

DYNAMIC LINKAGE OF STOCK RETURNS AND EXCHANGE RATES: COMPARATIVE ANALYSIS EVIDENCE FROM NIGERIA AND GHANA

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ABSTRACT

This study attempts to analyze the dynamic linkage between stock market returns and exchange rate in two West African emerging economics, namely; Nigeria and Ghana. To enhance purpose of this study we employed monthly closing prices of All Share Price Index (ASPI) from Nigerian Stock Exchange and Ghana Stock Exchange market and monthly exchange rate of US dollar in terms of Nigerian (USD/Naira) and US dollar in terms of Ghana (USD/Cedes) covering the period from 2004 to 2016. First, the study performed Augmented Dickey Fuller (ADF) test to enhance integrating order of the variables. Then, we employed Johansen's Cointegration test to examine long run relationship among variables and Granger causality test to determine causal relationship between variables and Ordinary Least Square (OLS) analysis to determine relationship between stock returns and exchange rate. The results suggest that there is long run relationship between variables in Nigeria and Ghana. Furthermore, one way causality from stock returns to exchange rate in both countries and all findings are similar to both countries. Finally, OLS regression suggests that the existence of relationship between stock returns and exchange rate is seen only in Indian context.

KEYWORDS: Exchange rate, Stock returns, Cointegration, Nigeria, Ghana

1. INTRODUCTION

The performance of a stock market is a key indicator of economic condition of any economy. Scholarly evidences suggest that several macro-economic factors are affected to the performance of the stock market, namely; Gross Domestic Production (GDP), inflation, exchange rate, interest rate, money supply etc. Importantly, the ancient economic theory explored the relationship between exchange rate and stock price movements and finds that exchange rate lead to stock market returns. After-wards, many scholars attempted to examine dynamic relation among exchange rate and stock market returns and they developed arguments against the traditional approach, mainly, the portfolio approach. The portfolio approach states that the changes in the stock price movements will lead the exchange rate. The empirical investigation on this is very rich in developed countries in compared to emerging counties

2. LITERATURE REVIEW

Empirical studies on the dynamic relationship between stock returns and exchange rate were carried out by many scholars in developed countries but very limited in developing economies (Hassan and Dantama, 2017). Yet, majority of these studies confirmed the existence of linkage between exchange

rate and stock returns by adopting difference econometric approaches. The first thinking on this aspect emerged with the novel work by Frank and Young (1972) and they documented that there is no significant relationship between the stock prices and exchange rate. However, later, Aggarwal (1981) found that stock prices and US dollar is positively correlated and confirmed that relationship between stock prices and US dollar is stronger in the short run rather than long run. Further, he argued that changes in the exchange rate influenced to changes in profit and loss in multinational firms' balance sheet which induce the fluctuation of stock market prices.

Moreover, Abdalla and Murinde (1997) examined the long run relationship between stock price index and real effective exchange rate in four Asian countries; Pakistan, Korea, India and Philippine using cointegration and causality approaches. They found that long run association between exchange rate and stock price index for India and Philippine but no long run relationship was found for Pakistan and Korea. Their findings reported that unidirectional causality from exchange rate to stock price for four countries. Similarly, Muhammad, Rasheed and Husain (2002) applied cointegration test, Vector Error correction model and granger causality to study the relationship between stock market prices and exchange rate. The results suggest that short run and long run association among variables in Nigeria, Ghana, Cameroon and Togo. However, they revealed that bidirectional causality exist in Togo and Ghana. On other hand, Oskooe and Sohrabian (1992), Nieh and Lee (2001), Ramasay and Yeung (2005) and Abidin (2013) have contend that insignificant of long run equilibrium between the stock prices and exchange rates. Rahman and Uddin (2009) argued that no long term equilibrium among stock prices and exchange rate in three emerging south West African countries: Cameroon, Nigeria and Ghana. Their study implies that no causal relationship between stock prices and exchange rate. They adopted Cointegration analysis and granger causality test for study.

Furthermore, findings of Ono's (2009) indicated that there was no cointegration between stock prices and exchange rate. His findings show bidirectional causality among variables. The empirical work of Bala and Hassan (2071) revealed that absence of long run association between stock prices and exchange rate in Nigeria. Also, Granger causality test results shows that unidirectional and bidirectional causal relationship between stock prices and exchange rate. Malarvizhi and Jaya (2012) also found that long run equilibrium and bidirectional causality between Movement of effective index and exchange rate.

Also, Yahaya and Shitu (2015) examined the impact of stock returns and exchange rate on conditional stock market volatility in Nigeria. They applied generalized autoregressive conditional heteroscedasticity (GARCH) and Quadratic GARCH model in their analysis with monthly series data spanning from 2000 -2013 were used. The results of their analysis indicate that stock returns and exchange rates exact significance influence on conditional stock market volatility. Because of that they are of the view that the findings are of great significant to policy maker, stock brokers and investors operating in Nigeria economy.

Further extending the body of knowledge in the field, Ali, Anwar and Ziaei (2013) revealed that bidirectional and unidirectional causal relationship among stock market prices and exchange rate in Brazil, Russia and India based on three sub periods: Pre crisis, crisis and post crisis but China not provided evidence for causal relationship between stock market prices and exchange rate. In crisis period, Brazil showed bidirectional and Russia, India showed unidirectional relation moving from stock market and exchange rate. Russia showed bidirectional and Brazil indicated unidirectional causality in crisis and post crisis period. Relationship between stock prices and exchange rate variability in Nigeria was studied by Asekome (2013).and found positive Cointegration among variables and bidirectional granger causality between US exchange rate movements and Nigerian stock market prices. Hussain and Bashir (2013) suggest that long run association among exchange rate and stock return volatility is weak in Ghana, Nigeria and Togo and findings implied that no causality between variables in all sample countries.

Finally, Bala and Hassan (2017) explored the dynamic relationship between exchange rate and stock returns in Nigeria Stock Exchange Market. They employed Granger causality test and regression in explaining the relationship between exchange rate and stock returns. The result implies that one way causality of stock returns was granger cause with exchange rate. However, regression results demonstrated that no relationship between exchange rate and stock return. Similarly, Kayani, Hui and Gulzan (2015) also provided supportive evidence of long run equilibrium among exchange rate and stock returns and showed that global stock returns have significant impact on Togo and Cameroon in crisis period but not on their exchange rates and also it has significant impact on exchange rate in Nigeria and Ghana but not on their stock returns.

In summary, the accumulated previous evidences suggest that the link between the stock market prices/indexes highly, debated topic in the recent past. Those findings are essential to investors, policy makers; market practitioners and economists for understanding dynamic relationship between exchange rate and stock returns. It further revealed that the documented evidences not yet conclusive enough to rely on policy decisions for the stakeholders. The mixed results made us to re-visit the previous approaches with most recent data in two countries, Nigeria and Ghana. Both countries are emerging economics and powerful countries which located in the West African region.

Thus, this paper aims to examine dynamic relationship between stock market returns and exchange rates in Nigeria and Ghana. Further, this study focuses on exploring the long run relationship between stock returns and exchange rate in the context of West African emerging economics. Testing of the long run relationship is important to policy makers as one variable is predictable on the basis of past values of other variables.

3. METHODOLOGY

3.1. Data

To begin the econometric analysis, as the first step, monthly data from January 2000 to December 2016 are used for this empirical study for both countries. This study applied monthly exchange rate of US dollar in terms of Nigerian Naira (USD/Naira) and US dollar in terms of Ghana Cedes (USD/Cedes). As the proxy for stock market performance monthly closing values of All Share Price Index (ASPI) of CSE and monthly closing values of CNXNIFTY Index of Ghana Stock Exchange Market (NSE) are subjected for the analysis.

3.2. Test of Stationarity

The stationary data series is a pre-requisite for the time series regression analysis due to the fact that non-stationary time series data can mislead the parameter estimates of the variables in the model. Thus, in order to achieve data series stationary we employed Augmented Dickey Fuller (ADF) tests. Augmented Dickey Fuller (ADF) estimation equation (1) is given as follows;

$$\Delta y_t = a_0 + a_1 t + \delta y_{t-1} + \alpha_i \sum_{j=1}^p \Delta y_{t-j} + \varepsilon_t$$

Where, y_t is time series to be tested, a_0 represents constant and δ is parameter to be estimated and ε_t is the error term. For carrying out the ADF test the null hypothesis of $H_0: \alpha=0$ (non-stationary) is tested against the alternative hypothesis of $H_1: \alpha \neq 0$ (stationary). If the null hypothesis is rejected, that means data series is stationary.

3.3 Test of cointegration

We conducted Johansen Juselius Cointegration test to determine whether there is long term equilibrium between exchange rate and stock returns in Nigeria and Ghana. In 1988, Johansen Juselius used the Cointegration test to determine long term association between economic variables. For example, Zubairu, (2013), Malarvizhi and Jaya (2012), Hussain and Bashir (2013), Kayani, Hui and Gulzan (2015) Abidin & etl (2013), Rahman and Uddin (2009) also used Johansen's Cointegration test for assessing long term association between exchange rate and exchange rate. Moreover, Caporale (2004), Liu and Sinclair (2008), Buelens (2006), Bayar (2014), Osamwonyi & Kasimu (2013), Shahbaz (2008) employed Johansen's cointegration test for investigating long run relationship between two economic variables. Trace statistic and Maximal Eigen value statistics were used to test null hypothesis of no cointegration among variables against the alternative hypothesis of cointegration. Engle and Granger (1987) revealed that the evidence of cointegration rules out spurious correlation and suggests the presence of at least one direction of Granger causality.

3.4 Test of granger causality

This study employed the granger causality test for determining causal relationship between Stock returns and exchange rate in Nigeria and Ghana. Moreover, Granger causality test result used to

determine direction of the causal relationship among variables. Direction can be uni-directional or bi-directional. This procedure is widely used for the purpose for example, Ajayi and Mougoue (1996), Abdalla and Murinde (1997), Wu (2000), Smyth and Nandha (2003), Li and Huang (2008), Aydemir and Demirhan (2009), Tahir and Wong (2010) also used Granger causality test to investigate relationship among stock prices and exchange rate.

Granger Causality test is specified here as follows (2) and (3);

$$\Delta SP_t = \beta_0 + \sum_{i=1}^q \beta_{1i} \Delta SP_{t-1} + \sum_{i=1}^q \beta_{2i} \Delta ER_{t-i} + \varepsilon_{1t}$$

$$\Delta ER_t = \varphi_0 + \sum_{i=1}^r \varphi_{1i} \Delta ER_{t-1} + \sum_{i=1}^r \varphi_{2i} \Delta SP_{t-i} + \varepsilon_{2t}$$

Where, SP is stock returns and ER represents exchange rate. t denotes number of time periods and ε denotes uncorrelated error term.

3.5 OLS regression analysis

The results of the Granger causality test indicate the direction of the causal relationship of variables. It is important to determine which variable is dependent variable (Y) and independent variable (X). By fitting the OLS regression on determined Y and X variable, can be examined the relationship between variable

OLS regression Model is given below,

$$Y = a + \beta x + \varepsilon, \tag{4}$$

4.0 Results and Discussion

Table 1 displays the results of optimal lag selection test. According to the lag selection test results, we selected lag 2. Because out of six lag selection criterions three criterions were concluded number of optimal lags are two.

Table1: Results of Lag selection test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-4026.760	NA	2.66e+15	46.86930	46.94250	46.89900
1	-2873.814	2238.859	4.83e+09	33.64900	34.01499*	33.79750
2	-2838.756	66.44726	3.87e+09*	33.42740*	34.08618	33.69468*
3	-2828.615	18.75041	4.14e+09	33.49552	34.44709	33.88159
4	-2816.813	21.27103	4.36e+09	33.54433	34.78869	34.04920
5	-2801.676	26.57669	4.41e+09	33.55437	35.09152	34.17804
6	-2782.462	32.84282*	4.27e+09	33.51700	35.34694	34.25945

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Table 2 summarizes the results of Augmented Dickey Fuller (ADF) test in constant. The ADF test results reveal that the return series of ASPI and CNX NIFTY are stationary in level series at the 1% significant level. However, exchange rates are non-stationary in level series and then, the series is transformed to first difference this resulted for the stationary pattern at the 1% significant level. It assures the eligibility of data series for further applications of econometric models.

Table 2: Test results of the unit root test

Series		ADF (Constant)
ASPI	Level	-11.81*
	1 st Difference	-12.91*
CNX NIFTY	Level	-13.41*
	1 st Difference	-11.61*
USD/NIG	Level	-1.742
	1 st Difference	-16.17*
USD/GHN	Level	-0.292
	1 st Difference	-12.92*
1% level	-3.46	5% level -2.88
		10% level -2.57

Notes:* shows significant at 1% significant level

Similarly, the result of Johansen’s Cointegration test is shown in Table 3. Both Trace and Maximum Eigenvalue are reported as test statistics. The Trace value and Maximal Eigenvalue revealed evidence to reject the null hypothesis of no cointegration vectors at the 5% significant level for Sri Lanka as well as India. That means existence of long run equilibrium between exchange rate and stock market returns in Nigeria and Ghana is observed. Engle and Granger (1987) stated that the evidence of cointegration rules out spurious correlation and suggests the presence of at least one direction(s) of Granger causality. As noted before, this study also applied granger causality test to determine causal relationship between exchange rate and stock market returns. The Table 4 presents the test statistics of granger causality test.

Test statistics of Johansen’s cointegration test

Variables	H ₀	Trace Test		Maximal Eigenvalue	
		Test Stat	5% C. V.	Test Stat	5% C. V.
LKR & ASPI	r = 0	49.24	15.49	33.32	14.26
	r ≤ 1	15.91	3.84	15.91	3.84
INR & CNX	r = 0	48.63	15.49	29.44	14.26
	r ≤ 1	19.18	3.84	19.18	3.84

Table 3: Test statistics of Johansen’s cointegration test

The test of Granger causality between exchange rate and stock market returns showed that there is causality between exchange rate and stock returns. The results suggest that the one way causality among exchange rate and stock market returns in Nigeria and Ghana. The direction of causality is same for two countries and that from stock market return to exchange rate. Exchange rate does not appear to cause from exchange rate to stock market returns. Moreover, it clearly shows that stock return is the independent variable (X) and exchange rate is the dependent variable (Y) for both countries.

The results of Granger Causality test

Direction	2004/2016
	P value
NGRN → ASPI	0.1449
ASPI → NGRN	0.00251*
GHNC → CNX	0.2615
CNX → GHNC	0.0008*

Notes:* shows significant at 1% significant level

Table 4: The results of Granger Causality test

Table 5 presents the results of OLS regression for both countries which demonstrates that the regression results of, ASPI is 0.136 and null hypothesis of no relationship between stock returns and exchange rate is accepted at 1% significant level. The result of Ghana, null hypothesis is rejected as the P value is significant. It is concluded that there is a negative relationship between stock returns and exchange rate in Ghana and in Nigeria is not observed.

Table 5: Results of the OLS Regression

Country	Model	B	Std. Error	T	Sig.
Nigeria	Constant	.351	.095	3.688	.000
	ASPI	-.001	.000	-1.499	.136
Ghana	Constant	.157	.066	2.376	.019
	CNX	-.001*	.000	-5.441	.000

Note: *denotes significant at 5% significant level

Table 5: Results of the OLS Regression

5.0 CONCLUSIONS AND RECOMMENDATIONS

This study attempted to examine the dynamic linkage between exchange rate and stock returns in the case of Nigeria and Ghana by using monthly time series data from 2004 to 2016. We used Augmented Dickey Fuller test to find integrating order of variables. Johansen cointegration estimation is employed to confirm long run equilibrium among exchange rate and stock returns and granger causality test is used to determine causality between exchange rate and stock returns. The Cointegration test confirmed that long run relationship between exchange rate and stock market returns in Nigeria and Ghana. In addition, this study finds a causal relationship from stock market returns to exchange rate for Nigeria and Ghana, suggesting that stock returns affect behavior of exchange rate in both countries. Therefore, this study suggests that the stock return influences to exchange rate in Nigeria and Ghana. However, regression results suggest that only the Ghana stock market performance matters for the fluctuation of exchange rate while does not matter for Nigeria, implying that the past data of one variable can be used to predict the future behavior of the other variable only for Nigerian economy. The possible reason for this interesting finding can be the degree of openness of the economy for the foreign markets. Nigeria economy is more open to global economy than Ghana economy.

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