Stock Market Development and Inflation Rate in Nigeria

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Abstract

The Nigerian stock market has been adversely affected by persistent high inflation and a volatile business environment, resulting in lower capitalization and activity levels compared to other nations. This phenomenon poses a challenge to the economy in attaining a delicate equilibrium between fostering stock market expansion and upholding steady inflation levels, thereby establishing a conducive atmosphere for investment. This study thereby investigates the role of stock market development in ensuring price stability over the periods of 1985 to 2020. The ARDL bound testing approach was used to estimate the regression of inflation on stock market development indices such as market capitalization, stock traded and all share index. The study found that stock market is one of the key factors responsible for price instability in the short run, although, stock market does not have a significant link with inflation in the long run. There is need for authority to develop and implement short-term price stabilization policies that focus on mitigating the impact of stock market fluctuations on essential goods and services. These measures may include the use of market circuit breakers, price controls on critical commodities, and enhanced market surveillance to curb speculative activities. Also, they should continue to prioritize sound monetary and fiscal policies aimed at controlling inflation over extended periods.

Keywords: Market capitalization, stock traded, all share index, price stability, ARDL.

1. Introduction

Stock market development and its relationship with the inflation rate represent a critical nexus in the Nigerian economic landscape. In recent years, Nigeria has witnessed notable fluctuations in its inflation rate, with an annual average inflation rate of approximately 12.11% from 2016 to 2020 (World Bank, 2021). This elevated inflationary environment raises concerns about its potential repercussions on the nation's stock market, which is regarded as a pivotal source of capital for economic growth (Beck et al., 2000). Furthermore, the Nigerian stock market has experienced periods of growth and contraction, exhibiting a significant degree of volatility in its performance (Adebiyi *et al.*, 2019).

The stock market is suffering as a result of the country's persistent economic problems, such as rising inflation and an unstable business climate. The market does not reflect the enormous potential of the local economy, according to analysts (Oji, 2022). The market capitalization is only $56.6 billion, which is only 13% of the GDP, and there are only 177 listed enterprises (Central Bank of Nigeria, 2021). In comparison, the Johannesburg Stock Exchange has over 370 listed businesses with a total capitalization of $1.06 trillion, or about 235% of the country's GDP (World Bank, 2021). When compared to the New York Stock Exchange, which has over 2,000 listed businesses and a market capitalization of roughly $21 trillion, the amount of activities at the Nigerian market is negligible (World Bank, 2021). The expansion of the Exchange's menu of available asset classes to include exchange-traded funds is indicative of the extraordinary success made in developing Nigeria's capital market. South Africa, Egypt, Morocco, and Kenya are home to the continent's four most liquid stock markets by market capitalization. In terms of total market capitalization, they all rank above the Nigerian Exchange Limited. Although the management of the Nigerian Exchange Limited has worked to increase liquidity and make the Nigerian market more competitive internationally, it still lags behind other markets (Oji, 2022).

The central issue at hand is the complex and multifaceted relationship between stock market development and inflation rate in Nigeria. Prior research offers diverse perspectives on this relationship. Some studies suggest that an inflationary environment can have adverse effects on stock market performance by eroding the real returns on investments (Hussain and Abubakar, 2021). Conversely, others argue that a well-

developed stock market can serve as an effective hedge against inflation (Obamuyi and Oyinlola, 2017). As Nigeria continues to grapple with both high inflation and aspirations for a robust stock market, it is imperative to gain a deeper understanding of the mechanisms at play and their implications.

While existing literature has explored this relationship, the complexities and dynamics in Nigeria's economic context necessitate a comprehensive investigation. With the stock market playing a pivotal role in capital mobilization and economic development, and inflation remaining a persistent challenge, there is a pressing need for a paper that synthesizes empirical evidence and advances a nuanced understanding of how stock market development and inflation interact in the Nigerian context. This study fills this research gap, employing autoregressive distributed lag (ARDL) estimator to inform policy decisions and investment strategies regarding the nexus between stock market development and inflation in Nigeria from 1985 to 2020.

In the following sections, the study reviewed some of the theoretical and empirical literature that is relevant to stock market development and inflation. The model, data, and estimation methods are presented in Section 3. The findings are presented and discussed in Section 4, and the study concludes and proffers policies in Section 5.

2. Literature Review

The economic inquiry into the links between inflation rate and stock market returns is founded upon two opposing theories, namely the Fisher hypothesis and the Fama Proxy hypothesis (Fisher, 1930; Fama, 1981). The theoretical underpinning of the discourse is rooted in the declaration on equity equities by Fisher (1930). According to Fisher (1930), the generalized Fisher hypothesis posits that equity equities can be considered as claims on the tangible assets of a company, hence potentially functioning as a safeguard against inflation. If this assertion holds true, investors have the potential to divest their financial assets in favour of tangible assets during periods of significant anticipated inflation. According to Ioannides, Katrakilidis, and Lake (2005), in a given scenario, it is expected that stock prices, when expressed in nominal terms, will accurately incorporate anticipated inflation. Furthermore, the association between these two variables is anticipated to exhibit a positive correlation prior to their occurrence. Consistent with

Lawal (2016), the notion that the stock market functions as a hedge against inflation implies that investors receive full compensation for the increase in the overall price level through matching increments in nominal stock market returns. Consequently, the real returns stay unaltered.

Empirically, the study conducted by Omotor (2010) examines the links between stock market returns and inflation in Nigeria throughout the time span of 1985 to 2008, utilizing both monthly and quarterly data. The study discovered that there was a potential correlation between stock market results and the ability to mitigate the impact of inflation in Nigeria. The relationship between inflation and stock prices can be elucidated by the Fisher (1930) hypothesis, which posits a significant and positive correlation. This suggests that investors should consider regarding equities as long-term assets in order to mitigate the impact of inflation on their purchasing power, thereby making sound portfolio decisions. Ibrahim and Agbaje (2013) investigate the enduring associations and dynamic interconnections between stock returns and inflation in Nigeria. They employ a dataset comprising monthly observations of the All Share Price Index from the Nigerian Stock Exchange and the Nigerian Consumers Price Index, spanning from January 1997 to 2010. The Autoregressive Distributed Lag (ARDL) bound test was utilized as the analytical technique. The findings indicate the presence of a long-term association between stock returns and inflation. The analysis of the short-run dynamic model also indicates that the rate at which the system approaches equilibrium is moderate, suggesting the existence of a short-run association between stock returns and inflation. This phenomenon can be attributed to the observed volatility in stock values over a period of time.

Tarza-Sokpo, Iorember, and Usar (2017) conducted an investigation of the impact of inflation on stock market returns inside the Nigerian stock exchange market. To analyze this relationship, they employed a volatility modelling approach. The study utilized monthly data on stock market returns and consumer price index inflation rate to conduct an analysis, employing GARCH and E-GARCH volatility modeling methodologies. The research findings indicate that Consumer Price Index (CPI) inflation does not possess significant explanatory power in relation to the volatility of stock market returns in Nigeria. The E-GARCH model did not detect any presence of asymmetry in the stock return series, indicating that both

positive and negative news had an equal impact on stock returns in Nigeria. The GARCH model exhibits a notable degree of persistence in the series of stock returns, despite the fact that a shock to stock returns has a transient effect.

The study conducted by Usman and Adejare (2013) investigates the impact of inflation on the performance of the capital market in Nigeria, focusing on the time frame spanning from 1970 to 2010. The findings from the multiple regression analysis indicate that inflation explains 18.2% of the variability in the impact of capital market performance. The impact of inflation on the performance of the Nigerian capital market has a limited degree of strength. All of the indicators of the stock market had a negative correlation with inflation, with the exception of market volume. This finding deviated from the anticipated outcome, as it demonstrated a positive association between inflation and market volume. Hence, it may be inferred that there exists an inverse correlation between inflation and the performance of the capital market.

Okechukwu *et al.* (2019) utilized GARCH (1.1) methodologies to assess the presence of elevated volatility in stock market returns and examine the influence of currency rate, interest rate, and inflation on stock market returns in Nigeria. The researchers employed a dataset of monthly series data spanning from 1995 to 2014. The stock market's ability to effectively mobilize financial resources from surplus units to deficit units may be impeded by excessive volatility, potentially leading to a financial crisis. The results indicate that there exists an inverse correlation between interest rates and stock market returns, although there is a positive correlation between inflation rates and exchange rates with stock market returns. Therefore, it may be concluded that the Nigerian stock market returns exhibit a significant and enduring level of volatility. The volatility of stock market returns in Nigeria is substantially influenced by the exchange rate, interest rate, and inflation.

In a recent study conducted by Alqaralleh (2020), the relationship between stock market returns and inflation in the G7 countries was examined. The study utilized a nonlinear autoregressive distributed lag (ARDL) model to re-evaluate existing data. The findings revealed that during expansionary periods, stock market returns had a greater increase compared to contractionary periods. This observation provides support for the Fisher effect, which suggests that inflation has a positive impact

on stock market returns. In addition to providing support for the Fisher hypothesis, Kwofie and Ansah (2018) conducted a study investigating the impact of inflation on stock market returns in Ghana. Their findings revealed a positive and enduring association between inflation and stock market returns.

Jelilov *et al.* (2020) investigate the relationship between stock market returns and inflation rate in Nigeria, taking into consideration the impact of the novel Corona virus (COVID-19) pandemic. The objective of this study is to investigate the relationship between stock market returns and inflation, as proposed by the Fisher (1930) hypothesis, and the opposite relationship as suggested by the Fama (1981) proxy hypothesis. This study utilizes the GARCH (1,1) and GJRGARCH models, along with accounting innovation tests, to analyze daily data spanning from February 27, 2020 to April 30, 2020. This time period encompasses the announcement of the first COVID-19 index case in Nigeria up until the most recent month for which inflation rate data is available. The findings from the GARCH (1,1) and GJRGARCH models indicate that there is a positive relationship between the volatility of stock market returns and both the inflation rate and the number of COVID-19 cases. The GJRGARCH model's results demonstrate that the leverage effect confirms the impact of a negative shock caused by the increasing number of COVID-19 infections. This leads to heightened volatility and disrupts the previously observed positive correlation between inflation and stock market returns. Consequently, these findings contradict the Fisher hypothesis and support the Fama Proxy Hypothesis. Furthermore, the findings from the analysis of the impulse response and the forecast error variance decomposition suggest that there is a negative relationship between stock market returns and the shock caused by COVID-19 throughout the duration of the study. The efficacy of the response, over time, demonstrates a progressive nature. This implies that the adverse impact of COVID-19 on market returns and its disruption to the relationship between stock market returns and inflation is not expected to dissipate quickly, given the uncertain duration of the pandemic.

3. Methodology

The study adapts and modifies the models of Owusu (2018) and Offum and Ihuoma (2018) to investigate the impact of stock market development on inflation in Nigeria. The model specifies inflation rate

(*inf*) as a function of stock market development indices such as market capitalization to GDP (*mcap*), stock traded value to GDP (*sttrd*) and all share index (*asi*); including other controlling variables like capital investment (*inv*), financial sector development proxy by domestic credit to private sector by banks to GDP (*fsd*), trade openness (*topen*), income per capita (*gdppc*), unemployment rate (*unemp*). Consequently, the model is stated functionally as:

$$\inf_t = f(smd_t, inv_t, fsd_t, topen_t, gdppc_t, unemp_t) \quad (1)$$

In mathematical form, it becomes:

$$\inf_t = \gamma_0 + \Phi smd_t + \gamma_1 inv_t + \gamma_2 fsd_t + \gamma_3 topen_t + \gamma_4 gdppc_t + \gamma_5 unemp_t + \nu_t \quad (2)$$

Where: *inf* is inflation; *smd* is a vector of stock market development indices like market capitalization to GDP (*mcap*), stock traded value to GDP (*sttrd*) and all share index (*asi*); *inv* represents capital investment measured by gross fixed capital formation to GDP; *fsd* is financial sector development proxy by domestic credit to private sector by banks to GDP; *topen* is trade openness; *gdppc* denotes gross domestic product (GDP) per capita growth; *unemp* denotes unemployment rate; $\gamma_0, \Phi, \gamma_{1-5}$ are parameters; *t* denotes time; and ν is error term.

As to the a'priori expectation, stock market development is expected to curtail the incessant increase in price of goods and services as it provides alternative source of capital for firms to conduct their businesses at a low cost rate. Similarly, an increase in capital is expected to have a negative relationship with general price level of a country. More so, output growth and financial sector development are expected to have an indirect relationship with the country's inflation. As output and domestic credit to private sector increases, there is high chance of more funds at low interest rate for businesses to thrive in the country. If there is high employment rate in an economy, it is expected to lessen inflation. Also, trade openness is expected to have an indirect relationship with inflation.

The study used the augmented Dickey Fuller and Phillip-Perron to test the unit root of the variables. Afterwards, the autoregressive distributed lag (ARDL) was used to estimate the short-run and long-run estimates of the existing relationship between stock market development and economic performance. Three advantages for using this method are

stated as: (a) small sample data (b) variables with mixed stationarity level either I(0) or I(1) and (c) both long- and short-run estimates can be derived simultaneously. The lag length is selected using the Akaike information criteria (AIC) (Shahbaz *et al.*, 2013). The calculated F-statistic value is used to make the decision about the cointegration. The significance of our calculated value is compared with the two tabulated values (upper bound and lower bound) computed by Narayan (2004). The decision criteria support cointegration if the calculated value is greater than the upper bound value; no cointegration if the value is lesser than the lower bound value; and inconclusive if the value lies between the two bounds values.

Furthermore, the data spans for the period 1985 to 2019. The study uses secondary type of time series data for the variables, inflation rate, market capitalization, stock traded value, all share index, capital investment, financial sector development, and trade openness that were obtained from the Statistical Bulletin and Annual Report of the Central Bank of Nigeria (CBN) 2021 and World Bank Development Indicators 2021.

4. Results and Discussion

4.1 Preliminary analysis

The summary statistics revealing the mean, standard deviation, skewness and peakedness of the relationship between stock market development and inflation in Nigeria is presented in Table 1. The table shows that the mean of inflation is 19.18%. Correspondingly, the table revealed its maximum value to be 72.84% and minimum value to be 5.39%. The average value of inflation rate is high as it stood at a double digit. As for stock market development indicators, the average values of market capitalization and stock traded, all in the percentage of GDP are 11.78%, and 0.84% respectively. Also, their maximum values are 38.01% and 4.203% whereas the minimum values are at 3.09% and 0.041% correspondingly. The mean value of all share index stands at 17,257.12. Its respective maximum value is 57,990.2 while the minimum value is 127.3. In addition, the average values of domestic credit to private sector by banks to GDP, total trade to GDP and domestic investment to GDP are 9.54%, 34.27% and 31.1% respectively. Likewise, their maximum values are 19.6%, 53.28% and 54.95% whereas the minimum values are at 4.95%, 9.14% and 14.17% correspondingly.

Table 1: Descriptive Statistics

	inf	*mcap*	*sttrd*	*asi*	*fsd*	*topen*	*inv*
Mean	19.18	11.78	0.842	17257.12	9.538	34.27	31.10
Standard Deviation	17.68	8.385	0.935	15413.76	3.544	10.94	13.14
Kurtosis	2.144	0.960	4.539	-0.448	1.147	-0.078	-1.262
Skewness	1.819	0.986	2.004	0.575	1.102	-0.451	0.255
Minimum	5.388	3.085	0.041	127.3	4.948	9.136	14.169
Maximum	72.84	38.01	4.203	57990.2	19.60	53.278	54.948
Observation	36	36	36	36	36	36	36

Source: Author's computation (2022).

Moreover, the skewness which measures the asymmetry of the distribution of the series around its mean always has a normal distribution at zero. A positive skewness implies that the distribution has a long right tail and a negative skewness implies that the distribution has a long left tail. The outcomes from Table 1 showed that all the variables are positively skewed except for trade openness (which is negatively skewed) thereby implying long right tails. Also, Kurtosis measures the peakedness or flatness of the distribution of the series. If the kurtosis is above three, the distribution is peaked or leptokurtic relative to the normal and if the kurtosis is less than three, the distribution is flat or platykurtic relative to normal. The result from the table indicated that only the value of stock traded to GDP exceeds three which implies peakedness or leptokurtic. As for the other variables, their values fell below three therefore implying flat or platykurtic.

The correlation analyses of the variables are presented in Table 2. The coefficients show that the level of association between the variables used to explain the existing relationship between stock market development and inflation in Nigeria. The results show that market capitalization, stock traded and all share index correlated negatively with inflation rate. Regarding the controlling variables, inflation rate is adversely related with financial sector development and trade openness but directly correlated with investment. It is imperative to note that the correlation coefficients are relatively moderate except for the one showing the relationship among the indicators of stock market development (market capitalization, stock traded and all share index). More so, the correlation coefficients of these controlling variables are equally reported. Consequently, these results are just preliminary analysis subject to

confirmation using the appropriate estimation method to reveal the parameter signs and magnitudes of the variables.

Table 2: Correlation Matrix

	Inf	*mcap*	*sttrd*	*asi*	*fsd*	*topen*	*inv*
inf	1						
mcap	-0.418	1					
sttrd	-0.371	0.812	1				
asi	-0.431	0.968	0.765	1			
fsd	-0.339	0.643	0.630	0.696	1		
topen	-0.080	0.153	0.195	0.131	0.090	1	
inv	0.365	-0.609	-0.658	-0.751	-0.775	-0.285	1

Source: Author's computation (2022).

The study proceeds to present the unit root test results by investigating the stationarity level of the variables. This estimator is used to check for the existence of a unit root i.e. if the variables are not stationary at levels. The estimators used to carry out the test are Augmented Dickey Fuller (ADF) and Phillip-Perron (PP) tests. The ADF and PP results are presented in Table 3.The a'priori expectation while carrying out the ADF and PP tests is that the variable is stationary when the value of the ADF and PP test statistics are greater than the critical value at 5%. From the test results, only financial sector development measured by domestic credit to private sector by banks was found not to accept the null hypothesis "it has unit root test" at 5% level using both ADF and PP estimators. It implies that financial sector development is stationary at levels i.e. the series is integrated at order zero [I(0)]. Other variables such as inflation, market capitalization, stock traded, all share index, trade openness, and investment are stationary at first difference for both unit root estimators.

Table 3: ADF and PP Test Results [Trend and Intercept]

Variables	Augmented Dickey Fuller Test		Phillip-Perron Test		Remarks
	Stat at level	Stat at first diff.	Stat at level	Stat at first diff.	
inf	-2.6321(7) [-3.580]	-4.2478**(8)[-3.5950]	-2.9829(7)[-3.5443]	-6.6223***(2)[-3.5485]	I(1)
mcap	-3.3215*(0)[-3.5443]	-6.3029***(0)[-3.5485]	-3.5443*(1)[-3.5443]	-8.0513***(11)[-3.5485]	I(1)
sttrd	-2.6549(0)[-3.55443]	-6.2382***(0)[-3.5485]	-2.6245(3)[-3.5443]	-6.5693***(3)[-3.5485]	I(1)
asi	-3.4320*(0)[-3.5443]	-6.1785***(1)[-3.5530]	-3.4320*(0)[-3.5443]	-7.7239***(9)[-3.5485]	I(1)
fsd	-3.9980**(1)[-3.5485]	-	-4.3273***(3)[-3.549]	-	I(0)
topen	-2.8449(1)[-3.5485]	-5.2353***(1)[-3.5530]	-2.6092(4)[-3.5443]	-7.9579***(3)[-3.5485]	I(1)
inv	-0.7543(0)[-3.5443]	-6.2791***(0)[-3.5485]	-0.6386(2)[-3.5443]	-6.5354***(6)[-3.5485]	I(1)

Note: ***, ** and * signify significance level at 1%, 5% and 10% respectively.
Sources: Author's computation (2022).

Furthermore, the long-run relationship among the indices of stock market development (market capitalization, stock traded and all share index), inflation and other controlling variables are tested using the autoregrssive distributed lag (ARDL) bound cointegration tests prior to the estimation of both the short-run and long-run parameters. The F-statistics estimate for testing the existence of long-run relationship among stock market development and inflation in Nigeria is presented in Table 4. The table showed that the estimated F-statistics of the normalized equation (F_{arb} = 3.486, 6.958 and 6.075) are greater than the lower and upper critical bound at 5% significance level. This implies that the null hypothesis of no long-run relationship is rejected at 5% significance level. The implication of the above estimation is that stock market development, control variables (such as capital investment, financial sector development, trade openness, income, and unemployment) and inflation, all have equilibrium condition that keep them together in the long-run. Thus, there exists a long-run relationship between stock market development and inflation in Nigeria.

Table 4: Existence of cointegration between stock market development and inflation

Test Statistic	**Value**	**K**
F-statistics (inf| mcap, inv, fsd, topen, gdppc, unemp) ARDL(3, 3, 3, 2, 3, 2, 3)	3.4858	6
F-statistics (inf| sttrd, inv, fsd, topen, gdppc, unemp) ARDL(4, 2, 3, 1, 2, 0, 2)	6.9580	6
F-statistics (inf| mcap, inv, fsd, topen, gdppc, unemp) ARDL(3, 0, 3, 0, 1, 0, 2)	6.0746	6
Critical Value Bounds		
Significance	**I(0) Bound**	**I(1) Bound**
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

Source: Author's computation (2022).

4.2 Short-and long-run estimates of market capitalization and inflation

The study presents the short- and long-run estimates of market capitalization and inflation in Nigeria using the ARDL approach. The estimation outcomes are presented in Table 5.The short-run estimation results show the error correction mechanism which measures the speed or degree of adjustment. It is the rate of adjustment at which the dependent variable changes due to changes in the independent variables. The short run analysis shows the dynamic pattern in the model and to ensure that dynamics of the model have not been constrained by inappropriate lag length specification. The ARDL test automatically choose the lag length on all variables as the model was set at three to ensure sufficient degree of the freedom based on automatic selection of Akaike Information Criterion. The short-run estimate of the relationship between market capitalization and inflation is presented in Table 5. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.7320) implied that the model corrects its short-run disequilibrium by 73.2% speed of adjustment in order to return to the long run equilibrium.

Table 5: Results of estimated ARDL model of market capitalization and inflation

Dependent Variable: Inflation (INF)
Selected Model: ARDL (3, 3, 3, 2, 3, 2, 3)
Sample: 1985 2020 **Included observations:** 33

Short-Run Estimates				
Variables	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(INF(-1))	-0.512313	0.140687	-3.641504	0.0083
D(INF(-2))	-0.846091	0.186984	-4.524931	0.0027
D(MCAP)	0.398083	0.297780	1.336837	0.2231
D(MCAP(-1))	4.290029	0.902947	4.751144	0.0021
D(MCAP(-2))	2.140242	0.648815	3.298693	0.0131
D(INV)	-2.481021	0.810525	-3.061006	0.0183
D(INV(-1))	-2.312703	0.820002	-2.820362	0.0258
D(INV(-2))	-6.040518	1.338627	-4.512473	0.0028
D(FSD)	-0.010858	1.233630	-0.008802	0.9932
D(FSD(-1))	-4.043094	1.237365	-3.267503	0.0137
D(TOPEN)	-0.798374	0.200362	-3.984656	0.0053
D(TOPEN(-1))	-0.406337	0.161918	-2.509526	0.0404
D(TOPEN(-2))	-0.481241	0.170573	-2.821315	0.0257
D(GDPPC)	-1.999820	0.446511	-4.478768	0.0029
D(GDPPC(-1))	1.934404	0.660374	2.929255	0.0220
D(UNEMP)	0.428938	0.294998	1.454036	0.1893
D(UNEMP(-1))	-3.403676	0.694382	-4.901730	0.0017
D(UNEMP(-2))	-1.202630	0.429193	-2.802076	0.0264
ECT(-1)	-0.731952	0.098010	-7.468153	0.0001
Long-run Estimates				
MCAP	-4.431788	3.344460	-1.325113	0.2267
INV	3.987509	1.251377	3.186497	0.0154
FSD	12.76721	7.523124	1.697063	0.1335
TOPEN	-2.469910	1.077849	-2.291518	0.0557
GDPPC	-5.834354	1.717949	-3.396116	0.0115
UNEMP	6.730624	2.835343	2.373831	0.0493
C	-155.9212	77.87718	-2.002142	0.0853

Adj. R-squared	0.7811	**F-stat**	5.5666
D-Watson	2.0140	**Prob(F-Statistics)**	(0.0128)

Diagnostic Tests of Selected ARDL Model

Serial Correlation: 1.5111 [0.3067] **Normality Test:** 0.8553 [0.6520]
Functional Form: 0.6072 [0.7549] **Heteroskedasticity Test:** 0.5395 [0.8791]

Source: Author's computation (2022).

The coefficient of the short-run lag one of change in inflation has negative and significant impact on the current changes in inflation at 5%. This means that the previous rate of price of goods and services accounts for the present level of living cost in Nigeria. The short-run parameter estimates of market capitalization at lag 1 and 2 were found to be positive and significant at 5%. This indicates that market capitalization contribute to increasing inflation in the short run. However, the coefficient of investment, financial sector development and trade openness were negative and statistically significant at 5%. Thus, investment, domestic credit to private sector by banks and trade openness affect inflation negatively in the short run. The current and first lag of income per capita have indirect and direct effect on inflation at 5% significance level respectively. As for unemployment, the first and second lags exact negative impact on inflation while the current level reported positive impacts.

Concerning the long run estimates, Table 5 indicated that market capitalization has negative and insignificant impact on inflation in Nigeria. This does not corroborate the a'priori expectation. Also, income per capita and trade openness have negative impact on inflation. It implies that the coefficient of the former was significant at 5% while that of the latter was significant statistically at 10%. On the contrary, capital investment and financial sector development and unemployment positively impacted on inflation in Nigeria for the periods understudy. In magnitude terms, a 1% increase in capital investment and financial sector development and unemployment will cause an increase in inflation 3.99%, 12.77% and 6.73% respectively. Only the parameter estimate of investment and unemployment are significant statistically at the conventional level.

The coefficient of determination (Adjusted-R^2) is high (78.11) indicating that about 78.11% of the total variation in inflation was explained by the variables in the model. It simply indicated that the variation of changes in inflation was explained by 78.11% variations in market capitalization and other controlling variables. The overall test using the F-statistic (5.567) is statistically significant at 5% level of significance showing that model is well specified and statistically significant. The Durbin Watson statistic (2.0140) shows that there is absence of serial autocorrelation in the model.

The estimated ARDL model is tested for heteroscedasticity, serial correlation, functional form misspecification, parameter stability and normality. The results from these tests are shown in Table 5. The estimated ARDL model revealed that the model passed the serial correlation, normality test, and heteroskedasticity test. It means that the error terms are normally distributed with same variables and they are not serially correlated. Also, the Ramsey RESET test was satisfactory for the ARDL model indicating that the model is well distributed. Besides, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) respectively presented in Figures 1(a-b) are stable.

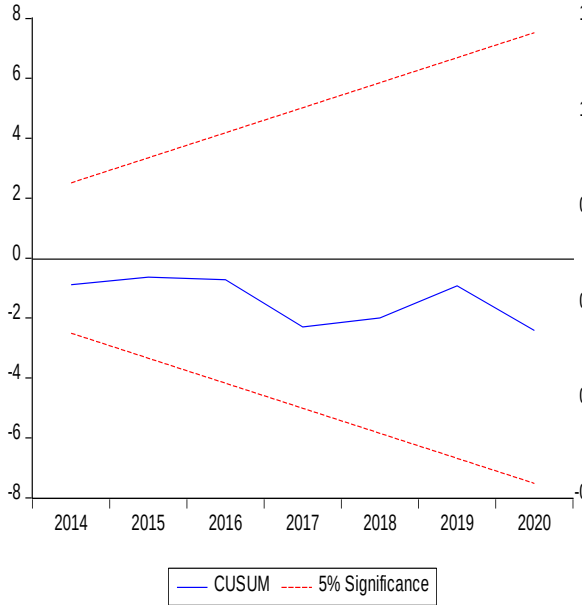

Figure 1a: Cumulative sum

Figure 1b: Cumulative sum of squares

4.3 Short- and long-run estimates of stock traded and inflation

The short-run and long-run estimates of stock traded and inflation rates in Nigeria using the ARDL approach are presented in Table 6. The short-run estimation results show the error correction mechanism which measures the speed or degree of adjustment. The ARDL test automatically choose the lag length on all variables as the model was set at three to ensure sufficient degree of the freedom based on automatic selection of Akaike Information Criterion. The short-run estimate of the relationship between stock traded and inflation is presented in Table 6. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.6308) implied that the model corrects its short-run disequilibrium by 63.1% speed of adjustment in order to return to the long run equilibrium.

The coefficients of the short-run lag one of change in inflation at lag 2 and 3 have negative and positive impact on the current changes in inflation respectively. The parameter estimates are significant at 5% level. The short-run parameter estimate of stock traded at lag one was found to have positive and significant impact on inflation while the current level of inflation was negative but not significant at 5% level. Capital investment at current level, lag one and two has an indirect effect on inflation which are significant statistically at 5% and 10%. Meanwhile, financial sector development negative influence on inflation is insignificant statistically at 5%. As for unemployment and trade openness, their current values exact positive impact on inflation while the lag one values reported significant negative impacts at 5% level.

Table 6: Results of estimated ARDL model of stock traded and inflation

Dependent Variable: Inflation (INF)
Selected Model: ARDL(3, 3, 3, 2, 3, 2, 3)
Sample: 1985 2020 **Included observations:** 33

Short-Run Estimates				
Variables	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(INF(-1))	0.129685	0.082173	1.578186	0.1428
D(INF(-2))	-0.456745	0.086831	-5.260185	0.0003
D(INF(-3))	0.274479	0.075278	3.646222	0.0038
D(STTRD)	-0.268715	1.497352	-0.179460	0.8608
D(STTRD(-1))	8.187476	2.599864	3.149194	0.0093
D(INV)	-2.877157	0.436535	-6.590898	0.0000
D(INV(-1))	-0.888179	0.462455	-1.920575	0.0811
D(INV(-2))	-4.181465	0.661742	-6.318876	0.0001
D(FSD)	-0.113616	0.703481	-0.161505	0.8746
D(TOPEN)	0.141442	0.162998	0.867753	0.4041
D(TOPEN(-1))	-0.425145	0.130800	-3.250336	0.0077
D(UNEMP)	0.468970	0.222687	2.105962	0.0590
D(UNEMP(-1))	-1.191855	0.335976	-3.547443	0.0046
ECT(-1)	-0.630761	0.066090	-9.543914	0.0000
Long-run Estimates				
STTRD	-8.843263	9.441942	-0.936594	0.3691
INV	2.057958	0.826060	2.491295	0.0300
FSD	2.731741	2.936318	0.930329	0.3722
TOPEN	-0.946623	0.796491	-1.188492	0.2597
GDPPC	-4.324237	1.331166	-3.248458	0.0078
UNEMP	3.712002	1.892656	1.961266	0.0757
C	-70.48232	47.73437	-1.476553	0.1678

Adj. R-squared	0.8582	**F-stat**	10.3766
D-Watson	1.9867	**Prob(F-Statistics)**	(0.0002)

Diagnostic Tests of Selected ARDL Model

Serial Correlation: 2.0875 [0.3067] **Normality Test:** 0.8865 [0.6420]

Functional Form: 1.0875 [0.1800] **Heteroskedasticity Test:** 0.5395 [0.8791]

Source: Author's computation (2022).

The long-run estimates in Table 6 indicated that total value of stock traded and trade openness have positive and insignificant impact on inflation in Nigeria. This does not corroborate the a'priori expectation. Meanwhile, real income per capita negatively and significantly influences inflation in Nigeria at 5% level. A 1% change in total value of stock traded, trade openness and real income per capita influence inflation adversely by 8.84%, 0.95% and 4.32% respectively. On the contrary, capital investment, financial sector development and unemployment rate positively impacted on inflation in Nigeria for the periods understudy. Also, on magnitude basis, 1% increase in capital investment, financial sector development and unemployment rate will cause a rise in inflation by 2.06%, 2.73% and 3.71% respectively. Only the parameter estimate of investment is significant statistically, while the coefficient of unemployment rate is at 10%.

The coefficient of determination (Adjusted-R^2) is high (85.82%) indicating that about 85.82% of the total variations in inflation was explained by the variables in the model. It simply indicated that the variation of changes in inflation was explained by 85.82% change in total value of stock traded and other controlling variables. The overall test using the F-statistic (10.38) is statistically significant at 5% level of significance showing that model is well specified and statistically significant. The Durbin Watson statistic (1.9867) shows that there is absence of serial autocorrelation in the model.

Besides, the estimated ARDL model is tested for heteroscedasticity, serial correlation, functional form misspecification, parameter stability and normality. The results from these tests are shown in Table 6. The estimated ARDL model revealed that the model passed the serial correlation, normality test, and heteroskedasticity test. It means that the error terms are normally distributed with same variables and they are not serially correlated. Also, the Ramsey RESET test was satisfactory for the ARDL model indicating that the model is well distributed. As well, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) respectively presented in Figures 2(a-b) are stable.

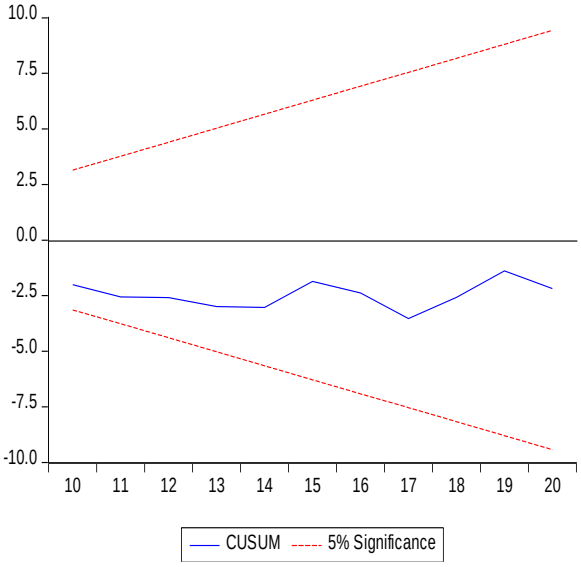

Figure 2a: Cumulative sum

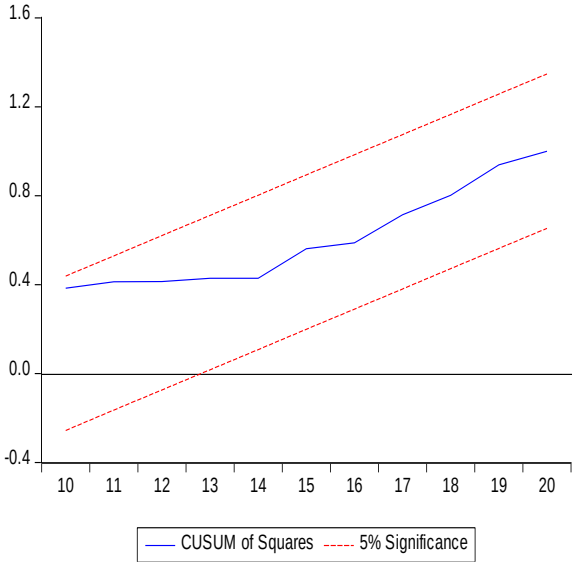

Figure 2b: Cumulative sum of squares

4.4 Short- and long-run estimates of all share index and inflation

The short-run and long-run estimates of all share index and inflation using the ARDL are presented in Table 7.The short-run estimation results show the error correction mechanism which measures the speed or degree of adjustment. It is the rate of adjustment at which the dependent variable changes due to changes in the independent variables. The ARDL test automatically choose the lag length on all variables as the model was set at three to ensure sufficient degree of the freedom based on automatic selection of Akaike Information Criterion. The short-run estimates of the relationship between all share index and cost of living are presented in Table 7. The coefficient of the ECT is found to be negative and statistically significant at the conventional level. The ECT value (-0.5029) implied that the model corrects its short-run disequilibrium by 50.29% speed of adjustment in order to return to the long run equilibrium.

Table 7: Results of estimated ARDL model of all share index and inflation

Dependent Variable: Inflation (INF)
Selected Model: ARDL(3, 0, 3, 0, 1, 0, 2)
Sample: 1985 2020 **Included observations:** 33

Short-Run Estimates				
Variables	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(INF(-1))	-0.233709	0.104100	-2.245056	0.0384
D(INF(-2))	-0.380161	0.095366	-3.986312	0.0010
D(INV)	-2.848375	0.470370	-6.055604	0.0000
D(INV(-1))	-2.874858	0.510910	-5.626938	0.0000
D(INV(-2))	-3.270557	0.741909	-4.408297	0.0004
D(TOPEN)	-0.687274	0.184752	-3.719975	0.0017
D(UNEMP)	0.845431	0.298020	2.836826	0.0114
D(UNEMP(-1))	-0.656698	0.303243	-2.165585	0.0449
ECT(-1)	-0.502855	0.060710	-8.282945	0.0000
Long-run Estimates				
ASI	-0.000384	0.000396	-0.969153	0.3461
INV	2.364829	1.028268	2.299817	0.0344
FSD	-0.308773	1.392016	-0.221817	0.8271
TOPEN	-3.011860	1.279818	-2.353350	0.0309
GDPPC	-4.039437	1.436007	-2.812964	0.0120
UNEMP	5.581255	2.584002	2.159927	0.0454
C	-0.524172	40.51753	-0.012937	0.9898

Adj. R-squared	0.8146	**F-stat**	10.3726
D-Watson	2.0252	**Prob(F-Statistics)**	(0.0000)

Diagnostic Tests of Selected ARDL Model

Serial Correlation: 0.6812 [0.5413] **Normality Test:** 1.7474 [0.4174]
Functional Form: 1.8033 [0.1462] **Heteroskedasticity Test:** 0.4988 [0.9082]

Source: Author's computation (2022).

The coefficient of the short-run lag one and two of change in inflation has negative and significant impact on the current changes in inflation at 5% level. This means that the previous rate of price of goods and services depends on the current state of living cost in Nigeria. The short-run parameter estimates of current, first and second lags were found to be negative and significant at 5%, indicating that it influences changes in the inflation in Nigeria. However, the negative coefficient of trade openness is statistically significant at 5%. Trade openness has an adverse effect on inflation in the short run. As for capital investment, the current

value exact positive impact on inflation while the lag one value reported negative impacts on living cost in Nigeria.

The long-run estimates in Table 7 indicated that all share index and financial sector development have negative impact on inflation in Nigeria. They do not corroborate the a'priori expectation and not statistically significant at 5%. However, trade openness and real income per capita growth have negative and significant impact on inflation in the long-run. Thus, a 10% changes in all share index, financial sector development, trade openness and real income per capita impacted adversely on inflation by 0.004%, 3.09%, 30.12%, and 40.39% correspondingly. On the contrary, capital investment and unemployment positively impacted on inflation in Nigeria for the periods understudy. On magnitude basis, a 1% increase in capital investment and unemployment will cause a rise in inflation by 2.37% and 5.58% respectively. Their parameter estimates are significant statistically at 5% level.

The coefficient of determination (Adjusted-R^2) is high (81.46%) indicating that about 81.46% of the total variations in inflation was explained by the variables in the model. It simply indicated that the variation of changes in inflation was explained by 81.46% variations in all share and other controlling variables. The overall test using the F-statistic (10.373) is statistically significant at 5% level of significance showing that model is well specified and statistically significant. The Durbin Watson statistic (2.0252) shows that there is absence of serial autocorrelation in the model.

The estimated ARDL model is tested for heteroscedasticity, serial correlation, functional form misspecification, parameter stability and normality. The results from these tests are shown in Table 7. The estimated ARDL model revealed that the model passed the serial correlation, normality test, and heteroskedasticity test. It means that the error terms are normally distributed with same variables and they are not serially correlated. Also, the Ramsey RESET test was satisfactory for the ARDL model indicating that the model is well distributed. Additionally, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) respectively presented in Figures 3(a-b) are stable.

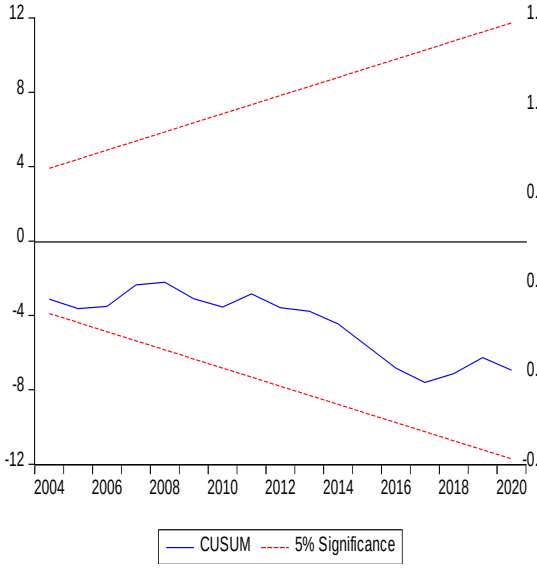

Figure 3a: Cumulative sum

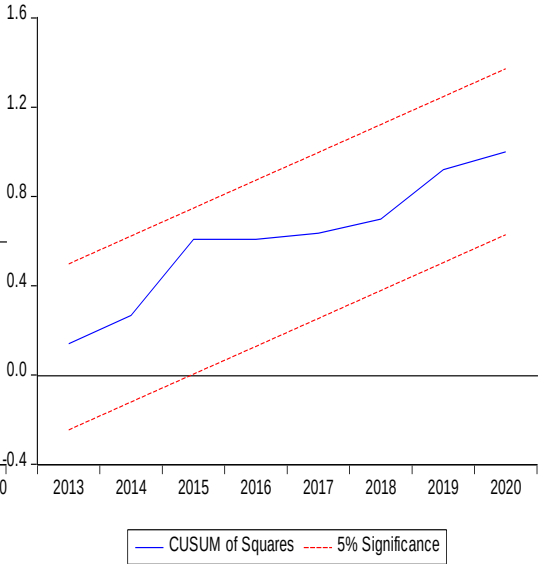

Figure 3b: Cumulative sum of squares

5. Conclusion

The study investigates the effects of stock market development measures (comprising of market capitalization, stock traded and all share index) on inflation in Nigeria from 1985 to 2020. Using the ARDL estimator, the study found that market capitalization positively and significantly impacted on inflation in the short run but the direct link between the variables was established statistically in the long run. Similarly, stock traded had direct link with inflation in the short run, but no statistical significance relationship was reported in the long run. As for all share index, the long run positive impact on inflation was not significant statistically at 5% level. This means that the stock market is one of the key factors responsible for price instability in the short run. Meanwhile, in the long run, stock market does not have a significant link with inflation. Other potential factors that contribute to price instability are inadequate investment and poor domestic credit system while income, trade openness and unemployment act as deteriorating factors of inflation rate.

On the policy front, the study recommends that the government should develop and implement short-term price stabilization policies that focus on mitigating the impact of stock market fluctuations on essential goods

and services. These measures may include the use of market circuit breakers, price controls on critical commodities, and enhanced market surveillance to curb speculative activities. While the study suggests no long-term link between the stock market and inflation, policymakers should continue to prioritize sound monetary and fiscal policies aimed at controlling inflation over extended periods. Maintaining a prudent monetary policy framework, fiscal discipline, and economic diversification efforts can help achieve this goal. Also, there is need for government to strengthen financial market regulations to ensure transparency and fairness in stock trading. Simultaneously, promote investor education programs to enhance market participants' understanding of stock market dynamics and risks. An informed and well-regulated stock market can contribute to reducing short-term price instability.

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