

# LIQUIDITY OF STOCK MARKET AND INFLATION IN NIGERIA

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## **Abstract**

The study investigates the effect of inflation on the liquidity of the Nigerian stock market using annual time series data from 1981 to 2020. The main objective of this study is to examine the impact of inflation on the liquidity of the Nigerian stock market by applying the Fisher Hypothesis and taking cognizance of interest and exchange rates as important control macroeconomic variables. We employed the unit root tests, cointegration and the ARDL Bounds Testing Technique in our econometric processes. The result of the unit root test shows a mixed order of integration. Therefore, we applied the ARDL Bound test in analyzing the series. Our results revealed that inflation rate has a positive and significant effect on Nigeria stock exchange liquidity within the period reviewed, affirming the Fisher hypothesis of 1930. More so, exchange and interest rates are significant with positive and negative impact on the market liquidity. The estimated regression line has a good fit and generally significant, and above all satisfies all the post test of normality, serial correlation, and recursive test of stability. The study recommends that, a reduction of personal income tax be enacted as a law in order to boost savings and investments in the market .

**Keywords:** Stock Market, Fisher hypothesis, Inflation, Liquidity, ARDL Bounds Testing, Nigeria

**JEL Classification:** E31, G10, O16

## **1. INTRODUCTION**

The term liquidity is frequently used loosely, and it is often difficult to disentangle precisely what concept this meant in most situations. From economic postulates, the term has two different meaning, first is monetary related as regards volume of liquid asset in an economy, and second, market related in terms of securities transaction without triggering price changes. Here we are interested in the second aspect of liquidity as relate to stock market. The patterns of financial market liquidity are factored across markets as relates to foreign exchange, equity, fixed income and credit with respect to the dimensions of market liquidity including tightness, depth and resiliency as well as estimates of liquidity premiums (Bank of England, 2007 and Ishioro, 2013a and 2013b). Tightness, is the magnitude of risk premiums required by market-makers for holding inventories of securities, is usually

gauged by the width of bid-ask spreads. Depth and resiliency, is the degree to which trading impacts on asset prices, can be gauged using ratios of price movements to transactions in the relevant markets. And liquidity risk premium, is the compensation required by investors for the risk that attempts to exit positions could be challenged by uncertain market conditions in the future, can be measured using various spreads between securities which are known to have varying degrees of liquidity (Osisanwo and Atanda, 2012).

Daferighe and Charlie (2012), believes stock market to be a common feature of a modern economy given it reputed functions in promoting economic growth and development. Economic institution that enhances capital formation and allocation within an economy, wherein governments and industry can easily raise long-term capital to finance projects, and expansion of industrial related activities.

In the words of Alile (1997), the primary objective of stock market across the globe is maintenance of market efficiency to promote economic growth. In Nigeria, the establishment of the Nigerian Stock Exchange to promote private capital investment for growth and development took place in 1961. And ever since, policy maker and private individual has witnessed the efficacy of the market in living up to its objective of promoting growth and development through capital allocation. Investment in the market is long term in nature and any developmental move that could affect the stability of the polity or economy usually has serious impact on the performance of the stock market and Inflation as one of the major factors that could influence the market performance (Al-Abbadi and Abdul-Khaliq, 2017; Ishioro, 2017; Tripathi and Kumar,2014;Daferighe and Charlie,2012).

Nigeria Stock Exchange is not an exemption and is expected to be influenced by internal and external shocks, which are within and without the realm of capital market. The external shocks are the macroeconomic indicators that are expected to cause variation in the stock prices movement. Maku and Atanda (2009) argued that these changes are often reflected by the magnitude and movement in stock prices, market index and liquidity of the market. For is a known fact that the market liquidity is an important attribute of stock market development (Osisanwo and Atanda, 2012). Corrado and Jordan (2002) identify inflationary rate amongst others as a factor that could influence the market performance ( Ishioro, 2017 and 2015a).

In Nigeria, inflation rates have persistently been two digits and is of great concern for policy makers, investors, analysts and economists. As a macroeconomic factor, it has the capacity of derailing an economy from her macroeconomic objectives. The stock market being an integral part of the economy ( Ishioro, 2013a), invariably be affected by this macroeconomic problem of inflation. The relationship between inflation and stock returns was first defined in the context of the Fisher effect, also known in some literature as the Fisher hypothesis. The Fisher effect is a product of the economic theory by Fisher (1930), who argued that stock prices should be positively related with expected inflation, providing a hedge against rising prices. Contrary to this view, Reilly and Brown (1997) points out that inflation affects the performance of stock markets as it causes differences between real and

nominal interest rates thus changing the spending and saving behavior of consumers and corporations.

However, recent research empirical findings by Daferighe and Charlie (2012); Zhang, (2021); Eldomiatiy, Saeed and Hammam, (2020), established the existence of a negative relationship between stock market performance and inflation, which contradict Fishers' hypothesis, while evidences from Abdullahi and Fakunmoju (2019), Al Oshaibat (2016), and Jepkemei (2017) revealed a positive response of stock liquidation to inflation rate, affirming Fishers' hypothesis. The concern is why the contradiction? Coleman and Tettey (2008) studied the Ghana stock exchange and reported that inflation rate had a negative effect on stock market performance. They further argued that high rates of inflation increase the cost of living and a shift of resources from stock market instruments to consumables hence a reduction in the demand for market instruments. Inflation is therefore expected to have a negative impact on the market index and the performance of the exchange.

In Nigeria, the empirical evidences from above literature established a conflict, lacking a uniform analysis on the relationship between inflation and stock market. More so, they focus on the impact of inflation on stock performance without reviewing the liquidity aspect of the market response to inflation. This is what we address in this study, examining the response of stock market liquidity to inflation variability, responding to the question of what effect does inflation has on the Nigeria stock market liquidity rate?

The study aims at investigating the effect of inflation rate of Liquidity on the Nigeria stock exchange taking interest and exchange rates as control macroeconomic variables in the study.

### **Hypotheses formulated**

The formulated null hypotheses of the study are:

Ho<sub>1</sub> Inflation does not have significant relationship on stock market liquidity.

Ho<sub>2</sub> Interest rate and stock market liquidity does not have significant relationship.

Ho<sub>3</sub> Stock market liquidity does not respond to exchange rate.

## **2. REVIEW OF RELATED LITERATURE**

Volumes of literature has been development on the relationship between inflation and stock market with reference to theories and academic arguments, which ranges from fisher hypothesis, Fisher (1930) hypothesized a positive relationship between stock returns and inflation based on the understanding that assets ought to maintain their values against inflation. The Fisher hypothesis, also known as the Fisher effect, states that nominal asset returns move one-for-one with the expected inflation so that real stock returns are determined by real factors independent of the rate of inflation. Proxy hypothesis, Fama (1981), acknowledged that the negative relationship between inflation and stock returns is puzzling given the accepted

wisdom that common stock, representing ownership of the income generated real assets, should be a hedge against inflation. Inflation illusion hypothesis, Modigliani and Cohn (1979) who asserted that the correlation between inflation rate and stock returns is as a result of inflation Illusion. They attributed the negative relationship to inflation illusion, and thus the use of nominal interest rates by irrational investors to discount real cash flows. Competing theories, Feldstein (1980) attributed the negative relationship between stock returns and inflation to the higher effective rate of tax on corporate income caused by historic-cost depreciation and the tax on the artificial capital gains caused by inflation, which reduce the real net yield that investors receive per unit capital. Feldstein posited that inflation generates artificial capital gains due to the valuation of depreciation and inventories. Fama (1981) argues that taxes could not be responsible for the fall in real share values in the 1960s, when inflation increased in the USA, because the ratio of taxes to gross income does not support this notion. The tax burden model as an explanation of inflation and stock returns relations is much localized and at best explained the specific period which Feldstein sought to review.

However, for the purpose of this study, we adopted the Fisherian hypothesis of 1930, to critically examine the relationship between inflation and stock market liquidity. The prediction that equity will act as an inflation hedge is what constitutes the Fisher effect. The Fisher effect expresses the nominal rate of interest ( $r$ ) as the sum of real rate of interest plus the inflation rate.

Empirically, Daferighe and Charlie (2012), investigated the impact of inflation on stock market performance in Nigeria using time series data for twenty years from 1991 to 2010. They employed the OLS in analyzing the influence of inflation on various measures of stock market performance (market capitalization, total value traded ratio, percentage change in All-share Index and turnover ratio). They established that these measures were negatively related to inflation in convergence to *a priori* expectation except for TOR that positive response to inflation. Also, that the effect of inflation is relatively low between 14.6% and 0.3% on stock market in Nigeria.

In a related development, Al Oshaibat & Majali (2016) decided to clarified the true impact of inflation, interest rates, share liquidity and workers' remittances on stock returns of Amman Stock Exchange (ASE), from 1980 to 2014 using the Vector Autoregressive model, complemented by variance decomposition and Johansen cointegration. They established from their findings that inflation rate and workers remittance positively affected stock liquidity at short and long terms, respectively. Also, interest rate has a negative effect on stock returns of the market, and that stock liquidity responsive effects of workers remittances and interest rate are positive and negative in both periods.

Fapetu, Adeyeye, Seyingbo, & Owoeye (2017), examined the impact of exchange rate on stock market performance using monthly data. They employed four different estimation techniques; Autoregressive Conditional Heteroskedasticity (ARCH), Generalized Autoregressive Conditional Heteroskedasticity (GARCH), Exponential Generalized Autoregressive Conditional Heteroskedasticity

(EGARCH), and Threshold Autoregressive Conditional Heteroskedasticity (TARCH) in their analysis. And they discovered that exchange rate has a positive relationship with market capitalization rate in Nigeria in all cases of the study. However, the study showed that the volatility of variance of the residual across the techniques varies. It was discovered that there is no ARCH effect in the ARCH model, while there is ARCH and GARCH effect in the GARCH model.

Additionally, Eldomiaty et al (2020) examine the effect of inflation and interest rates on stock prices using quarterly data of non-financial firms from 1999 to 2016. They established from their results that there is cointegration among the variables. And that inflation rates positively associated with stock prices, while real interest rates positively associated stock prices. Changes in both inflation and interest rate significantly causes a change in stock market prices with a significant speed of adjustment to long run equilibrium.

Abdullahi and Fakunmoju (2019), examined the effect of market liquidity, inflation, and exchange rates on stock return in Nigerian Stock Exchange market. The researchers used ex-post facto design and employed secondary data subjected to Auto-regressive Distributive Lag (ARDL) bound test method of analysis within the period of twenty-one years. Findings reveal that in the short run, stock turnover, trading volume, exchange, and inflation rates have affected stock return positively and significantly. In the long run, market turnover has a positive effect. However, inflation and exchange rates have affected stock return negatively and significantly. Then, trading volume has a negative but insignificant effect on stock return, which is all at 5 percent level of significance. The researchers concluded that market liquidity, exchange, and inflation rates affect stock return.

Again, from the above literature, we decided to build on the already existing evidences with some degree of deviation, focusing on liquidity of the stock market rather than the stock performance indicator like previous studies in Nigeria.

### **3. METHODOLOGY**

#### **3.1. DATA: NATURE AND SOURCES**

The data used in this study are time series data sourced from the Central Bank of Nigeria Statistical Bulletin 2021 volume. The period of study cover from 1981 to 2020, and the variables considered in the study were selected base on combination approach of variable selection. The variables comprise of dependent and independent variables, wherein the dependent is the stock market liquidity measure by the value of trade share as percentage of market capitalization. And the independent variable are inflation, interest, and exchange rates. Furthermore, to critically examine the true relationship between the variables of interest, we follow Lotto (2002), Ishioro (2020a, 2020b, 2019, 2018, 2017) by converting the indicators to uniform digit, by taking their natural logarithm.

**3.2. SPECIFICATION OF MODEL**

The functional model in this research is adapted from Kahuthu (2017) and Jepkemei (2017) who examined the effect of stock market liquidity on stock return in Kenya. This model is modified to suit the objectives of this study and in line with Fisher hypothesis which predict that equity always reacted to inflation hedge which is the Fisher effect. The Fisher effect expresses the nominal rate of interest (r) as the sum of real rate of interest plus the inflation rate:

$$SML = F(INF, INTR, EXCHR) \tag{1}$$

Where SML is stock market liquidity measure by

INF is inflation rate

INTR and EXCHR are interest and exchange rates, as control macroeconomic variables in the model

The econometric model is given as

$$SML = \alpha_0 + \alpha_1 INF + \alpha_2 INTR + \alpha_3 EXCHR + \varepsilon \tag{2}$$

With  $\alpha_i > 0$  and  $\varepsilon$  as the error term

The above model defines the exact relationship between inflation and stock market liquidity with reference to the Fisher hypothesis. This model is analyzed based on the nature of the time series data collected, which is assumed to have unit root problem. Hence, stationarity test is conducted on the variable data and the outcome of the test define the method of analysis employed for the study. it worth mentioned here that if all the variable data turn stationary at level, the classical least square will be adopted otherwise the Johansen cointegration method will be adopted. But a situation wherein the variables in the above model has a mixed order of integration between zero and one then the Autoregressive Distributed Lag model will be adopted for the study.

**Table 1.** Unit root test

Variables	ADF Statistics	Level Critical Value	1 <sup>ST</sup> Diff. Critical Value	Order of Integration
<b>INF</b>	-2.5970 -7.0012*	-2.9434	-2.9434	I(1)
<b>SML</b>	-5.8994	-2.9411	-	I(0)
<b>INTR</b>	-3.1872	-2.9390	-	I(0)
<b>EXCHR</b>	-3.3338	-2.9434	-	I(0)

*Source: Author computation 2022*

From the above unit root test, we discovered that all the variable data lack unit root problem except for inflation rate. Exchange rate interest rate and stock market liquidity turn stationary at level as the respective computed ADF statistics is greater than the 5 percent critical values in absolute terms. While that of inflation is the first difference ADF that is asterisks that is greater than the first difference critical value. The stationarity test result, reveals a mixed order of integration which calls for the application of the Autoregressive and Distributed Lag model or better still the bound test model. This model was propounded by Pesaran et al (2001), with superior

advantages against the Johansen cointegration in terms of sample size and efficiency. Hence, we proceed with the bound test of cointegration among the variables.

**Table 1A: Result of Bound Test**

<b>Null Hypothesis:</b> No long-run relationships exist		
<b>Test Statistic</b>	<b>Value</b>	<b>K</b>
<b>F-statistic</b>	2.21	3
<b>Significance</b>	I (0) Bound	I (1) Bound
<b>5 percent</b>	3.23	4.35

*Source: Author's Computation*

In this scenario the bound test result shows that the computed f-statistics of 2.21 is lower than the I0 (3.23) bound of 5 percent critical level. The computed f-statistics falls in within the acceptance region, and the test is conclusive on the no existence of long run relationship stock market liquidity and inflation rate as posited by Pesaran et al (2001) and applied by Ishioro (2017). Thus, we settle with estimated ARDL model without proceed further. The estimated ARDL model base on the appropriate lag is shown in table 1B below.

**Table 1B: Result of ARDL Model Estimation**

<b>Dependent variable</b>		<b>LSML</b>		
<b>Model selected</b>		ARDL (1, 1, 2, 0)		
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
<b>LSML(-1)</b>	0.772715	0.086914	8.890576	0.0000
<b>LINF</b>	0.260133	0.110917	2.345287	0.0258
<b>LINF(-1)</b>	-0.214926	0.104723	-2.052331	0.0490
<b>LEXCHR</b>	0.094635	0.224393	0.421736	0.6762
<b>LEXCHR(-1)</b>	0.584796	0.280526	2.084639	0.0457
<b>LEXCHR(-2)</b>	-0.444263	0.220930	-2.010883	0.0534
<b>LINTR</b>	-0.597487	0.251975	-2.371217	0.0243
<b>C</b>	-0.489470	0.591145	-0.828005	0.4142
<b>R<sup>2</sup> = 0.9610    DW Stats = 1.8663    F-stat = 105.6950 (0.000)</b>				

*Source: Author's Computation 2022*

The above result shows the exact relationship between inflation rate and stock market liquidity in Nigeria from 1981 to 2020. Theoretically, the estimated coefficient is in line with the theoretical postulation of Fisher hypothesis on the positive response of stock liquidity to inflation. The model has a negative intercept of -0.4894 with inflation and exchange rates having a positive impact on liquidity of stock market while interest rate has a negative impact. On the average, a unit change in inflation and exchange rates, ceteris paribus stock market liquidity will respond by an average increase of 0.2601 and 0.0946, respectively. While that of interest rate will reduce the market liquidity by 0.5974 due to liquidity preferences of the household sector. This affirmed Fisher (1930) postulation and empirical findings of Jepkemei (2017); Abdullahi and Fakunmoju (2019); and Al Oshaibat (2016).

Statistically, the computed p-values of the corresponding coefficients that are less than 0.5, implies that current and past inflation rates and interest rate have significant effects on Nigeria stock market liquidity. The computed coefficient of

determination ( $R^2$ ) reveals that the estimated model has a good fit and that inflation, exchange and interest rates predict about 96 percent of the total variation of the Nigeria stock market liquidity level. This is also affirmed by the f-statistics value that the estimated model is general significant and different from zero. More so, the Durbin Watson statistics reveals a no existence of autocorrelation.

The relationship between inflation and stock market in Nigeria is positive responsive and in tandem with Fisher hypothesis, however, a continuous rise of inflation in the economy result to assets illusion and this mitigates economic activities. For the stability of the system and overall balance of macroeconomic objective, the inflations rate target should not exceed the current two digits.

### 3.3. RESULT OF POST ESTIMATION TEST

#### Normality test

The test shows that the error is normally distributed across the period under review, and that it disperses against the mean and the distribution of the items is asymmetrical. The Jarque-Bera normality test with value of 2.0024 and probability value of 0.3674 indicates the validation of the null hypothesis that the residuals are normally distributed as indicated in figure 1.

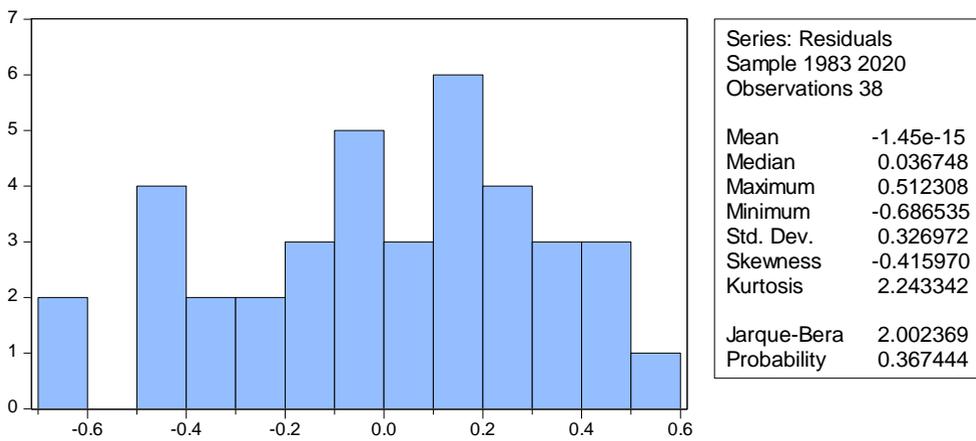


Figure 1: Jarque-Bera Normality test

## 4. RESULT AND DISCUSSION

### 4.1. RESULT OF STATIONARITY TEST

Table 2: Serial correlation test LM test

f-statistics	0.0214	Prob. F(2,28)	0.9789
Obs*R-squared	0.0579	Prob. Chi-square(2)	0.9715

From the insignificance status of the computed f-statistics and chi-square, we conclude that there is no serial correlation and multicollinearity. And this result validated the null hypothesis that there is no correlation among variables.

#### 4.2. RESULT OF STABILITY TEST

The result of the cumulative sum of recursive residual (CUSUM) test shows that the estimated result is in order and the residual is normal and within the bound, hence it spreads across the period. The (CUSUM) indicates the validation of the null hypothesis that the residuals are stable since the CUSUM square line fell in between the two 5% lines for the three cases as shown in figure below.

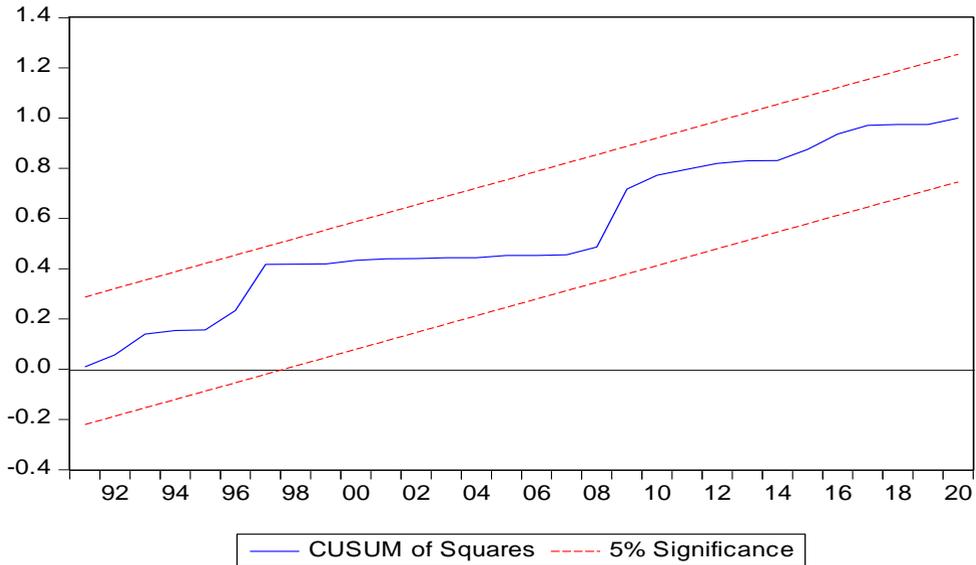


Figure 2: CUSUM Test

#### 5. CONCLUSION AND RECOMMENDATIONS

The study pry into the causal effect of inflation of the Nigeria stock market liquidity level for a period of 40 years from 1981 to 2020. From the findings above, it is clear that inflation induces the market liquidity positively, and this confirm theoretical postulation, it further be deduced that external macroeconomic variable shocks in this case interest, exchange and inflation rates predicts the stock market operation and volatility, at a significant measure with the period reviewed. The stationarity test reveals a mixed order of integration and the application of the ARDL truly reveals the real cost of inflation on the stock market in the short run. The estimated model has a good fit and generally significant. The contentment of the economy at a given rate of inflation will enhance the market productivity and fiscal and monetary measures of government in sustaining the market activities within the current economic state of fiscal deficit finance by monetary measures seems productive. Therefore, we recommend that:

1. Government through monetary authority should manage the current exchange rate to attract portfolio investment in the market.
2. To encourage savings in the market there is need to boost the living wage of the household across the country. Since the government has fail in utilizing tax

revenue for the welfare of the masses, there is need to reduce personal income tax to boost the market through increase saving.

3. Deregulation of the market prices will sustain the already established relationship of the reaction of liquidity market to inflation. From the current regulatory to 10 percent regulatory measures with seasonal or period intervention will aid the inflation enhancement of the market performance.

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