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DRIVERS OF STOCK MARKET RETURNS IN SUB-SAHARAN AFRICA: EVIDENCE FROM SELECTED COUNTRIES

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ABSTRACT

This study investigates the drivers of stock market returns in selected Sub-Saharan African (SSA) economies. Secondary monthly data from January 2000 to December 2016 were collected and analyzed using the dynamic ordinary least square methods (DOLS) and fully modified ordinary least squares (FM-OLS) models to identify endogeneity and serial correlation and check for robustness. In accordance with a priori expectations, this study has proved the key driver of stock market returns across the selected countries is its lag. Although considerable literature exists on the principal determinants of stock market returns in SSA, there is an absence of empirical comparative studies of SSA countries that examine other salient internal and external variables. This study recommends that stockbrokers do not underestimate the importance of previous market performance, as it can potentially inform stock market predictions.

Contribution/Originality: This study is one of only a few that have investigated the comparative effect of both internal and external macroeconomic factors on stock market returns in Sub-Saharan Africa.

1. INTRODUCTION

Some economies in Sub-Saharan Africa (SSA) have interconnected with other developing and developed economies to a greater extent as a result of globalization and international trade and investment. However, the openness of the SSA economies to the global economy has led their stock markets to become more susceptible to changes in external macroeconomic variables, such as exchange rates, crude oil prices, and international stock market indices (Adjasi *et al.*, 2008).

Studies have reasserted this and established that such external macroeconomic factors as stock market indices, especially those of developed economies, exert an influence on stock markets in emerging and/or developing economies. This influence usually presents as co-movement between developed and emerging stock markets (Valadkhani and Chancharat, 2008; Diebold and Yilmaz, 2012).

It is worth mentioning that previous studies have predominantly focused on a few internal macroeconomic variables, such as interest rates, inflation, money supply, exchange rate and industrial production index (Adjasi *et al.*, 2008; Agrawal *et al.*, 2010; Prempeh, 2016), while a few scholars have employed crude oil prices on the list of explanatory variables (Kuwornu, 2012). However, these studies did not take into account the impact of external

factors that influence SSA stock market indices, due to the openness of SSA economies to the global economy, especially those developed economies.

Similarly, the majority of studies on the determinants of stock market returns in SSA failed to include salient domestic variables, such as political risk, as one of the internal explanatory variables. Virtually all SSA countries are characterized by some type of political risk, which in most cases, materialize in conflicts between ruling and opposition political parties, and negative pronouncements by political and ethnic leaders, among others. Such events have been reported as unfavorable to stock market performance (Białkowski *et al*., 2008).

The situation is further worsened by the absence of any comparative research to determine the relationship between mainly macroeconomic risk factors and stock market returns in SSA. This study is thus undertaken to investigate both internal and external macroeconomic variables that exert a significant influence on stock market returns in five selected SSA countries: Ghana, Nigeria, Kenya, South Africa, and Namibia.

2. LITERATURE REVIEW

The arbitrage pricing theory (APT) proposed by Ross (1976), which underpins this study, asserts that the expected return of an asset is influenced by their sensitivity to mainly macroeconomic factors, such as changes in interest rates, economic growth, exchange rates, and inflation; it also takes into account the effects of non-market factors on securities. However, the APT model has a number of pitfalls, mainly its multiple factor nature: the researcher is able to select those variables they deem suitable for the market being studied. Dritsaki (2005) claimed that when selecting macroeconomic variables, it is important to ensure they would objectively reflect the general situation in the country being studied.

2.1. Inflation and Stock Market Returns

The relationship between stock returns and inflation is highly controversial. Empirical researchers have proven, overwhelmingly, a negative relationship between the two (Fama and Schwert, 1977; Geske and Roll, 1983). It has been predicted that an increase in inflation raises the nominal risk-free rate, and in turn, the discount rate used for stock valuation. These findings have been supported by later studies, such as Ratanapakorn and Sharma (2007), Ahmed and Mustafa (2012), and Otieno *et al.* (2017).

Contrary to these studies, though, Choudhry (2001) found a positive relationship between inflation and stock returns, as did Maysami *et al.* (2004), Ochieng and Oriwo (2011), and Ouma and Muriu (2014).

Such incongruity in the results calls for further investigation to validate the relationship between the two variables.

2.2. Interest Rate and Stock Market Returns

The interest rate is charged or paid for the use of money and is a vital factor in deciding the amount to save as opposed to borrow. Interest rates are expected to be negatively related to market returns, due to either the inflationary or discount factor effect (Abugri, 2008); in general, an increase in the interest rate makes money market, such as treasury bills, more lucrative than capital market securities, resulting in a reduced demand for stocks and, therefore, stock market index. Consequently, the interest rate is seen primarily as exerting a negative impact on stock market returns (Maysami *et al*., 2004; Gan *et al*., 2006); however, a few studies, such as Hasan *et al.* (2000), reported a positive relationship between interest rates and stock market returns.

2.3. Exchange Rate and Stock Market Returns

A number of earlier empirical studies have reported a negative relationship between the devaluation of the domestic currency and stock market returns (Geske and Roll, 1983; Adam and Tweneboah, 2008; Adjasi *et al*., 2008). However, a significant number have also confirmed a positive relationship between exchange rates and stock

market prices (Aurangzeb, 2012; Bornholt, 2012; Kuwornu, 2012; Okoli, 2012; Issahaku *et al.*, 2013; Fosu *et al.*, 2014).

2.4. Gross Domestic Product (GDP) and Stock Market Returns

A significant number of finance scholars and researchers believe that financial resources are closely related to a country's economic output, which is measured by either gross domestic product or industrial production index (Lakstutiene, 2008). The higher the growth rate in GDP, all other things being equal, the more favorable for the stock market: on the whole, empirical findings do reveal that real GDP exerts a positive impact on stock market returns (Fama, 1981; Oskooe, 2010).

2.5. Crude Oil and Stock Market Returns

Crude oil is seen as an important factor in production: a rise in the price of crude oil on the international markets leads to a decline in real economic activity across all sectors, including the stock markets. Empirical results reveal that crude oil prices do affect stock returns.

Sadorsky (2001) and Basher and Sadorsky (2006) found strong evidence of the sensitivity of stock market returns to changes in crude oil prices. Arouri and Rault (2012), studying the Gulf Region, established that an increase in oil prices had a positive impact on stock prices, except in Saudi Arabia, while Kpanie *et al.* (2014) also reported a positive, but not significant, coefficient at lag 1 for crude oil. In contrast, Büyükşalvarcı (2010) found a negative relationship between crude oil prices and stock market returns in Turkey, as did Kuwornu and Owusu-Nantwi (2011) and Kuwornu (2012) in Ghana.

2.6. Political Cycle (Risk) and Stock Market Returns

Political risk and instability affects macroeconomic factors, including stock market returns (Karolyi, 2006), becoming one of the key factors that influence the performance of a country's stock market and the financial market in general. Previous research suggests that the political uncertainty around elections creates economic uncertainty, which increases investors' risk aversion (Białkowski *et al.*, 2008). However, conclusions on how stock prices are affected by political events, such as general elections, vary greatly according to the country, while how stock markets are influenced by different political events and how abnormal returns occur are of great interest to both investors and researchers.

2.7. Effect of International Stock Markets

There is significant literature addressing the issue of stock market co-movements (Syriopoulos, 2007; Valadkhani and Chancharat, 2008; Marimuthu and Kok, 2010; Diebold and Yilmaz, 2012; Dhanaraj *et al.*, 2013), but little on the influence, or co-movement of, globally recognized stock markets on SSA stock markets, except for South Africa, for which a number of studies have been conducted. The main international stock market indices, such as those of the New York and London Stock Exchanges, are perceived as having an impact on emerging stock markets.

3. METHODOLOGY

3.1. Model Specification and Description of Data

Consistent with Ross' (1976) APT framework, as well as notable scholars such as Chen *et al.* (1986), Nishat and Shaheen (2004), Adam and Tweneboah (2008), Kuwornu (2012), and Nkoro and Uko (2013), who have empirically explored the macroeconomic determinants of stock market returns, this study has adopted the empirical model specified in Equation 1:

$$SMR_t = \beta_0 + \beta_1 SMR_{t-1} + \beta_2 CPI_t + \beta_3 TBILL_t + \beta_4 EXCH_t + \beta_5 RGDP_t + \beta_6 OIL_t + \beta_7 LSE_t + \beta_8 POL_t + \varepsilon_t \quad (1)$$

where:

SMR: All-share index (proxy of stock market returns)

SMR_{t-1}: Lag of all-share index (proxy of stock market returns)

CPI: Consumer price index (proxy for inflation)

TBILL: Nominal 91-Day Treasury Bill rate (proxy for interest rate)

EXR: Nominal exchange rate between the domestic currency and the US dollar (proxy for exchange rate)

RGDP: Real gross domestic product (proxy for economic growth)

OIL: Monthly crude oil prices per barrel (proxy for global crude oil prices)

LSE: Monthly London Stock Exchange (LSE) all-share index (proxy for major global stock market indices)

POL: Political cycle (period of national elections in a typical SSA country; proxy for political risk)

As can be seen, Equation 1 is a modification of the many models employed by previous scholars. This study does not take account of money supply as an explanatory variable, though. According to the monetarists (Friedman, 1970; Tymoigne and Wray, 2013), money supply can be reflected in excess liquidity, as well as inflation, which is the principal bane of the African economy. Theoretically, therefore, money supply and inflation placed in the same equation can lead to multicollinearity, and accordingly, was not added to the model in this study.

Previously, most African scholars have used annual or quarterly GDP data and the monthly industrial production index in their studies (Asaolu and Ogunmuyiwa, 2011; Ibrahim and Musah, 2014), because GDP serves, comparatively, as a better proxy for economic growth and is calculated annually and quarterly in most African countries. In this study, though, monthly real GDP data was calculated from the available quarterly data, using the Chow–Lin interpolation procedure within the Matlab temporal disaggregation library developed by Abad and Quilis (2005). Estimated monthly derived from quarterly real GDP is arguably more preferable as it also captures the entire economy.

This study also employed the political, or election, cycle as a proxy for political risk, due to scholars reporting that a change of regime, declarations by political leaders, and violence both before and after general elections have an impact on stock market performance (Białkowski *et al.*, 2008).

Furthermore, this study departed from the norm of relying on internal factors by also considering external factors, mainly the performance (composite index) of a world-leading stock market (the LSE), because of the economic and political links between the UK and the five selected countries, and global crude oil prices, which only a few scholars have employed in their studies. The issue of stock market co-movements has recently become a principal research topic owing to the influence of stock market indices on one another.

Crude oil is a factor in production for most firms, especially those in manufacturing. Therefore, changes in crude oil prices are likely to affect the performance of firms listed on the stock exchanges of the SSA countries.

To summarize, the monthly figures for crude oil prices, real GDP, LSE all-share index, and political cycle were included, as suggested by Kuwornu and Owusu-Nantwi (2011), Kuwornu (2012) and Ouma and Muriu (2014). Future research should consider other salient variables that are likely to improve stock market return predictions.

This study also maintains that stock market performance can be self-enhancing: the past stock market index can affect present performance. Previous stock market indices are therefore employed as explanatory variables in the model.

Table-1. Variable Description and Information.

Notation	Variable	Brief Description of Data	Sources
Log SMR	Log of All-Share Index	Monthly all-share index used as a proxy for stock market returns.	Research departments of Ghana Stock Exchange, Nigerian Stock Exchange, Nairobi Securities Exchange, Johannesburg Stock Exchange, and Namibian Stock Exchange.
Log CPI	Log of Consumer Price Index	Monthly consumer price index used as a proxy for inflation.	Research departments of Bank of Ghana, Central Bank of Nigeria, Central Bank of Kenya, South African Reserve Bank, and Bank of Namibia. Research departments of Ghana Statistical Service, National Bureaus of Statistics for Nigeria and Kenya, Statistics South Africa, and Namibia Statistics Agency.
Log TBILL	Log of Treasury Bill	Monthly 91-Day Treasury Bill rate used as a proxy for interest rate.	Research departments of Bank of Ghana, Central Bank of Nigeria, Central Bank of Kenya, South African Reserve Bank, and Bank of Namibia.
Log EXR	Log of Exchange Rate	Monthly nominal exchange rate between the domestic currency and US dollar used as a proxy for exchange rate.	Research departments of Bank of Ghana, Central Bank of Nigeria, Central Bank of Kenya, South African Reserve Bank, and Bank of Namibia.
Log RGDP	Log Real GDP	Monthly real GDP used as a proxy for economic growth.	Research departments of Bank of Ghana, Central Bank of Nigeria, Central Bank of Kenya, South African Reserve Bank, and Bank of Namibia. Research departments of Ghana Statistical Service, National Bureaus of Statistics for Nigeria and Kenya, Statistics South Africa, and Namibia Statistics Agency.
Log OIL	Log of Global Crude Oil Prices	Monthly crude oil prices per barrel used as a proxy for global crude oil prices.	World Bank website (www.worldbank.org)
Log LSE	LSE All-Share Index	Monthly LSE all-share index used as a proxy for the major global stock market indices.	London Stock Exchange website (www.londonstockexchange.com)
POL	Political Cycle	Political cycle used as a proxy for political risk.	www.un.org/africarenewal https://en.wikipedia.org/wiki/Elections_by_country

3.2. Tests and Models Used

The main models adopted for this study were fully modified ordinary least squares (FM-OLS) and dynamic ordinary least squares (DOLS).

FM-OLS regression was originally developed by Phillips and Hansen (1990) to provide optimal estimates of cointegrating regressions. The method modifies least squares to account for serial correlation effects and endogeneity in the regressors, as a result of a cointegrating relationship. Kwablah *et al.* (2014), Asiama and Amoah (2018), and Ahiabor and Amoah (2019)have argued that FM-OLS is an added improvement to the OLS estimator. DOLS is an alternative approach with certain advantages over the ordinary least squares (OLS) method, as it copes with small samples and dynamic sources of bias.

In effect, DOLS is a simple approach to constructing an asymptotically efficient estimator that eliminates feedback in the cointegrating system. Technically, DOLS involves augmenting the cointegrating regression with lags, leading to the resulting cointegrating equation error term is orthogonal to the entire history of the stochastic regressor innovations (Stock and Watson, 1993).

FM-OLS and DOLS estimates are therefore more robust in the presence of serial correlation, endogeneity, and heteroskedasticity, which are usually associated with time-series data (Phillips, 1995).

4. RESULTS AND DISCUSSION

4.1. Stylized Facts—Trends in SMR, CPI, TBILL, and EXR

4.1.1. Stock Market Index (Returns)

On average, stock market returns were highest in Nigeria for most of the period under investigation, until August 2009, when it was overtaken by South Africa (see Figure 1). Over the entire period, the stock market returns in these two countries were alternatively the highest, followed in descending order by Ghana, Kenya, and Namibia, although Kenya overtook Ghana from the beginning of 2011 when Ghanaian stock market returns fell). Stock market returns across SSA have been relatively volatile with significant structural breaks, especially in Nigeria and Ghana; although structural breaks can be observed in the other countries, they appear smoother in comparison with Nigeria and Ghana. However, stock market returns in Nigeria, and South Africa, appear to experience significant upward movements relative to the other countries.

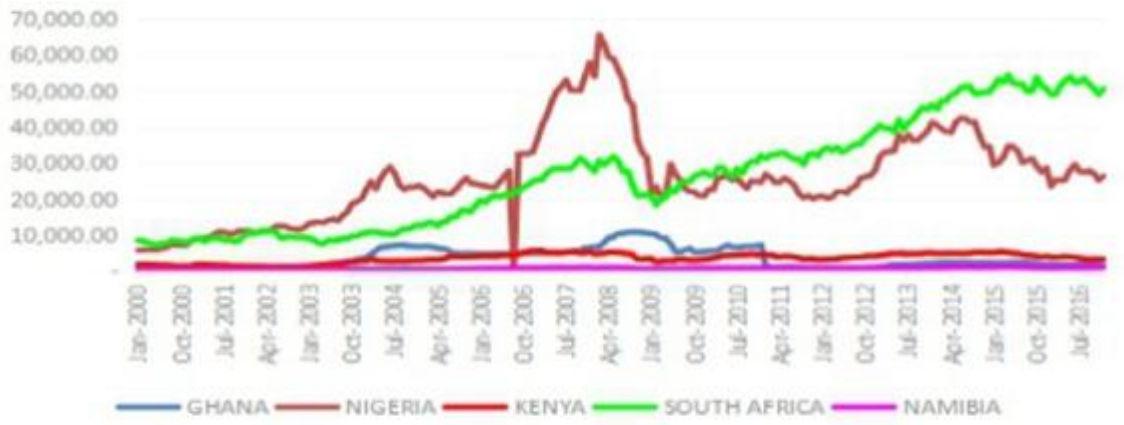

Figure-1. Trend in Stock Market Returns (Jan 2000–Dec 2016)

Source: Various Stock Exchanges.

4.1.2. Consumer Price Index

With the exception of Ghana, the CPI of the other selected countries has risen steadily and gently (see Figure 2). The sudden fall of the CPI in Ghana was a result of rebasing in May 2013.

Figure-2. Trend in Consumer Price Index (Jan 2000–Dec 2016)

Source: Various Central Banks.

4.1.3. Treasury Bills

The treasury bill rate in SSA countries seem to be the most volatile variable, especially in Ghana, Nigeria, and Kenya, with some structural breaks (see Figure 3), which would undoubtedly affect their stock market returns. The treasury bill rates in South Africa and Namibia are relatively stable, whereas the particularly high rates in Ghana are likely to have considerable adverse effects on its stock market performance.

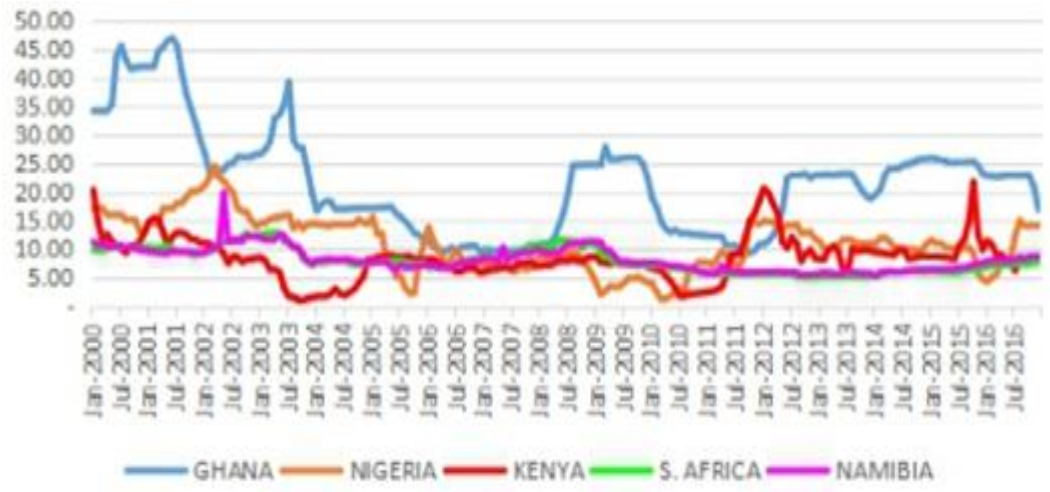

Figure-3. Trend in 91-Day Treasury Bill (Jan 2000–Dec 2016)

Source: Various Central Banks.

4.1.4. Exchange Rates

This study employs monthly data to study the effect of the explanatory, mainly macroeconomic variables, on stock market returns from January 2000 to December 2016. Figure 4 displays how the exchange rates between the currencies of the five selected countries and the US dollar have been gently increasing, with some structural breaks, over the entire period in Nigeria and Kenya; the trend was exceptional in Nigeria, where the rise was more than 100%. It is worth noting that the exchange rate between the Ghanaian cedi and US dollar has been relatively low, due to the redenomination of the cedi in 2007, which "cut off" four zeroes. Also, as the exchange rates of South Africa and Namibia were virtually the same for the entire period, the lines depicting their monthly figures overlap in Figure 4.

On the whole, the currencies of the five SSA countries have depreciated against the US dollar over period studied.

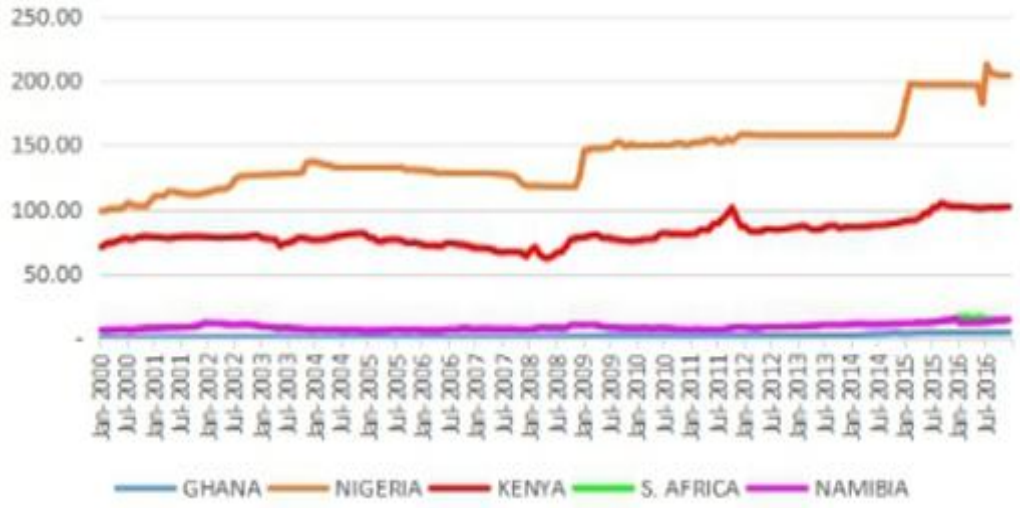

Figure-4. Exchange Rates between Domestic Currencies and US Dollar (Jan 2000–Dec 2016)

Source: Various Central Banks.

4.1.5. Global Crude Oil Prices

It is imperative to examine the trend in global crude oil prices over period January 2000–December 2016 (see Figure 5). In general, this period experienced an increase, with some declines. It would be expected that an increase would have a positive effect on crude oil-exporting countries in SSA.

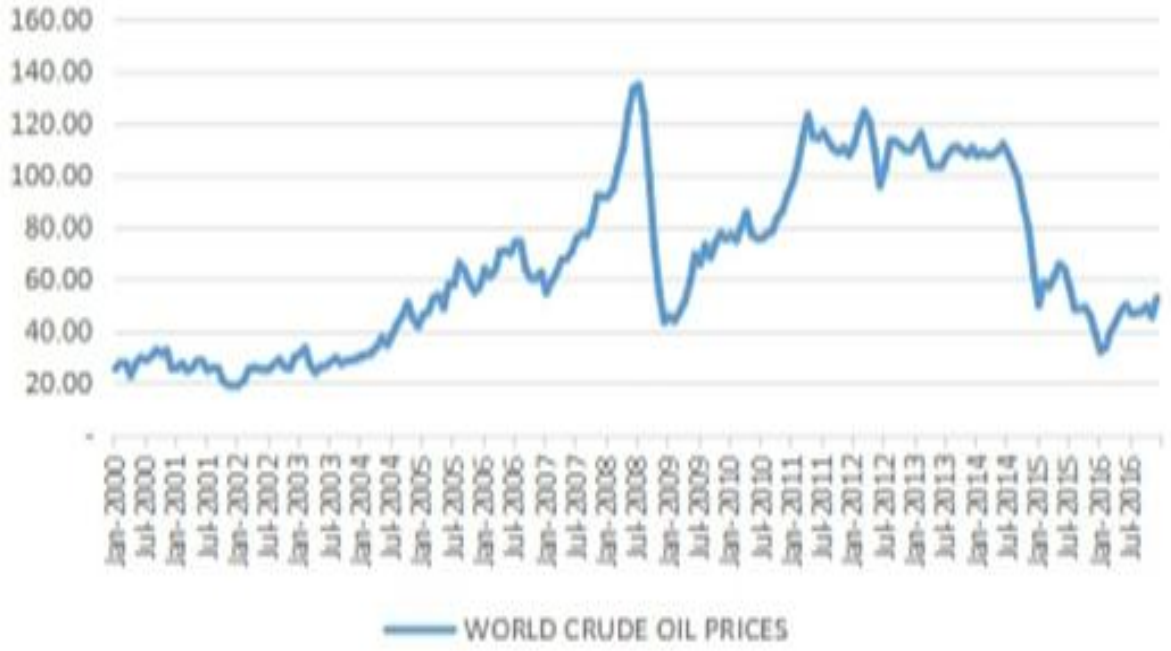

Figure-5. Trend in Global Crude Oil Prices (Jan 2000–Dec 2016)

Source: World Bank website.

4.2. Descriptive Statistics

The descriptive statistics for all five countries exhibit a positive mean (see Tables 2.1–2.5) and no randomness, which indicates that aggregate stock market prices (all-share index) and the selected macroeconomic variables are all sensitive to periodic changes and speculations. An individual investor, therefore, could take advantage of an emerging arbiter to earn a significantly higher return from the stock markets studied.

All the variables are asymmetrical. Skewness, which is the measure of deviation of the distribution from symmetry, is positive for seven Ghanaian series—a fat–tailed distribution on the right-hand side—but negative for LSE and crude oil—fat-tailed distribution on the left-hand side. For both Nigeria and Kenya, there is negative skewness, or a fat–tailed distribution on the left-hand side for five series—SMR, CPI, LSE, OIL, and TBILL—while the remaining three—EXR, RGDP, and POL—are skewed to the right. Five South African series are also negative, or skewed left—SMR, CPI, LSE, and OIL again, but RGDP this time—with the remaining three—EXR and POL once more, as well as TBILL—are skewed right. Finally, four of the Namibian series—SMR, $SMR_{(t-1)}$, CPI, and POL—are positive, or skewed to the right—and the other four—RGDP, LSE, OIL, and TBILL—are negative, or skewed to the left. The kurtosis values for all variables in every country reveal that there is no normal distribution, which is assigned a kurtosis value of 3.

Based on the Jarque–Bera test statistic and p-values, normal distribution is rejected at the 5% significance level for all variables. Except for CPI in Ghana and TBILL in Nigeria, all the other variables show p-values less than the 0.05 critical value. Thus, the implication is that the null hypothesis is rejected and the alternative hypothesis accepted because the residuals are not normally distributed; the descriptive statistics do show that the values are not normally distributed about the mean and variance.

Table-2.1. Descriptive Statistic – Ghana.

	LN_SMR	LN_SMR(t-1)	LN_TBILL	LN_EXR	LN_POL	LN_RGDP	LN_CPI	LN_OIL	LN_LSE
Mean	7.87	7.87	21.51	1.56	0.16	24.13	5.21	4.04	7.95
Median	7.72	7.72	22.77	1.04	0	24.1	5.19	4.11	7.99
Maximum	9.3	9.3	47	4.19	1	24.6	7.25	4.9	8.26
Minimum	6.61	6.61	9.13	0.37	0	23.64	4.02	2.92	7.45
Std. Dev.	0.82	0.82	9.3	1.02	0.37	0.32	0.54	0.55	0.19
Skewness	0.06	0.06	0.78	1.34	1.88	0.07	0.11	-0.26	-0.57
Kurtosis	1.6	1.6	3.29	3.57	4.53	1.56	2.91	1.82	2.51
Jarque–Bera	16.67	16.75	21.05	63.76	139.28	17.7	0.5	14.08	13.06
Probability	0	0	0	0	0	0	0.78	0	0
Sum	1598.29	1597.49	4366.87	315.71	32	4898.03	1057.73	821.06	1613.81
Sum Sq. Dev.	135.2	136.58	17488.84	209.09	26.96	20.73	59.07	60.08	7.44
Observations	203	203	203	203	203	203	203	203	203

Source: Research Departments of Bank of Ghana, Ghana Stock Exchange, and Ghana Statistical Service.

Table-2.2. Descriptive Statistics—Nigeria.

	LN_SMR	LN_RGDP	LN_CPI	LN_LSE	LN_OIL	LN_POL	LN_TBILL	LN_EXR
Mean	10.05	24.13	4.44	7.95	4.04	0.14	10.88	146.12
Median	10.12	24.09	4.46	7.99	4.10	0.00	10.78	133.37
Maximum	11.09	24.60	5.36	8.26	4.90	1.00	24.50	312.50
Minimum	8.66	23.63	3.38	7.45	2.92	0.00	1.04	98.78
Std. Dev.	0.53	0.32	0.54	0.19	0.55	0.34	4.79	37.93
Skewness	-0.67	0.08	-0.17	-0.58	-0.25	2.11	0.15	2.45
Kurtosis	3.15	1.56	1.92	2.52	1.81	5.44	2.63	10.69
Jarque–Bera	15.48	17.78	10.89	13.19	14.27	201.93	1.87	706.26
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.00
Sum	2050.43	4921.66	906.43	1621.81	824.29	28.00	2219.78	29808.63
Sum Sq. Dev.	57.72	20.98	59.68	7.45	60.74	24.16	4666.88	292058.20
Observations	204	204	204	204	204	204	204	204

Source: Research Departments of Central Bank of Nigeria, Nigerian Stock Exchange, and National Bureau of Statistics (Nigeria).

Table-2.3. Descriptive Statistics—Kenya.

	LN_SMR	LN_CPI	LN_LSE	LN_OIL	LN_TBILL	LN_POL	LN_RGDP
Mean	8.08	4.52	7.95	4.04	8.23	0.10	12.73
Median	8.24	4.53	7.99	4.10	8.26	0.00	12.74
Maximum	8.66	5.17	8.26	4.90	21.65	1.00	13.13
Minimum	6.95	3.84	7.45	2.92	0.83	0.00	12.39
Std. Dev.	0.46	0.40	0.19	0.55	3.71	0.30	0.22
Skewness	-0.95	-0.01	-0.58	-0.25	0.62	2.61	0.11
Kurtosis	2.79	1.67	2.52	1.81	4.72	7.83	1.80
Jarque–Bera	31.26	15.14	13.19	14.27	38.03	430.40	12.61
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	1648.74	921.53	1621.81	824.29	1679.27	21.00	2596.85
Sum Sq. Dev.	42.11	32.80	7.45	60.74	2792.07	18.84	9.83
Observations	204	204	204	204	204	204	204

Source: Research Departments of Central Bank of Kenya, Nairobi Securities Exchange, and Kenya National Bureau of Statistics.

Table-2.4. Descriptive Statistics—South Africa.

	LN_SMR	LN_TBILL	LN_EXR	LN_POL	LN_RGDP	LN_CPI	LN_OIL	LN_LSE
Mean	10.00	7.84	8.68	0.10	12.56	4.34	4.04	7.95
Median	10.19	7.33	7.78	0.00	12.69	4.39	4.10	7.99
Maximum	10.90	12.74	16.14	1.00	13.18	4.76	4.90	8.26
Minimum	8.90	4.93	5.64	0.00	11.91	3.87	2.92	7.45
Std. Dev.	0.65	2.13	2.39	0.30	0.46	0.26	0.55	0.19
Skewness	-0.28	0.51	1.26	2.61	-0.02	-0.10	-0.25	-0.58
Kurtosis	1.68	2.18	3.89	7.83	1.42	1.69	1.81	2.52
Jarque–Bera	17.37	14.60	60.93	430.40	21.29	14.90	14.27	13.19
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	2040.38	1598.85	1771.66	21.00	2562.48	885.16	824.29	1621.81
Sum Sq. Dev.	84.76	919.16	1158.67	18.84	42.48	13.64	60.74	7.45
Observations	204	204	204	204	204	204	204	204

Source: Research Departments of South Africa Reserve Bank, Johannesburg Stock Exchange, and Statistics South Africa.

Table-2.5. Descriptive Statistics—Namibia.

	LN_SMR	LN_TBILL	LN_EXR	LN_POL	LN_RGDP	LN_CPI	LN_OIL	LN_LSE
Mean	6.44	8.02	8.57	0.11	9.86	4.32	4.04	7.95
Median	6.64	7.61	7.80	0.00	9.86	4.33	4.10	7.99
Maximum	7.09	19.72	14.93	1.00	10.23	4.80	4.90	8.26
Minimum	5.48	5.14	5.73	0.00	9.42	3.71	2.92	7.45
Std. Dev.	0.48	2.05	2.11	0.32	0.23	0.30	0.55	0.19
Skewness	-0.51	1.23	0.98	2.45	-0.04	-0.15	-0.25	-0.58
Kurtosis	1.73	6.71	3.09	7.00	1.90	1.91	1.81	2.52
Jarque–Bera	22.40	168.03	32.88	339.66	10.36	10.87	14.27	13.19
Probability	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Sum	1313.76	1636.84	1748.74	23.00	2010.64	882.11	824.29	1621.81
Sum Sq. Dev.	47.44	855.65	907.30	20.41	10.67	18.40	60.74	7.45
Observations	204	204	204	204	204	204	204	204

Source: Research Departments of Bank of Namibia, Namibian Stock Exchange, and Namibia Statistics Agency.

4.3. Unit Root Test Results

This study investigates the time-series properties of the variables by employing the unit root to test for a stochastic trend in the regression model (Bohn, 2007). In addition, this test helps to avoid spurious regression, which is brought about by the regression of non-stationary variables. The test for stationarity test ensured that the statistical properties of the variables changed over time, as the estimation of stationarity for non-stationary variables tends to produce a misleading parameter estimate for the relationship between macroeconomic variables and stock market returns. Thus, an accurate prediction of the effect of the macroeconomic variables on stock market returns can be provided.

Table-3.1. Augmented Dickey–Fuller and Phillips–Perron Unit Root Test—Ghana.

Variables	Lag	ADF t-statistics	Test critical values @ 5%	Test critical values @ 1%	PP t-statistics	Test critical values @ 5%	Test critical values @ 1%
Log CPI	2	13.0874	2.87582	3.4630(0.000)	43.5815	2.87568	3.4627(0.0001)
Log EXR	0	19.7911	2.87568	3.4627(0.000)	19.7911	2.87568	3.4627(0.000)
Log LSE	0	143586	2.87568	3.4627(0.000)	14.4156	2.87568	3.4627(0.000)
Log OIL	0	15.2266	2.87568	3.4627(0.000)	15.1918	2.87568	3.4627(0.000)
Log POL	0	14.4787*	2.87568	3.4627(0.000)	14.1499*	2.87568	3.4627(0.000)
Log RGDP	0	14.1479*	2.87575	3.4629(0.000)	14.1479*	2.87575	3.4629(0.000)
Log SMR	0	12.0710	2.87568	3.4627(0.000)	12.2077	2.87568	3.4627(0.000)
Log $SMR_{(t-1)}$	0	12.0354	2.87575	3.4629(0.000)	12.1722	2.87575	3.4629(0.000)
Log TBILL	0	9.30984	2.87568	3.4627(0.000)	9.53629	2.87568	3.4627(0.000)

NB: All variables, except POL and RGDP, are stationary at first difference; the probability of having a unit root is in parenthesis.

Table-3.2. Augmented Dickey–Fuller and Phillips–Perron Unit Root Test—Nigeria.

Variables	Lag	ADF t-statistics	Test critical values @ 5%	Test critical values @ 1%	PP t-statistics	Test critical values @ 5%	Test critical values @ 1%
Log CPI	0	9.28215	2.87568	3.4627(0.000)	9.29194	2.87568	3.4627(0.0001)
Log EXR	1	9.93974	2.87575	3.4629(0.000)	10.1279	2.87568	3.4627(0.000)
Log LSE	0	14.3586	2.87568	3.4627(0.000)	14.4156	2.87568	3.4627(0.000)
Log OIL	0	15.2266	2.87568	3.4627(0.000)	15.1918	2.87568	3.4627(0.000)
Log POL	6	8.97615	2.87612	3.4637(0.000)	14.1421	2.87568	3.4627(0.000)
Log RGDP	2	4.94215	2.87582	3.4630(0.000)	11.5534	2.87568	3.4627(0.000)
Log SMR	2	5.27654	2.87620	3.4639(0.000)	12.9658	2.87589	3.4632(0.000)
Log $SMR_{(t-1)}$	2	5.24068	2.87627	3.4641(0.000)	12.8965	2.87597	3.4634(0.000)
Log TBILL	0	11.6861	2.87568	3.4627(0.000)	11.6590	2.87568	3.4627(0.000)

NB: All variables are stationary at first difference; the probability of having a unit root is in parenthesis.

Table-3.3. Augmented Dickey–Fuller and Phillips–Perron Unit Root Test—Kenya.

Variables	Lag	ADF t-statistics	Test critical values @ 5%	Test critical values @ 1%	PP t-statistics	Test critical values @ 5%	Test critical values @ 1%
Log CPI	0	8.80007	2.87568	3.4627(0.000)	8.80007	2.87568	3.4627(0.0001)
Log EXR	0	10.3496	2.87568	3.4627(0.000)	10.3496	2.87568	3.4627(0.000)
Log LSE	0	14.3586	2.87568	3.4627(0.000)	14.4156	2.87568	3.4627(0.000)
Log OIL	0	15.2266	2.87568	3.4627(0.000)	15.1918	2.87568	3.4627(0.000)
Log POL	6	8.97615	2.87612	3.4637(0.000)	14.1421	2.87568	3.4627(0.000)
Log RGDP	9	4.08014	2.87635	3.4642(0.000)	6.05745	2.87568	3.4627(0.000)
Log SMR	0	12.8698	2.87568	3.4627(0.000)	13.2153	2.87568	3.4627(0.000)
Log $SMR_{(t-1)}$	0	12.8420	2.87575	3.4629(0.000)	13.1816	2.87575	3.4629(0.000)
Log TBILL	2	7.20649	2.87582	3.4630(0.000)	12.57112	2.87568	3.4627(0.000)

NB: All variables are stationary at first difference; the probability of having a unit root is in parenthesis.

Table-3.4. Augmented Dickey–Fuller and Phillips–Perron Unit Root Test—South Africa.

Variables	Lag	ADF T-statistics	Test critical values @ 5%	Test critical values @ 1%	PP T-statistics	Test critical values @ 5%	Test critical values @ 1%
Log CPI	0	10.5371	2.87568	3.4627(0.000)	10.6330	2.87568	3.4627(0.000)
Log EXR	0	14.6241	2.87568	3.4627(0.000)	14.6197	2.87568	3.4627(0.000)
Log LSE	0	14.3586	2.87568	3.4627(0.000)	14.4156	2.87568	3.4627(0.000)
Log OIL	0	15.2266	2.87568	3.4627(0.000)	15.1918	2.87568	3.4627(0.000)
Log POL	6	8.97615	2.87612	3.4637(0.000)	14.1421	2.87568	3.4627(0.000)
Log RGDP	3	4.75420	2.87589	3.4632(0.000)	5.73529	2.87568	3.4627(0.000)
Log SMR	0	15.2266	2.87568	3.4627(0.000)	15.1918	2.87568	3.4627(0.000)
Log $SMR_{(t-1)}$	0	15.0307	2.87575	3.4629(0.000)	15.0110	2.87575	3.4629(0.000)
Log TBILL	1	6.98862	2.87575	3.4629(0.000)	11.0317	2.87568	3.4627(0.000)

NB: All variables are stationary at first difference; the probability of it having a unit root is in parenthesis.

Table-3.5. Augmented Dickey–Fuller and Phillips–Perron Unit Root Test—Namibia.

Variables	Lag	ADF T-statistics	Test critical values @ 5%	Test critical values @ 1%	PP T-statistics	Test critical values @ 5%	Test critical values @ 1%
Log CPI	0	13.9903	2.87589	3.4632(0.000)	14.0106	2.87589	3.4632(0.000)
Log EXR	0	12.1295	2.87568	3.4627(0.000)	12.0930	2.87568	3.4627(0.000)
Log LSE	0	14.3586	2.87568	3.4627(0.000)	14.4156	2.87568	3.4627(0.000)
Log OIL	0	15.2266	2.87568	3.4627(0.000)	15.1918	2.87568	3.4627(0.000)
Log POL	6	8.53102	2.87612	3.4637(0.000)	14.1521	2.87568	3.4627(0.000)
Log RGDP	3	4.96445	2.87635	3.4642(0.000)	5.97808	2.87568	3.4627(0.000)
Log SMR	0	14.2168	2.87568	3.4627(0.000)	14.2599	2.87568	3.4627(0.000)
Log $SMR_{(t-1)}$	0	14.1510	2.87575	3.4629(0.000)	14.1981	2.87575	3.4629(0.000)
Log TBILL	3	14.0383	2.87575	3.4629(0.000)	24.1886	2.87568	3.4627(0.000)

NB: All variables are stationary at first difference; the probability of having a unit root is in parenthesis.

To ensure robust results, both the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests are used (see Tables 3.1–3.5), which help to determine the difference of time-series data and ensure stationarity (Nyamongo and Misati, 2010). This study also uses the constant (intercept–only) scenario and assumes the null hypothesis of there being no unit root in the data series. The results indicate that all variables were non-stationary at both the 5% and 1% levels, but attained stationarity at first difference, except for POL and RGDP in Ghana which attained stationarity at these levels.

4.4. Cointegration Test Results

The results of the Johansen cointegration test, based on the trace and eigenvalues are shown in Table 4. Starting with the null hypothesis of no cointegration, this study concludes that at least one cointegrating vector occurs if the null hypothesis is rejected at the 5% significance level.

The results reveal a number of cointegrating equations for all five countries, providing evidence of a long-run relationship among the variables. The null hypothesis is thus rejected, leading to the conclusion that a long-run relationship exists between stock market indices and the explanatory variables in all the selected countries.

4.5. FM-OLS and DOLS Results

The regression results reveal very high variations in the stock market returns, explained by both the macroeconomic and political variables (see Table 5). The high R-squared values of 0.796–0.880 for the FM-OLS and 0.978–0.989 for the DOLS results indicate that the variables explain a greater part of the change in stock market returns in the selected SSA countries.

The CPI exerts a statistically and significantly positive impact on stock market returns in all the countries except Ghana. These empirical results are consistent with previous research (Choudhry, 2001; Maysami *et al.*, 2004). Stocks on these markets cannot be used as a hedge against inflation, because the positive regression coefficient implies a higher expected return is required for a higher inflation rate. The negative link between CPI and stock market returns in Ghana may be a result of the relatively high inflation over the period, which is consistent with the considerable empirical evidences that inflation rates negatively affect stock returns (Omran and Pointon, 2001).

Contrary to expectations, EXR in South Africa and Namibia are positively, though not significantly, related to stock market returns, which implies that the depreciation of their currencies reduces their stock market indices. The impact of exchange rates on stock market returns in the other three countries is negative, with the effect in Ghana and Kenya being statistically significant (see Table 5).

The FM-OLS and DOLS results show that the effect of interest rates (TBILLS) on stock market indices is negative for all countries and statistically significant for Ghana, Nigeria, and Kenya. This indicates that treasury bills represent an alternative investment opportunity to stocks: an increase in interest rates results in a more lucrative money market, leading to a tendency for greater investment in money market securities, mainly treasury bills, than stocks. This has been the bane of SSA economies, since various governments have depended on treasury bills to raise funds internally for development projects, which adversely affects the performance of their stock exchanges. The effect of treasury bills on stock market returns for South Africa and Namibia is positive, however.

The RGDP exerts a positive effect on stock market returns in all countries except Namibia. The negative result for Namibia, though not significant, is surprising, as it implies that as its economy grows, investment in sectors other than the stock market is preferred. The result for South Africa is also not significant, but is in accordance with the findings of Maysami and Koh (2000) and Daferighe and Aje (2009).

OIL is negatively related to SMR in Ghana and Namibia, with the results for Namibia being statistically significant from both the FM-OLS and DOLS estimates. This is not surprising for Ghana, which is a net importer of oil: in net oil-importing countries, oil prices are hypothesized to negatively affect stock market returns. This is due to an increase in oil prices causing a rise in production costs and a subsequent fall in aggregate economic activity, and ultimately lower stock market returns. OIL, however, is positively related to SMR in Nigeria, Kenya, and South Africa, with the results for Nigeria and Kenya not being statistically significant. The result for Nigeria is as expected, since it is considered to be one of the major oil- producing countries in Africa.

Table-4. Cointegration Test Results for Selected Countries.

	Ghana		Nigeria		Kenya		South Africa		Nairobi	
Hypothesized Number of CE(s)	Eigenvalue	Trace Value	Eigenvalue	Trace Value	Eigenvalue	Trace Value	Eigenvalue	Trace Value	Eigenvalue	Trace Value
None	0.237772	186.1508	0.202633	176.5629	0.250695	193.3838	0.260075	180.5101	0.247421	204.8693
At most 1*	0.192726	132.1205	0.199125	131.5013	0.198632	135.9505	0.192170	119.9675	0.187914	148.3036
At most 2*	0.153019	89.51605	0.169436	87.31327	0.160779	91.88495	0.115524	77.07350	0.167013	106.8821

* indicates the number of cointegrating equations (CEs)) at the 0.05 p-value level (MacKinnon *et al.*, 1999).

Table-5. FM-OLS and DOLS Results.

	Ghana		Nigeria		Kenya		South Africa		Namibia	
Variables	**FM-OLS**	**DOLS**	**FM-OLS**	**DOLS**	**FM-OLS**	**DOLS**	**FM-OLS**	**DOLS**	**FM-OLS**	**DOLS**
Log $SMR_{(t-1)}$	0.8853***	0.9931***	0.8732***	0.9872***	0.8734***	9.798***	0.8530***	0.9873***	0.9124***	0.9813***
Log CPI	-1.0701***	-0.9529**	4.4714***	4.2148***	0.5132	1.0698	1.9096***	1.8276***	1.2532***	1.1351***
	-0.298	-0.386	-0.647	-0.76	-0.811	-1.634	-0.352	-0.471	-0.283	-0.414
Log TBILL	-0.7821**	-0.6558**	-0.1192	-0.0735	-0.1686***	-0.2083**	-0.3347***	-0.2351	0.4251***	0.4182**
	-0.337	-0.488	-0.083	-0.103	-0.049	-0.082	-0.124	-0.165	-0.137	-0.194
Log EXR	-4.1972***	-3.7980***	-2.5851***	-3.0854**	-2.4779***	-2.5258***	-0.0547	-0.0733	-0.0191	-0.099
	-0.577	-0.765	-0.903	-1.215	-0.511	-0.932	-0.183	-0.275	-0.174	-0.267
Log RGDP	5.5566***	4.9905***	5.2290***	4.5781***	10.3246	-1.3225	0.1898	0.1259	-4.1744	-3.721
	-0.693	-1.037	-0.898	-1.012	-17.027	-32.909	-0.225	-0.297	-2.614	-3.646
Log OIL	-1.2598***	-1.2201**	0.1609	0.1356	0.0872	0.0517	0.3569***	0.2901**	-0.4291***	-0.4267***
	-0.342	-0.485	-0.16	-0.232	-0.122	-0.235	-0.09	-0.136	-0.084	-0.125
Log LSE	-0.3652	-0.3653	-0.021	-0.0794	0.6707***	0.7786*	0.8217***	0.7948***	0.9107***	0.9605***
	-0.657	-0.85	-0.29	-0.339	-0.244	-0.401	-0.152	-0.209	-0.151	-0.219
Log POL	0.2391	0.1632	0.2485**	0.3641***	-0.0923**	-0.0518**	0.0205	-0.0044	-0.009	0.0213
	-0.222	-0.334	-0.116	-0.141	-0.089	-0.143	-0.067	-0.089	-0.063	-0.091
Constant	-33.9270***	-28.8140**	128.3370***	117.0970***	-14.9752	11.6698	-4.7062***	-4.5146**	1.6982	0.531
	-9.408	-14.057	-19.117	-21.078	-39.774	-77.462	-1.589	-1.976	-4.876	-6.583
Observations	203	201	202	200	203	201	203	201	203	201
R-squared	0.874	0.978	0.796	0.985	0.865	0.989	0.880	0.986	0.864	0.983

Dependent Variable: Log SMR
Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

The LSE results from this study are a revelation. Its positive impact in Kenya, South Africa, and Namibia indicates that there may be common factors driving their stock markets and LSE in the same direction, whereas the negative affect in Ghana and Nigeria implies their stock markets and LSE move in different directions. Investors can benefit from this relationship by creating an international portfolio of stocks. The statistically significant results for both FM-OLS and DOLS In South Africa is to be expected owing to the collaboration between its and the UK's stock markets over the period.

The political cycle exerts a negative and statistically significant effect on stock market returns in Kenya, which is not surprising in light of its longstanding reputation as a country of political risk (Bandiera *et al.*, 2008). The results for the remaining four countries reveal that the political climate poses no threat to the performance of their stock markets, although the positive results are surprising for Nigeria, where there are usually severe conflicts during general elections.

Overall, a similarity in the pattern of South African and Namibian results depicts a common trend, which, except for a few possibly country-specific results, is also true of Ghana, Nigeria, and Kenya. In conclusion, these estimation results illustrate that the selected explanatory variables affect the stock market indices of the five SSA countries.

5. CONCLUSIONS, RECOMMENDATIONS AND IMPLICATIONS

This study reinforces the assertions of earlier researchers that macroeconomic and political factors predict stock market returns. Moreover, in addition to those few primary variables frequently studied, this study revealed the strong influence of other internal and external variables on stock market returns in Ghana, Nigeria, Kenya, South Africa, and Namibia.

It is hoped that this study's findings will help policymakers implement appropriate monetary policies to control inflation, interest rates, exchange rates and other macroeconomic variables, which will facilitate stock market development and performance in the five selected countries. Government dependence on treasury bills to raise funds for development projects should not result in a reduced demand for stocks and the exclusion of the private sector from the financial market, mainly the banking sector. Policies should constantly aim to develop and realize a sound and stable macroeconomic and political environment, therefore, to attract institutional and individual investors into the capital market and promote stock market development, stimulating economic growth.

Furthermore, policies, regulations, and laws forbidding negative and provocative pronouncements and violence, especially before, during, and after general elections should be implemented. This will attract more investment in stocks and companies to list their shares on the stock market, which will, in turn, facilitate the acquisition of equity capital and promote stock market performance and economic growth in SSA. Developments on the LSE should also be closely monitored and measures taken for the benefit of investors or to mitigate any possible adverse effects on the domestic stock market.

As with all social research, this study is not without its limitations. Ideally, more current data should have been included, but all efforts to obtain 2017 and 2018 data for all the variables proved futile.

In addition, the period covered by this study is relatively short in terms of years, due the unavailability of mainly stock exchange data; without doubt, a longer period would improve the reliability of the results would be improved by using a longer period. This limitation warranted the use of monthly data between January 2000 and December 2016 for 204 observations.

The unavailability of monthly GDP data, however, is likely to affect the empirical results from this study as well. To assist with the analysis, RGDP data had to be transformed, using the interpolation method, into monthly data, which was considered to be more reliable than the industrial production index previously employed by some scholars as an alternative proxy for economic activity and growth.

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APPENDIX

SSA Stock Exchanges Used for this Study

Table-6. Stock Exchanges.

Country	Exchange	Location	Year Established	No. Listed	Abbreviation
Ghana	Ghana Stock Exchange	Accra	1990	37	GSE
Kenya	Nairobi Securities Exchange	Nairobi	1954	64	NSE
Namibia	Namibian Stock Exchange	Windhoek	1992	44	NSX
Nigeria	Nigerian Stock Exchange	Lagos	1960	223	NSE
South Africa	Johannesburg Stock Exchange	Johannesburg	1887	388	JSE

Source: https://en.wikipedia.org/wiki/List_of_African_stock_exchanges