of relationship as well as the effect of positive, discharged and fatal cases of coronavirus disease on stock market capitalization in Nigeria.

Methodology

This study adopts an event study methodology, which in line with similar studies (Babarinde, 2020; Ikwuagwu, et al., 2020; Liu et al., 2020; Zaky et al., 2020) entails the measurement of the impact of a particular event/activity/phenomenon on a subject of interest. Hence, in this study we investigated the effect of covid-19 related positives, discharges and fatalities, on stock market capitalization in Nigeria. The data for the study are weekly time series covering 30 weeks of study, from the first week of March 2020 (beginning on Monday 2nd March 2020) to the penultimate week in September (ending on Sunday 27th September, 2020). Market capitalization data were obtained from the Nigerian Stock Exchange website while data on COVID-19 confirmed cases were extracted from the Nigeria Centre for Disease Control (NCDC) website. Trading on the Nigerian Stock Exchange ends on Friday, thus Friday's data are used as the end of the week data where Saturdays and Sundays data were included in the case of coronavirus data. The data were subjected to preliminary tests such as descriptive statistical test, Augmented Dickey-fuller (ADF) unit roots tests. To examine the nature of the relationship and uncover any multi-collinearity problem, a correlation matrix of the variables was employed. Furthermore, co-integration tests were carried out. The study adopts ARDL model for impact analysis while correlation analysis was used to measure the nature of relationship between COVID-19 and market capitalization in Nigeria. The ARDL model for this study is specified in equation (1).

$$\Delta \mathrm{InMCAP}_t = \alpha + \sum_{i=1}^{n} \Psi_{1i}\, \Delta In\mathrm{MCAP}_{t-1} + \sum_{i=0}^{n} \Psi_{2i}\, \Delta In\mathrm{CNNF}_{t-i} + \sum_{i=0}^{n} \Psi_{3i}\, \Delta In\mathrm{CNNP}_{t-i} + \sum_{i=0}^{n} \Psi_{4i}\, \Delta In\mathrm{CNNR}_{t-1} + \sum_{i=0}^{n} \Psi_{5i} \Delta In\mathrm{CNTF}_{t-1} + + \sum_{i=0}^{n} \Psi_{6i} \Delta In\mathrm{CNTP}_{t-1} + \sum_{i=0}^{n} \Psi_{7i} \Delta In\mathrm{CNTR}_{t-1} + \beta_{1i} In\mathrm{MCAP}_{t-1} + \beta_{2i} In\mathrm{CNNF}_{t-1} + \beta_{3i} In\mathrm{CNNP}_{t-1} + \beta_{4i} In\mathrm{CNNR}_{t-1} + \beta_{5i} In\mathrm{CNTF}_{t-1} + \beta_{6i} In\mathrm{CNTP}_{t-1} + \beta_{7i} In\mathrm{CNTR}_{t-1} + \gamma \mathrm{ECT}_t + \mu_t \quad (1)$$

Where; Δ denotes first difference operator,

In represents natural logarithm,
α = the drift component,
μ_t = the error term,
Ψ_1 - Ψ_7 = the parameters of the short-run dynamics of the model,
β_1 - β_7 corresponds to parameters of the long-run relationship,
γ is the coefficient of the error correction term (ECT),
MCAP=Market capitalization of the Nigerian Stock Exchange,
CNNP=Covid-19 new positives (or confirmed cases) in Nigeria,
CNTP=Covid-19 total positives (or confirmed cases) in Nigeria,
CNTR=Covid-19 total recovers (or discharged cases) in Nigeria,
CNNR=Covid-19 new recovers (or discharged cases) in Nigeria,
CNTF=Covid-19 total fatalities (or death cases) in Nigeria,
CNNF=Covid-19 new fatalities (or death cases) in Nigeria.

Results and Discussion

Descriptive Analysis

Reported in Table 1 is the descriptive statistics of the variables of study over the 30-week study period. The Table indicates an average weekly stock market capitalization to be ₦12.56trillion, with an associated minimum value of ₦10.99trillion and the maximum is ₦13.75trillion. The series is negatively skewed with a coefficient of -0.760156. With a kurtosis (2.574490) of roughly of 3, the distribution is mesokurtic, thus can be considered to be normally distributed. The formal test of normality by way of Jarque-Bera (3.115507) with p-value (0.210609) higher than the ideal p-values of 1%, 5% and 10%, confirms the normality of market capitalization over the study period. The series is considered to be fairly stable over the period, this is because its standard deviation (0.744866) does not exceed its mean value (12.65990). The weekly average number of new death cases (fatalities) (CNNF) is about 37, and ranges between 0 and 100 cases in the study period. 491 is the average number of total weekly fatal cases (CNTF), with an associated minimum and maximum of 1 and 1108 respectively. Both series (CNNF and CNTF) are widely dispersed, considering their respective standard deviations (28.80894 and 424.9488) which exceed their averages (36.9000 and 490.7667). Furthermore, according to the descriptive statistics, the weekly average number of new positives (confirmed cases) of COVID-19 (CNNP) and total positive cases (CNTP) stands at around 1944 and 23,331 respectively. While both new positive cases and total positive cases are having a minimum of 1 case each, their respective maximums are 4593 and 58324. Just like MCAP, CNNF and CNTF, both variables (CNNP and CNTP) do no exhibit wide dispersion, this is because of standard deviation (1502 and 22105) lie below their respective mean values (1944 and 23,331). With 0 minimum case for each, the new weekly recover cases (CNNR) and total weekly recover cases (CNTF) are highest with maximum cases of 13,633 and 49794 respectively. The mean value for CNNR and CNTR are 1660 and 14567 respectively. Unlike, CNNP and CNTP, CNNR and CNTF are widely dispersed considering their standard deviation value exceeding their mean value over the study period.

Table 1: Descriptive Analysis

	MCAP	CNNF	CNTF	CNNP	CNTP	CNNR	CNTR
Mean	12.65990	36.90000	490.7667	1944.133	23330.93	1659.833	14566.80
Median	12.91650	32.50000	437.0000	1898.000	16850.50	1090.500	5537.500
Maximum	13.75500	100.0000	1108.000	4593.000	58324.00	13633.00	49794.00
Minimum	10.99400	0.000000	0.000000	1.000000	1.000000	0.000000	0.000000
Std. Dev.	0.744866	28.80894	424.9488	1501.699	22104.97	2543.087	17606.29
Skewness	-0.760156	0.322662	0.151414	0.229660	0.345124	3.626173	0.887260
Kurtosis	2.574490	1.972143	1.402045	1.806083	1.501217	17.64146	2.177168
Jarque-Bera	3.115507	1.841169	3.306456	2.045515	3.403492	333.7111	4.782464
Probability	0.210609	0.398286	0.191431	0.359602	0.182365	0.000000	0.091517

Source: Authors' computation.

Stationarity Analysis

Stationarity test/analysis becomes imperative because of the nature of the time series nature of the data. Although, time series data are assumed to be stationary but in reality they may not be, so as to avoid spurious regression, the augmented Dickey-Fuller (ADF) unit test was conducted based on null hypothesis of no unit root in the variables. As reported in Table 2, COVID-19 new fatalities (CNNF) and COVID-19 new positives (confirmed cases) and

COVID-19 total recovers (discharged cases) (CNTR) are not stationary until after first difference. All other variables (MCAP, CNNR, CNTF, and CNTP) are stationary at level form. Thus, the variables are of mixed orders of integration, one and zero. In other words, the variables are integrated of orders one and zero.

Table 2: Augmented Dickey-Fuller (ADF) Unit Root Test

Variables	ADF	P-value	I(d)
MCAP	-3.094158	0.0395**	I(0)
CNNF	-9.308471	0.0000***	I(1)
CNNP	-6.208534	0.0000***	I(1)
CNNR	-3.838107	0.0068***	I(0)
CNTF	-3.302677	0.0898*	I(0)
CNTP	-3.514880	0.0578**	I(0)
CNTR	-3.815769	0.0074*	I(1)

Source: Authors' computation.
Note: Stationary at ***, **, and * 1%, 5% and 10% respectively.

Cointegration Analysis

This analysis was carried to determine whether there is a long run relationship among the variables, which are of mixed orders of integration. The ARDL Bounds test is considered suitable because of the mixture of orders of integration. The test result reported in Table 3 shows that since the t-statistic value (5.268224) exceeds all the critical values at the three ideals levels of significant at the upper bounds (3.99, 2.94 and 3.28); the null hypothesis of no levels relationship among the variables, is rejected at all the levels of significance. This implies the existence of a long run relationship between COVID-19 and stock market capitalization in Nigeria in the study period.

Table 3: F-Bounds Test

Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	5.268224	1%	2.88	3.99
K	6	5%	2.27	3.28
		10%	1.99	2.94

Source: Authors' computation.

ARDL Regression Analysis

The results of the ARDL regression analysis in reported in Table 4 indicate that generally, except for discharged (or recovers) cases (both total and new) which are positively signed with stock market capitalization, all positive (confirmed) cases and fatalities (death cases) both in their new and total forms are negatively signed with stock market capitalization in Nigeria. While other COVID-19 measures (CNNF, CNNP, CNNR and CNTR) are not statistically significant; however, total fatalities (CNTF)and total positives (confirmed cases) (CNTP) are statistically significant in explaining the reduction in stock market capitalization in Nigeria. The model's coefficient of determination is 0.946684 which means about 95% of the variation in the dependent variable is explained by independent variables which state that the model is a good fit. There is little or no serial correlation in residuals in the model, since its Durbin-Watson statistic (2.186988) is slightly above 2.

Table 4: ARDL Long-Run Estimates

Dependent Variable: LOGMCAP				
Method: ARDL				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGMCAP(-1)	0.403106	0.122259	3.297162	0.0038*
LOGCNNF	-0.005337	0.010997	-0.485337	0.6330
LOGCNNP	-0.006708	0.012637	-0.530815	0.6017
LOGCNNR	0.000475	0.007270	0.065267	0.9486
LOGCNTF	-0.116450	0.030292	3.844206	0.0011*
LOGCNTP	-0.108174	0.032066	-3.373513	0.0032*
LOGCNTR	0.016340	0.021208	0.770439	0.4505
Constant	1.805300	0.325403	5.547899	0.0000*
R-squared	0.946684			
Adjusted R-squared	0.927042	Durbin-Watson stat		2.186988

F-statistic	48.19544	Prob(F-statistic)	0.00000

Source: Authors' computation.

Furthermore, the ARDL error correction regression results in Table 5, reveal that the error correction term (ECT) coefficient (-0.596894) is negatively signed and statistically significant at 1%, given its p-value (0.0000). This further buttresses the long run estimates reported in Table 4. Therefore, the disturbance to the model is dynamically corrected at an adjustment rate of 59.7% per week. This is a very high speed of error correction of the estimated ARDL model.

Table 5: ARDL Short Run and Error Correction Regression Estimates

Dependent Variable: D(LOGMCAP)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT	-0.596894	0.078598	-7.594287	0.0000
R-squared	0.665995			
Adjusted R-squared	0.665995			
Durbin-Watson stat	2.186988			

Source: Authors' computation.

Post-Estimation Diagnostics

The post estimation diagnostic tests' results in Table 6, show generally that the model passes normality tests (with J-B's p-value (0.390506) higher than the ideal significance level). The ARDL model is also homoscedastic (Breusch-Pagan-Godfrey test's p-value (0.7591) >1%, 5% and 10%), thus the non-rejection of the null hypothesis of absence of heteroscedasticity. With the Breusch-Godfrey coefficient (0.660145) and an associated high p-value (0.5295), the null hypothesis of absence of serial correlation of error terms in the model cannot be rejected. This implies that the model does not suffer serial correlation problem.

Table 6: Model Diagnostics

Diagnostics	Test	Test Value	Probability	Result
Normality	Jarque-Bera (J-B)	1.880626	0.390506	Normal
Heteroscedasticity	Breusch-Pagan-Godfrey (BPG)	0.586002	0.7591	Homoscedastic
Serial Correlation	Breusch-Godfrey (BG)	0.660145	0.5295	Serial correlation free
Model Stability	CUSUM	Within 5%	$\leq 5\%$	Stable

Source: Authors' computation.

Moreover, the stability of the ARDL model investigated via the CUSUM graph (depicted in Figure 1), shows that the parameters are fairly stable over time. This is because the plot of the graph lies within the 5% critical boundaries, hence the non-rejection of the null hypothesis of parameter stability.

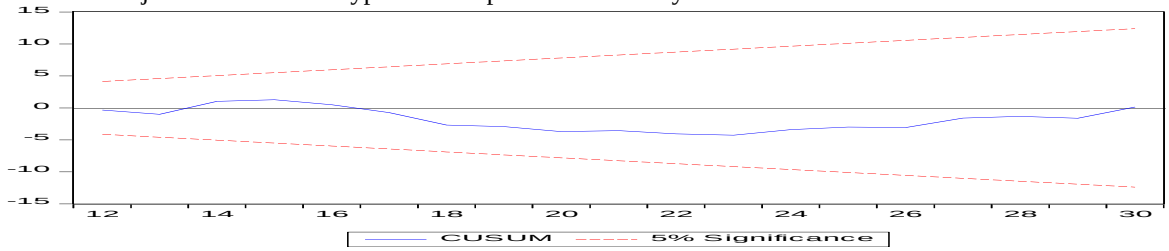

Figure 1: CUSUM Stability Graph

Source: Authors' design.

Conclusion

In a 30-week event study, this study examined the impact of coronavirus disease on stock market capitalization using Nigerian weekly data set. Empirical findings from this study reveal the existence of a long run relationship between coronavirus disease and stock market capitalization in Nigeria. Furthermore, the ARDL analysis shows that except for discharged cases (both total and new) which is positively signed with stock market capitalization, both new and total cases of positives and fatalities are negatively signed with stock market capitalization in Nigeria. Both total fatalities and positives are statistically significant in explaining the reduction in stock market capitalization in Nigeria but other COVID-19 measures are not statistically significant. It can be said therefore that as against the weekly new cases, rather, the cumulative cases of both confirmed positives and death cases actually have the potency of suppressing stock market capitalization in Nigeria.

Recommendations

In the light of the above findings and conclusion:

1. All hands must be on deck to ensure that the virus is short-lived in Nigeria. Therefore, to mitigate the negative impact and to respond to the COVID-19 consequences, government interventions are necessary. Investors boosting campaign, orientation, and public awareness in this time of health pandemic is necessary.
2. Certain palliatives, incentives, programmes targeted at further deepening the stock market is also germane. Future policies affecting the market should envisage and incorporate pandemic mitigating measures.
3. The post-COVID-19 regulatory regime should involve consistent and coordinated policy responses and pronouncement from these regulators and agencies to create considerable effective implementations, which will in turn boost market confidence.

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