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Effect of Inflation on Stock Market Development

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ABSTRACT

The purpose of this study is to investigate the effect of inflation on stock market development using stock market liquidity relative to gross domestic product as a surrogate between 1990-2019. Panel data analysis was applied on eighth (8) out of forty-six (46) countries in sub-Saharan Africa. Findings from empirical results revealed that inflation has a positive, but non-significant effect on stock market liquidity against a priori expectation. The random effect estimator was the most appropriate model and in all, our regressors were jointly significant. Most of the criteria confirmed stationarity at 1% significance level and we recommend that inflationary targeting through OMO, MPR and CRR can be applied by monetary authorities to stabilize inflation.

Keywords: Stock market liquidity, Stock market development, Inflation, Panel data.

1 Introduction

Anyanwaokoro (2008) describe liquidity as the availability of cash and near-cash to assets to settle short-term and maturing obligation without delay or within a shortest notice. In order words liquidity is a quick access to cash when required. While analyst generally use the term liquidity as the ability to easily buy and sell securities. Pastor and Stambaugh (2003) referred to liquidity as a comprehensive and elusive concept that generally underscores the ability to trade large quantities of securities quickly, at low cost, and without moving the price. Liquidity has often been measured in terms of the degree to which the quantity of traded stocks affects the market price of stocks summarized by the ratio of value of goods traded and market capitalization. Thus, in a liquid stock market, large sales of stocks can be completed without substantially changing the price of the stocks (Choi & Cook, 2005). Similarly, Ariwa, Ani, Onyele, Ekeleme and Odili (2017) corroborate Yusuf (2009) and contend that stock market liquidity could also mean the degree at which financial instruments can be quickly exchanged in the market without altering the prices of assets. According to Abdul-Khaliq (2013), stock market liquidity denotes the ability of investors to exchange securities in the stock market with easy of transfers. It is an important indicator of stock market development because it highlights how the market facilitates the allocation of capital and thus enhancing the prospects of long-term growth in an economy (see Onoh, Ukeje & Nkama, 2017; Elliot, 2015; Skjeltorp & Odegaard, (2009). Luo (2016) emphasizes that the large trading volume generated and high trading speed enabled by advanced computerized trading platforms and sophisticated trading strategies appear to indicate a growth and improvement of market liquidity.

The natural measure of market liquidity is the spread between the bid and ask price. The narration is that, in a developed capital market, market makers, which comprise corporations and individuals, are quoting buy and sell prices with the aim of making profit on the bid–ask spread. The spread has to be substantially enough to cover costs and also provide reasonable profits to market makers (Bogdan, Bareša & Ivanovic, 2012). On the other hand, Datar (2000) argues that one simple measure of stock market liquidity is the volume and frequency of trading, which is turnover. Past trading volume can give important information about stock see Skjeltorp & Odegaard, (2009). Trading volume is an increasing function of liquidity, and tries to capture the quantity of shares per time to measure the depth and dimension of liquidity (Bogdan, Bareša & Ivanovic, 2012). At times, total turnover with respect to market capitalization is regarded as a relative measure used for comparisons across different markets. However, Levine and Schmukler (2005) argue that as turnover does not directly measure trading costs or the price impact of transactions, turnover can be interpreted less as a precise measure of liquidity and more as a general index of trading activity. By analyzing market capitalization and the turnover ratio together, new insights are gained on the health of a stock market (FSDI, 2004).

From a theoretical perspective, El-Wassal (2013) argues that stock markets can stimulate economic growth by mobilizing and boosting domestic savings and improving the quantity and quality of investment. Better savings mobilization may increase the rate of saving and if stock markets allocate savings to investment projects that yield higher returns, the increasing rate of return to savers will make savings more attractive. Mobilization of such resources to various sectors certainly helps in economic development and growth. Tachiwou (2010) contends that, in principle, a well-developed stock market should increase saving, capital formation and efficiently allocate capital to productive investments. Nieuwerburgh, Buelens and Cuyvers (2001) opine that stock markets establish a marketplace and meeting point where investors feel comfortable to give up control of their savings; and since securities are in small denominations, a larger fraction of the investors can participate in the stock market.

Generally, the theoretical discussions surrounding stock market development and growth have concentrated on the growing intermediation functions of the stock market. the stock market is a feature of morden economy and its reputed to perform function that promote the growth and development of the economy. According to Manasseh, Ogbuabor, Anumudu, Abada, Okolie and Okoro (2018), stock markets facilitate liquidity as well as risk sharing, mobilisation of savings, making available needed information for potential investments and efficient capital allocation in an economy. These interconnected functions of a stock market may be explained in the following ways.

A stock market may help in the mobilisation of domestic savings through the provision of a set of financial instruments for individuals and corporations to diversify their portfolio. Stock market also provides opportunities for joint ownership thereby availing individuals with an efficient means of sharing risk.

Lastly, a stock market facilitates efficient allocation of capital to productive investments and, in addition, provides investment outlets for both foreign and domestic investments. It is therefore expected that stock markets have significant relations with the entire productive activities in an economy Pradhan, Arvin, Samadhan and Taneja, (2013). Hence, it can be argued that a stock market is a primary indicator of the economic activity in a country and has a significant influence on aggregate demand, mostly via aggregate consumption and investment. A number of factors can be a signal to participants in the stock market to anticipate a higher or lower return when investing in stocks and one of these signaling factors are macroeconomic variables. Changes in macroeconomic variables can significantly impact the stock price return (Talla, 2013).

From the policy point of view, the central bank actions, government policies and individual behaviors affect the financial system development. For instance, monetary policy connects with stock market development via money supply, interest rates, and investment activities in stocks as well as the market values of stocks. Expansionary monetary policy increases money supply, lowers interest rates, increases investment in stocks and market values of stocks. A similar fiscal policy can trigger the same effect, but the effect can transmit directly through interest rates and investment. Finally, the effect of individual behavior and motives is captured through the saving level, where the lack of financial institutions in economically poor areas (people with low-incomes) simply do not save at high levels (Abdelbaki, 2013) because their marginal propensity to consume is high. An increase in the money supply is frequently assumed to have a positive effect on stock prices. Talla (2013) asserts that growth in money stock will ultimately stimulate the economy thereby leading to greater credit being created to firms which leads to expansion of production and sales increases resulting in increased revenue for firms. This translates into better dividend payments for firms leading to an increase in the stock prices. However, money supply can also be negatively related to stock prices. An instance is the association between money supply and inflation, since the increase in money supply is positively associated with inflation which raises the nominal risk free rate (Fama, 1981). This increase in the nominal risk free rate will cause the discount rate to rise which leads to a decline in stock return. Treasury bill is a money market instrument with free nominal risk, so the increase in treasury bill rate (due to increased money supply) will make investors divert investment to money market (short-term) instruments instead of stock market (long-Term) thereby negatively affecting stock market and its development. Even though the future appears promising for stock markets in sub Saharan Africa, its development in most developing countries are characteristically small in terms of market capitalization, the number of shares traded and the number of companies listed.

Anyamele (2013) opines that stock markets development in Africa has not actually matched the expectations Africans had when these stock markets were opened in the continent. However, recent performance shows that if proper guidance and sound macroeconomic policies are in place, the future may be bright for stock markets in the region as the new emerging stock exchanges. Another feature of stock markets in Sub Saharan Africa is volatility attributed to fluid political and fluid socio-economic environment, accompanied with distorted incentives, short-term activities, and shortage of qualified managers and regulators Anyamele, (2013).

Statement of the Problem

This study will examine how inflation have affected the stock market development in sub-Saharan Africa (SSA). Examining such relationship in an inefficient market like the SSA appears to be a problem, and has its challenges. This may be due to the fact that stock markets in Africa are still developing while the perceived inefficiency in the market could distort the basic theoretical expectations that underline the linkage between the stock market and various macroeconomic indicators. A problem in our context is a deviation from expectation (Ezirim 2017), therefore when outcomes do not tally with expectation/apriori, there is a problem.

Objectives of the study

The objective of this study is to examine the effect of inflation on stock market liquidity.

Research questions

How far has inflation affected stock market liquidity in sub-Saharan Africa?

Research hypothesis

Ho1: inflation does not a significate effect on stock market liquidity

Scope of the study

This study aims to ascertain the impact of inflation on stock market development in sub-Saharan Africa. For the purpose of this study stock market development relative gross domestic product is proxied by stock market liquidity. The study covers the period of 1990-2019. the choice of 1990 as the base year is informed by the availability of comprehensive data on stock market development in SSA countries. and the year 2019 is predicated on the year for which data on the variables of interest are available.

Significance of the study

while there has been a rapidly growing literature on stock market development issues in developed continent, little attention has been paid to the effect of inflation on stock market development in sub-Saharan Africa, yet there is an increasing need for such studies. This research work contributes general by and specifically to government/policy investors, shareholder/stakeholders. This study will also benefit researchers whose current literature is contradictory and torn between various school of thoughts.

Review of Related Literature

2.1 Conceptual Review

2.1.1 Inflation

Inflation is a galloping rise in prices of goods and services as a result reduces the purchasing power of money. The major determinants of inflation are demand, price of commodity and quantitative easing. Inflation is bound to affect all sector of the financial system direct or indirect, that is the reason why stock market is affected when there is inflation. Stock market and inflation are closely association Inflation affects stock market performance as it causes differences between real and nominal interest rates; thereby altering the spending and saving behaviors of firms, investors, individuals and government. Unexpected fluctuations in the rate of inflation make it difficult for companies to plan, which consequently inhibits growth and innovations (Daferighe & Charlie, 2012). Bai (2014) stated that Inflation is basically one of the representations of overall macroeconomic imbalances, which will obviously increase the uncertainty of investors for the future economic situation. Inflation remains one of the biggest concerns of investors across the globe because it erodes the returns on investment and reduces the real value of money (Vena, 2014); hence, investors are always looking out for the best way to protect their wealth from the adverse effects of inflation (Nwude, 2013). Kontonikas, Montagnoli and Spagnolo (2006) asserts that since stock returns is a measure of nominal payoffs, inflationary uncertainties and nominal asset return volatilities ought to reflect inflation volatility; and lower variability in inflation should exert minimal effect on stock market volatility. Fama (1981) observes that even though inflation is negatively related to real activity, stock returns and inflation rate are more strongly related, with opposite signs, as a measure of real activity (see also Jepkemei, 2017) As a result, inflation has strongly been viewed as a macroeconomic variable necessary for economic recovery. inflation

2.1.2 Stock Market Development

Stock market is an indicator of the economic health of a financial system (Schumpeter 2005).it indicate the mood of investors in a financial market. As such, stock market development is an important instrument for growth. Stock Market liquidity is the ability of financial market to withstand brief variation in trading activities without substantial disbalance in prices. A liquid market is one which a huge volume of transaction is trading within a space of time but the movement in price is marginal. If the market is not liquid enough only investments with insignificant activities will yield returns.

2.1.3 Stock Market Liquidity

Stock market liquidity is one major aspect of stock market development. market liquidity renders make financial assets more attractive to investors, liquid market allows an easy switch out of equity for an investor who choose to change the composition of their portfolio. Investors do not lose access to their savings for the duration of the investment in a liquid market rather the can easily, quickly and cheaply sell their stake in the company in other to invest in a more profitable project and making diversification easier for investors (Levine 2000).

2.1.4 Inflation and Stock Market Liquidity

Inflation is the rise in general price level measured at a point in time. For financial institutional like deposit money banks, arise in inflation is synonymous with decrease in deposit and ultimately reduction in its ability to grant loan .this means that the reduction in earning, which may reduce stock performance of deposit institution on stock market .however, from non-bank organization perspective ,inflation may result in increase in earnings because of the high price of goods and service (Oshaibat 2016) this suggestion states that inflation may have a positive or negative on stock market and eventually stock market liquidity.

2.2 Theoretical Review

2.2.1 The Fisher Hypothesis

Boyld and Jalal (2012) state that the Fisher effect has been widely recognized since Irving Fisher's Theory of Interest (1930). The relation between interest rates and inflation was first put forward by Fisher (1930), and the hypothesis states that the nominal interest rate in any period is equal to the sum of the real interest rate and the expected rate of inflation. This postulation is called the Fisher Effect. Fisher (1930) hypothesized that the nominal interest rate could be decomposed into two components, a real rate plus an expected inflation rate.

The Fisher hypothesis states that nominal interest rates rise point-for-point with expected rate of inflation, leaving the real interest rate unaffected (Barsky, 1987; Gregoriou & Kontonikas, n.d.). He suggested that a one-to-one association exists between inflation and interest rates with real interest rates being unrelated to the expected rate of inflation and determined entirely by the real factors in an economy. Therefore, the nominal interest rates should have a direct one-to-one relation with the expected rate of inflation, on the assumption that real interest rates are independent of movements in rate of inflation (Oprea, 2014). The argument was that, if real interest rates are related to the expected inflation, then any changes in the real rate will prompt full adjustment in nominal rates in response to expected inflation (Cooray, n.d.). Thus, the Fisher supposition implies that real interest rates remain constant in the long run, and they will not be affected by changes in the expected inflation (Udayaseelan & Jayasinghe, 2010; Vena, 2014; Freeman, Groom & Panopoulou, 2013).

Bosupeng (2016) stresses that the Fisher effect remains an important concept in the field of financial asset returns since it provides an approximation of the actual returns while accounting for changes in inflation. Inflation appears to affect stock prices but the relationship between unexpected inflation and stock prices is not yet clear (Geetha, Mohidin, Chandran & Chong, 2011). While some existing earlier studies argues that a significant negative relationship between stock prices and rate of inflation (see Fama & Schwert, 1977; Schwert, 1989; Fama, 1981),

some studies other contend that no significant relationship exist between the two variables (see Amonhaemanon, Annaert, Ceuster & Long, 2014; Hardouvelis, 1988). Since the relationship between inflation and stock prices is not clear, it is important for researchers to find out the behavior of the variables. Summarily, Fisher's hypothesis focused on interest rate effect via inflation. If we net off the inflation effect on the interest rate, the resulting figure is the real interest rate as against the nominal interest rate.

However, Nwude (2013) argues that the relation between stock returns and rate of inflation implies that investment in equity markets can provide a good hedge against inflation if the revenue and earnings of a company improves over time. Feldstein (1983) explores the inflation and stock market nexus and explains that in order to understand the structural link between inflation and share prices, it is essential to distinguish between the effect of a high constant rate of inflation and the effect of an increase in the rate of expected future inflation rate. He argues that when the inflation rate is steady, share prices rise in proportion to the price level to maintain a constant ratio of share prices to real earnings. In contrast, an increase in the expected future rate of inflation leads to a concurrent fall in the ratio of share prices to current earnings.

2.2.2 Proxy Effect Hypothesis

The Proxy effect hypothesis was documented by Fama and Schwert (1977), with main explanation in Fama (1981) in his outline tilted "Proxy hypothesis". The claim of his proposition is that a negative relationship exists between stock returns and both future expected inflation and current inflation. Fama (1981) asserts that inflation influences the stock returns through real activities which are critical determinants of the equity values. The real activities comprise, for instance, capital expenditures, and average real rate of return on capital and output (Limpanithiwat & Rungsombudpornkul, 2010). Fama's hypothesis has been confirmed by some empirical studies (see Cifter, 2015; Schmeling & Schrimpf, 2008; Kim, 2003). Ely and Robinson (1989) argue that inflation as applied in Fama's postulation is simply serving as a proxy for expected real economic activity, which is the more fundamental determinant of stock returns. When economic activity slows down, it negatively affects the future corporate profits and hence, stock prices.

Balduzzi (1994) provides some insights into Fama's thesis, and emphasises that the explanations to the hypothesis is based on two stylised facts. The first is that high inflation rates lead to low growth rates of real aggregate economic activity; as the growth in economic activity is expected to decline, the growth rate of the demand for real cash balances is also projected to decrease, thereby causing future-expected and current inflation to rise. The second basis is that high stock returns correlates positively with growth rates of aggregate economic activity. As a result, inflation rate and real stock returns are driven in opposite directions by expected business fluctuations, and thus correlates negatively.

The negative relationship between inflation and the stock returns is on account of the 'proxy effect' in the sense that it reflects the negative consequence of inflation on (real) aggregate economic activity (Shanmugam & Misra, 2009). Fama pointed out that the statistical association between inflation and real stock returns should disappear once the effect of real output growth is controlled.

Shanmugam and Misra (2009) argue that the reverse causality theory proposed by Geske and Roll (1983), suggest that a reduction in real activity not only affects the stock prices adversely, but it also leads to a fall in government revenue and rise in fiscal deficits. Since the central bank monetizes a portion of fiscal deficits, the money supply increases, which in turn increases inflation.

2.2.3 Inflation Illusion Hypothesis

Modigilani and Cohn (1979) developed another hypothesis that discovers the negative relationship between inflation and stock returns, citing that the result of inflation illusions is caused by the correction between inflation rate and stock returns. The inflation illusion hypothesis state that investors fail to understand the effect of inflation on nominal dividend growth rate and hence, the stock market incorrectly extrapolates past nominal growth rate

without considering the impact of time-varying inflation. Fama (1981) argued that the sign on inflation is due to the fact that inflation acts as a proxy for omitted variables. Given that higher inflation anticipates low growth and there is a relationship between expected economic growth and stock prices, therefore, taxes could not be responsible for the fall in real share values.

2.3 Empirical Review

There have been quite a number of studies aimed at establishing the impacts of macroeconomic variables on stock market development. However, there seems to be no consensus regarding the exact cause-effect relationship between the two variables. For instance, Pradhan, et al (2013) assessed the nature of causal relations among stock market development, economic growth, and inflation using a panel Granger causality test on a sample of 16 Asian countries over 1988-2012.Employing a panel vector autoregressive (VAR) model, our results revealed that these variables are cointegrated, suggesting presence of a long-run equilibrium relationship among them.

Owusu-Nantwi & Kuwornu (2011) investigated the relationship between macroeconomic variables and stock market returns in Ghana using monthly data from January 1992 to December, 2008. The OLS model based on the Box-Jenkins time series methodology was employed in establishing the relationship between macroeconomic variables and stock market returns. The results revealed that there is a significant relationship between stock market returns and consumer price index (inflation). On the other hand, exchange rate, Treasury bill rate and crude oil prices do not seem to have any significant effect on stock returns.

Also, on the case of Ghana, Issahaku, Ustarz & Domanban 2013) examined the existence of causality between macroeconomic variables and stock returns in Ghana. The study employs monthl y time series data spanning the period January 1995 to December 2010. Then, the Vector Error Correction (VECM) model was employed to establish long-run and short-run relationships between stock returns and macroeconomic variables. In order to determine the existence of causality, the Granger Causality tests were performed. The finding revealed that a significant long run relationship exists between stock returns and inflation, money supply and Foreign Direct Investment (FDI). In the short-run, a significant relationship exists between stock returns and macroeconomic variables such as inflation, money supply and interest rate.It was found that a causal relationship runs from stock returns to money supply, interest rate and FDI over the period.

In the Kenyan context, Kirui, Wawire and Onono (2014) assessed the relationship between Gross Domestic Product, Treasury bill rate, exchange rate, inflation and stock market return using times series data from 2000 - 2012. The Engle-Granger two step method was used to establish the co integrating relationship between stock returns and the macroeconomic variables. Threshold Generalized Autoregressive Conditional Heteroskedasticity (TGARCH) model was used to capture the leverage effects and volatility persistence at the Nairobi Stock Exchange (NSE). Empirical results of the regression model revealed that exchange rate showed a significant relationship with stock returns. Gross Domestic Product, Inflation and the Treasury bill rate indicated insignificant relationships.

In Nigeria, Omorokunwa, & Ikponmwasa, (2014) examined the relationship between stock price volatility and some macroeconomic variables in Nigeria. Annualized time series data from 1980 to 2011 was used for this study. The Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model was employed in the empirical analysis. The findings showed that stock prices in Nigeria are volatile. And that past information in the market has an impact on stock price volatility in Nigeria. In addition, the study revealed that exchange rate and interest rate have a weak effect on stock price volatility while inflation was found to be a key determinant of stock price volatility in Nigeria.

Manasseh, Ogbuabor, Anumudu, Abada, Okolie and Okoro (2018) examined the causal relationship between stock market development (market capitalization), financial sector reform and economic growth in Nigeria, using Vector autoregressive and error correction model for the analysis. The variables tested were financial sector reforms (domestic credit to private sector), financial integration (private capital flow), business environment (gross fixed capital formation) and legal framework (which measures instability in the economy) and proxied by inflation and

interest stability. While there was bidirectional causality between stock market development and economic growth, along with financial sector reform, the findings reveal a unidirectional causality running from financial sector reform to stock market development. There is also a positive long run relationship between business environment, legal framework and stock market development and other cointegrating variables.

Osamwonyi and Evbayiro-Osagie (2012) assessed the relationship between macroeconomic variables and the Nigerian stock market index. The study used annual data of selected macroeconomic variables from 1975 to 2005. The Vector Error Correction Model (VECM) was employed to estimate the short-run dynamics as well as long-run relationship between the stock market index and the six selected macroeconomic variables (interest rates, inflation rates, exchange rates, fiscal deficit, GDP and money supply). The finding showed that macroeconomic variables have influence on the stock market index in Nigeria.

Odhiambo (2010) examined the relation between banks and stock market development in South Africa. The bank development was represented by the ratio of the domestic credit to the private sector to GDP while the stock market development is proxied by the ratio of the stock market capitalization to GDP. The study used the ARDL-Bounds testing procedure. The empirical results showed that there is a distinct positive relationship between banks and stock markets in South Africa. Other findings revealed that, in the short run, the stock market development is positively determined by the level of savings, but negatively affected by the inflation rate and the lagged values of the stock market development. However, in the long-run, the stock market is positively determined by real income and the rate of inflation.

Oseni and Nwosa (2011) This study employed the LA-VAR Granger Causality test to analyse the connection between stock market fluctuations and macroeconomic variables in Nigeria for the periods 1986-2010 using annual time-series data. The results of the findings showed that there exists a bi-causal relationship between GDP and stock market volatility in Nigeria; and no causal relationship was found between stock market volatility and such other variables like interest rate and inflation rate.

Asaolu and Ogunmuyiwa (2011) investigates the impact of macroeconomic indicators on Average Share Price and goes further to examined whether changes in macroeconomic indicators explain movements in stock prices in Nigeria from the period, 1986-2007. The Granger Causality test, Johansen Cointegration and Error Correction Method were adopted in analyzing the data. The results indicated that a weak relationship exists between Average Share Price and macroeconomic variables in Nigeria. The findings further revealed that Average Share Price is not a leading indicator of macroeconomic performance in the Nigerian context, even though, a long-run relationship was found between Average Share Price and macroeconomic indicatord for the period under review.

Nkechukwu, Onyeagba and Okoh (2015) assessed the effect of macroeconomic variables on stock market prices using annual data for Nigeria for the period 1980-2013. The study employed Johansen cointegration and VECM in the analysis. The macroeconomic variables utilised were gross domestic product (GDP) and broad money supply (M2). The results of the findings indicate that Nigerian stock market prices had long-run association with macroeconomic variables. However, gross domestic product has significant long-run negative effect on stock prices contrary to a priori expectation that gross domestic product had significant positive effect on stock prices. But M2 has significant long-run positive effect on stock prices, the result being consistent with a priori expectation. Again, there is unidirectional causal effect between GDP and stock prices with direction running from stock prices to GDP. Whereas there is no causal effect between stock prices and broad money supply. However, in the short-run both GDP and M2 have positive but insignificant effect on stock prices in Nigeria. This result suggests that stock market in Nigeria is informational inefficient. It shows that predicting stock prices based on macroeconomic factors is difficult.

Osamwonyi and Evbayiro-Osagie (2012) analysed the relationship between macroeconomic variables and the Nigerian stock market index, using annual data of several macroeconomic variables of GDP and money supply from 1975-2005. The VECM was adopted to examine the short-run dynamics and the long-run relationship between the

stock market index and the selected macroeconomic variables from the Nigerian economy. The major finding is that macroeconomic variables influence stock market index in Nigeria.

Kalu and Okechukwu (2014) examined the impact of macroeconomic indicators on stock market return volatility in Nigeria, using GARCH-X model on a monthly data from January 1996 to March 2013. Selected macroeconomic variables namely, GDP, consumer price index, exchange rate, broad money supply, credit to the private sector, and the net foreign assets were obtained. The results suggested that the stock market return volatility is positively influenced by variations in exchange rates and credit to private sector but negatively influenced by estimated changes in money supply and consumer price index. Then again, changes in net foreign assets showed negative but insignificant influence on changes in the stock market return.

Yartey and Adjasi (2007) investigated the economic importance of stock markets in Africa. The results of the paper showed that the stock markets have contributed to the financing of the growth of large firms in certain African countries. An econometric assessment of the impact of stock markets on growth in selected African countries, however, found inconclusive evidence although stock market value traded appeared to be positively and significantly related to growth.

In the Kenyan context, Elly and Oriwo (2012) evaluated the relationship between macroeconomic variables on the All share index (ASI) and also determined whether changes in macroeconomic variables can be used to forecast the future ASI. Dataset for the periods of March 2008 to March 2012 were collated. The findings in the study revealed that 91 – day T bill rate had a negative relationship with the ASI while inflation did not have a strong positive relationship with the ASI.

Ho (2017) examined the macroeconomic determinants of stock market performance in South Africa over the period, 1975-2015. Specifically, the paper examined the impact of economic growth, banking sector performance, inflation rate, trade openness, and real interest rate on the performance of South African stock market. This paper enriched existing literature by investigating the linkages using the ARDL bounds testing technique. The results found that economic growth and banking sector performance had long-run positive impact, whereas inflation rate and trade openness had long-run negative impact on stock market performance. In the short run, the results showed that economic growth had positive influence on stock market performance.

Ahmad, Abdullah, Sulong and Abdullahi (2015) investigated of the causal relationship between stock market returns and macroeconomic variables in Nigeria. The study used Autoregressive Distributive Lag (ARDL) and Vector Autoregressive Model (VAR) on annual data from 19842013. The Bound test procedure showed that the stock market returns and the macroeconomic variables were cointegrated and entails that a long-run equilibrium relationship exists between them. Similarly, the Granger causality tests revealed that economic growth had bidirectional causality with the stock market returns; while other variables had unidirectional causality. The variance decomposition test revealed that the stock market returns can be explained by gross domestic saving as well as nominal effective exchange rate.

3 Methodology

3.1 Research Design

According to Onwumere (2009), a research design provides a blueprint that guides a researcher in carrying a research work. Research design for this study is the ex post facto design. Simon and Goes (2013) describe the ex post facto design as one which is based on a fact or event that has already happened and at the same time employs the investigation and basic logic of enquiry like the experimental method. The choice of ex post facto design and its justification is informed by the historical nature of the data on our variables of interest.

3.2 Population and Sample of Data

The population for this study is Sub Saharan Africa (SSA). SSA according to the International Monetary fund (IMF) have forty-eight (48) countries. Our sample is derived from our population and is comprised of eight (8) countries between 1990-2019 namely: Nigeria, Coted'Voir, Ghana, Kenya, Namibia, Zambia, Eswatini (Swaziland) and South Africa. These are countries that have data on our variables of discourse because world Development Indicator's (WDI) data on stock market development started in 1990 and as at 1989, we only have five (5) stock markets in SSA.

3.3 Nature and Sources of Data

The nature of data used in this study is secondary and collated from the World Bank database over the period 1990-2019. The data is on Sub-Saharan Africa.

3.4 Description of Research Variables

This research will involve an empirical analysis, of dependent and independent variables.

3.4.1 Dependent Variable

The dependent variable in this study is stock market liquidity and it is proxied by stock market development relative to GDP.

3.4.2 Independent Variable

Inflation rate is principally the independent variable in this study.

3.5 Technique of Analysis

Our analytical model is Panel OLS regression techniques which was unbundled into Fixed and Random effects estimators while the Hausman test was used to determine the best and appropriate model between the two.

3.6 Model Specification

We adapted the model developed by Worlu and Omodero (2017) which evaluated the impact of macroeconomic variables on stock market performance in Africa. The model used in the study is represented as follows:

$$SPI_{it} = \beta_0 + \beta_1 GDP_{it} + \beta_2 INFL_{it} + \beta_3 REXGR_{it} + \varepsilon_{it} \text{ ---------- (1)}$$

SPI = Share Price Index; GDP = Gross Domestic Product; INFL = Inflation Rate; and REXGR = Real Effective Exchange Rate Index.

Based on the above model, our model is expressed in modified form as follows:

Fixed Effect Model

$$STKML_{it} = \alpha_i + \beta_1 INF_{it} + \beta_2 BSD_{it} + \beta_3 INT_{it} + \beta_4 FDI_{it} + \varepsilon_{it} \text{ ---------- (2)}$$

Where

STKML	=	Stock market liquidity (% of GDP)
INF	=	Inflation rate
BSD	=	Banking sector development (ratio of private sector credit to GDP)
INT	=	Interest rate
FDI	=	Foreign direct investment in ratio of GDP

α = intercept

β_1-β_4 = Parameter estimates

ε = Error term

Random Effect Model:

$$STKL_{it} = \mu_i + \beta_1 INF_{it} + \beta_2 BSD_{it} + \beta_3 INT_{it} + \beta_4 FDI_{it} + \mu_{it} \text{ ---------- (3)}$$

Pooled Model:

$$STKL_{it} = \beta_0 + \beta_1 INF_{it} + \beta_2 BSD_{it} + \beta_3 INT_{it} + \beta_4 FDI_{it} + \varepsilon_{it} \text{ ---------- (4)}$$

4 Data Presentation and Analysis

4.1 Descriptive Statistics

Table 4.1 below shows the trend of our variables. It is a description of the measures of central tendency, deviation and probabilities of our dependent and independent variables.

Table 4.1. Descriptive Statistics of the panel Series

	STKML	INF	BSD	INT	FDI
Mean	8.504067	14.76687	25.25829	4.914241	2.99709
Median	0.548	8.938547	17.94287	4.820565	2.217432
Maximum	136.21	183.312	78.29413	25.28227	10.83256
Minimum	0	-0.80588	3.65734	-43.5727	-2.73891
Std. Dev.	20.87509	21.75365	18.81705	10.15895	2.741595
Skewness	3.150563	4.935294	1.192472	-2.08009	0.953805
Kurtosis	13.8625	33.10595	3.337	11.13782	3.20274
Jarque-Bera	1077.603	8406.796	51.97205	598.64	33.12074
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	1394.667	2968.141	5430.533	845.2495	647.3714
Sum Sq. Dev.	71030.42	94644.23	75773.41	17647.93	1616.013
Observations	164	201	215	172	216

Source: Researcher's Compilation.

Table 4.1 presents the descriptive statistics of our panel dataset which shows that, on the average, Inflation rate stood at 14.77% over the period under review with lowest point at -0.81% (Cote d'voir) in 1990 and highest point at 59.46% (Ghana)in 1995. Banking sector development averaged 25.26% and was highest at 78.29% in 2007 in South Africa, over the period. Foreign direct investment as a ratio of GDP stood at the average rate of 2.10%. It should be noted that FDI relative to GDP remained low during the period under review and ranged from -2.73% in 2003 (Eswatini) to 10.83% in Nigeria between 1990 and 2019. Real interest rate was also found to be below double digits on the average 4.91% but peaked at 25.28% in 1998 in Nigeria during the period.

The mean and median are widely apart, which further accentuated by the wide spread between the minimum and maximum likelihoods. Most of the variables are positively skewed except for real interest rate at -2.08. The normality and peakness our curve is measured by the kurtosis (an extension of skewness) and shows that our data

may not be normally distributed. This may be due to heterogeneity within the countries under study, however our statistical econometrics test will prove the efficacy of our data.

4.2 Tests for Stationarity

Table 4.2 below depicts the result of the stationarity tests of our variables. It shows the constant nature of the time series data and its usefulness in predicting the future, therefore the stochastic trend in time series is random, but predictable.

Table 4.2. Panel unit root test

Variable	[a] Levin, Lin & Chu t	[a] Breitung t-stat	[b] Im, Pesaran and Shin W-stat	[b] ADF - Fisher Chi-square	[b] PP - Fisher Chi-square	er of gration
STKML	-6.28825***	-0.50772	-5.62097***	61.4400***	88.7201***	I (1)
INF	-8.49167***	-6.62416***	-8.17858***	89.5414***	294.791***	I (1)
BSD	-3.54483***	1.28476	-2.69716***	35.8806***	19.9253	I (1)
INT	-3.77445***	-5.69473***	-5.20702***	66.7236***	930.168***	I (1)
FDI	-8.26689***	-7.09713***	-10.2252***	109.801***	1042.15***	I (1)

Source: Researcher's Computation.
[a] Null: Unit root (assumes common unit root process),
[b] Null: Unit root (assumes individual unit root process)
*** Significant at 1% and 5%

Results of the panel unit root test are presented in Table 4.2. The stationarity status of the variables was tested using five test criteria namely, Levin, Lin & Chu t, Breitung tstat, Im, Pesaran and Shin W-stat, ADF - Fisher Chi square, and PP - Fisher Chi-square.

The results showed that all our panel series are stationary hence, do not have unit root. The stationarity status of the series is reflected in the p-value of the majority of the test criteria which are less than 5% probability value. All the criteria confirmed stationarity at 1% significance level with the exception of, Breitung t-stat failed to reject common unit root process for STKML. From the general results, we can therefore conclude that our panel series are stationary after first differencing [i.e. at order one (I (1)) and none at I (2).

4.3 Test of Hypothesis

Restatement of hypothesis in null and alternate Forms:

H o1: Inflation had a positive and significant impact on stock market liquidity in Sub Saharan Africa.

H a1: Inflation did not have a positive and significant impact on stock market liquidity in Sub Saharan Africa.

Decision Rules:

The decision rules are based on 5% probability value.They are stated below:

$$H_0: \theta = \theta_0 \text{ versus } H_a: \theta \neq \theta_0$$

Reject null hypothesis if p-value < 0.05 and Accept alternative hypothesis

Accept null hypothesis if p-value > 0.05 and Reject alternative hypothesis

4.4 Analysis of Regression Results

Table 4.3 Presents the regression estimate of model one, and comprises the fixed effect, random effect and pool estimators.

Table 4.3 Results of Panel Regression

Table 4.3 Results of Panel Regression
Dependent Variable: STKML

Variable	Fixed Effect Estimator	Random Effect Estimator	Pooled Regression
	[Coefficient] (p-value)	[Coefficient] (p-value)	[Coefficient] (p-value)
INF	[0.038286] (0.7750)	[0.019504] (0.8821)	[0.174136] (0.2020)
BSD	[1.456512] (0.0000) ***	[1.122411] (0.0000) ***	[0.808584] (0.0000) ***
INT	[-0.142667] (0.3180)	[-0.118912] (0.4009)	[-0.014391] (0.9279)
FDI	[-0.288281] (0.6400)	-0.202990] (0.7352)	[-1.097569] (0.0607)
Intercept	[-31.05946] (0.0001) ***	[-21.68222] (0.0089) ***	[-11.85205] (0.0033) ***
Prob (Hausman)		0.1937	
R ²	0.728320	0.238592	0.558024
Adjusted R ²	0.703844	0.212561	0.542913
DW	1.640004	1.533479	2.327756
F-statistic	29.75686	9.165662	36.93001
Prob(F-statistic)	0.000000***	0.000002***	0.000000***

Source: Author's Compilation, 2019. *(*Extractions *from Appendices 2, 3, 4 and 5)*

*Model Equation: STKML = 0.019504*INF + 1.122411*BSD - 0.118912*INT - 0.202990*FDI - 21.68222 + [CX=R]*

We present in Table 4.3 the results of our three key estimations. Our estimators of interest are the FE and RE while the Hausman test was applied to select the most appropriate model between the two conventional estimators. The Hausman diagnostic test has the p-value 0.1937>0.05, which upholds the null hypothesis that the Random effect model is the most appropriate model and upon which we base our analysis. The results revealed that Inflation (INF) has positive and non-significant impact on STKML. However, this outcome is not in line with a priori expectation that inflation should be indirectly related to stock market liquidity. Moreover, the coefficient value indicated that 1% increase in INF brings about a 1.95% increase in STKML. BSD exerts a positive and significant impact on STKML. It can be observed that when BSD increases by 1%, STKML rises by 112.24%. On the other hand, interest rate (INT) and FDI both have negative and nonsignificant impact on STKML. The R^2 shows that about 24% of the variations in the dependent variable are explained by changes in the regressors. The low degree of determination or explanation may be due to absence of variable data in some countries under discourse. The F-value (9.17), with a probability value 0.000002<0.05 entails that the regressors are jointly significant in explaining the dependent variable (STKML). DW (1.53) is higher than R^2 and shows non-spurious results and slight positive serial correlation.

Decision:

Given that the coefficient of our main independent variable is positively signed but with p-value 0.8821>0.05, we weakly accept the null hypothesis and reject the alternative hypothesis. This implies that though inflation has a positive impact, it is less significant on stock market liquidity in Sub Saharan Africa

5 Summary of Findings, Conclusions and Recommendations

5.1 Summary of Findings

This study examined how macroeconomic variables have affected the stock market development in Sub Saharan Africa (SSA) using market liquidity as measure of stock market development and data from eight (8) out of the forty-six (46) countries in Sub Saharan Africa between 1990 to 2019. The finding showed that inflation has a positive impact, it is less significant on stock market liquidity in Sub Saharan Africa.

5.2 Conclusions

The sample countries are Nigeria, Ghana, Coted ‘voire, Namibia, Zambia, Kenya, South Africa and Swaziland. The empirical examination of the responsiveness of the stock market to the various macroeconomic factors have become even more timely as the financial industry’s globalization evolution continues. It is in view of the critical role of stock market liquidity that we examine how it is affected by inflation in selected Sub Saharan African countries. We found that Inflation had positive and non-significant impact on stock market liquidity in the SSA which is not in line with a priori expectation that inflation should be inversely related to stock market liquidity. We concluded from the overall estimation that our selected regressors (INF, BSD, INT and FDI) were jointly significant in explaining stock market liquidity in the SSA.

5.3 Recommendations

We recommend that Inflationary targeting by monetary authorities in the region should be pursued in such a way that price stability is maintained. This can be achieved through mopping of excess monetary liquidity in the economy either by contractionary monetary policy stance via the open market operation and increase in the monetary policy rates (MPR) and its asymmetric window. The central banks can also increase the Cash Reserve Ratio (CRR) to reduce liquidity in the economy. This is expected to boost the confidence of the diverse participants in the stock market.

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