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RELATIONSHIP BETWEEN STOCK MARKETS IN AFRICA: A CASE OF FIVE SELECTED COUNTRIES

Abdifitah Mohamed Jama DEER

Istanbul Commerce University,Turkey

Ayben KOY

Istanbul Commerce University, Turkey

Abstract

This article aims to analyze the relationship between the stock markets in Africa (Egypt, Kenya, Morocco, Nigeria and South Africa). The sample used in the study is beginning from 2009 to 2018 in a weekly data range. The main findings in the study are: (1) price indices of Casablanca stock exchange are not influenced by other stock markets in the long run (2) Egyptian stock market can be used to predict the Kenyan stock market but not Morocco, South Africa, or Nigeria, (3) South African stock market can be used to predict the Egyptian, Nigerian, and Kenya stock markets, and (4) Johannesburg stock exchange plays a vital role in effecting the stock prices of other African countries.

Keywords: *Stock Market, Causality*

1. Introduction

One of the results of globalization is a free flow of capital speculations, dominatingly from developed markets to developing nations such as Asia, Africa, Eastern Europe and South America (Adjei, 2015, p.7). A large number of such emerging and frontier economies have come a long way with democratic governance, accountability and upgrades in their financial administration, which has led to strengthened institutions and administrative frameworks. As of 2012, the emerging economies had contributed 38% of worldwide GDP which could ascend to 63% by 2050 (Adjei, 2015, p.8).

Statistics show that the African continent has yet to play a unique role in global economic growth, though the potential exists. Nonetheless, some of the world top growing economies are in Sub-Saharan Africa (IMF, 2015). Between 1995 and 2013, the economy of Sub-Saharan Africa grew at 4.5% per annum on average (World Bank, 2015). Commonly, many African face issues that limit speculation, such as obsolete business laws and guidelines, poor infrastructure, challenges in getting to money related capital, resolute and complex duty approach, and frequent conflicts that have resulted to regional instability.

The formal financial markets in Africa have developed from the last two decades (Ntim et al., 2011). The considerable growth in formal financial markets was brought by the establishment of several capital and money markets in Africa. From the mid-1990s, African nations sold the vast majority of their stakes of public organizations to provoke the development of the private sector (Ly, 2011, p.6). There has been an increased number of African nations setting up stock markets from 18 in 2002 to 29 active stock markets in 2018 (Coetzer, 2018). This mirrors a picture of readiness to grow and eventually overcome any gap between Africa and other nations across the globe. The aim behind the creation of stock trades in Africa was to mobilize national resource and attract foreign investors (Mahama, 2013, p.6).

In general, African stock markets can't flaunt an exceptionally outstanding share of the world market capitalization yet (Coetzer, 2018). There has however been at least one African stock trade on the world top ten best performing stock markets. This is viewed as an impression of the endeavors on the headway of stock trades in the African district. It is an inspiration for both neighborhood and remote financial specialists to think about putting resources into African stocks. The rise of African stock markets has raised worries about the mix of African stocks as money related center point with the influence of pulling in universal financial specialists to Africa (Mahama, 2013, p.7).

In this study, the stock market for five countries in the last ten (10) years are analyzed in a weekly data range. The five countries (Egypt, Kenya, Morocco, Nigeria and South Africa) position themselves as the giants in the African region. They also command the highest stock market in the entire African continent.

Stock markets in Africa represent a quickly developing portion of the world economy. They offer conceivably exceptional returns. In the last decade, some of the best performers in the stock market have hailed from this region. Experimentally, it has been shown that albeit individual developing stock markets have been volatile, their risk-balanced return in groups has been higher than their counterparts in developed markets.

2. Literature Review

2.1 History of Development of African Stock Markets

African Stock Markets have indicated an aggregate indication of agile development and improvement after some time. In 1987, the stock market had only eight stock exchanges, and by 2018 it had a total of 29 stock markets from a total of 38 countries (Coetzer, 2018). The oldest stock exchange is the Egyptian stock exchange which was established in 1883 (ASEA, 2012). It is thus correct to say that African stock exchanges have been in the market for quite some time.

African stock markets differ significantly in institutional and market infrastructural attributes. Ntim (2012) offers a five-tier characterization of African stock markets. The first level consists exclusively of South Africa – the most well built up, the biggest, and one of the early established financial exchanges in Africa. The second level comprises of several medium-size markets among them Egypt, Tunisia, Nigeria, Morocco, Kenya, and Zimbabwe (Ntim, 2012).

The third level is comprised of new and small, however quickly developing markets, consisting of Ghana, Cote d'Ivoire, Namibia, Mauritius and Botswana (Ntim, 2012). The fourth level comprises of exceptionally new and small markets, including Libya, Sudan, Uganda, Tanzania, Mozambique, Malawi, Zambia and Swaziland. The fifth tier includes seven markets, to be specific; Algeria, Cameroon, Gabon, Cape Verde, Rwanda, Angola, and Sierra Leone, which either regardless of having been in presence for moderately longer time are not widely known or are not formally known in light of the fact that they are essentially excessively youthful (Ntim, 2012).

Among the five stock markets under this study, the oldest market in Egyptian stock exchange founded in 1883 followed by Johannesburg stock exchanged founded in 1887. Casablanca stock exchange was established in 1929 while the Nairobi stock exchange was started in 1954. The youngest among the five is Nigerian stock exchange which was launched in 1998. All the stock markets are located in their respective countries capital cities (Coetzer, 2018).

2.1.1. Egyptian Stock Exchange (Egypt)

The Egyptian Stock Exchange (EGX) is the oldest stock exchange in Africa. Though in Africa, the market is in most cases counted as a Middle East stock market. The number of firms trading with the EGX has increased tremendously over the years (African Securities Exchanges Association (ASEA), 2018). The EGX trades in stocks, funds and known related items issued by specific global monetary organizations. The EGX has task instrument where there are potential outcomes of intraday and online exchanging availabilities, which shows how well the stock trade has developed throughout the years. The EGX has kept its performance consistently throughout the years.

In 2014 the EGX was positioned second by the MSCI lists in 2013 and number one among developing business sector peers in two years spreading over 2012-2014 (ASEA Yearbook, 2014). In the year ending 2012, it was voted the most lucrative securities exchange by garnering 49.56%. This may be credited to the European predicament, preparing for expansion into developing markets. The main index under the EGX is the EGX 30 which includes 30 listed companies.

2.1.2. Casablanca Stock Exchange (Morocco)

The Casablanca Stock Exchange (CSEX) was initially known as was known as the "Office de Compensation des Valeurs Mobilières." It is Africa's third biggest Bourse after Johannesburg Stock Exchange and Nigerian Stock Exchange (ASEA, 2018). In January 1997, Morocco enacted a law making further enhancements to securities exchange organization. In 2000 the name of the stock market was further changed from Société de la Bourse des Valeurs de Casablanca (SBVC) to Casablanca Stock Exchange. In January 2007, the CSE upgraded its visual character with a desire to help its adjustment in size.

Formation of a Casablanca Stock Exchange follow-up council made by the Board chiefs for the redoing of the rules of the organization was done in December 2008. The CSE officially received corporate governance with Board of Directors and General Management in April 2009. In 2015 CSE recorded a value turnover of US$ 20.4 billion with 130 exchanges. The Stock trade which recorded a total market capitalization of US$ 45,763,178,295 in 2015, and had a sum of 75 listed firms. The CSX has two indices; Morocco All share and FTSE CSE Morocco 15 Index.

2.1.3. Johannesburg Stock Exchange (South Africa)

Johannesburg Stock Exchange (JSE) is one of the most established markets in Africa. JSE is currently positioned nineteenth biggest stock trade globally and the greatest in Africa as far as market capitalization (ASEA, 2018). The JSE is a member of World Federation of trades after joining 1963. The JSE has more than 395 listed firms (Johannesburg Stock Exchange, 2018). JSE has an automatic trade service.

In 2010, total trade raised to $438.08 billion from $374.00 billion in 2009. In 2015, its sum market capitalization was 756.8 billion USD. It recorded a turnover of 392.6 billion USD with a total of 61,894,253 exchanges. The JSE index is JSE/FTSE all share index with approximately 99% of the market capitalization. This study will utilize the FTSE/JSE Africa All-Share as a stock market representing South Africa.

2.1.4. Nairobi Securities Exchange (Kenya)

Nairobi Securities Exchange (NSE) was set up in 1954 (ASEA, 2018). NSE has throughout the years experienced numerous changes to turn into the most exceptional stock trade in the East Africa region and a standout amongst the most lucrative markets worldwide (Ventures Africa, 2013). The NSE has developed into a full securities service exchange dealing with derivatives, debt, clearing, and repayment of equities and other related instruments (Nairobi Securities Exchange, 2018). It is one of only a few stock exchanges with live exchanging through computerized trading services. In 2015, with 63 listed firms, NSE recorded a market capitalization of US$20 billion. Its turnover was US$2,045, and it had 406,634 exchanges amid a similar period. It is a price weight index, and the individuals are chosen dependent on weighted market performance for a year: 40% for Market Capitalization, 30% for Shares Traded, 20% for Number of deals 20%, and 10% for Turnover (ASEA, 2018).

The NSE has one major index which is the NSE-20 started in 1994. The index return of the NSE-20 is fundamentally founded on capital increase/decrease of the 20 most prominent securities recorded The study will use the NSE 20-Share Index (NSE-20) to determine the stock market of Kenya as its members make up 80% of the stock trade in the country.

2.1.5. Nigerian Stock Exchange (Nigeria)

Nigerian Stock Exchange (NGSE) was built up in 1960. It was officially started in 1961 with a total of 19 listed firms. The total number of listed firms has risen to 184 companies by 2018 (Nigeria Stock Exchange, 2018). The managing body is the Securities and Exchange Commission (SEC) while its certification comes from Investments and Securities Act (ISA). The listed firms hail from 11 key sectors among them financial services, construction, agriculture, and consumer goods. In 2015, it recorded a total market capitalization of US$49,456,969,735, and it had 184 registered organizations. Around the same time, it registered a turnover of US$3,931,503,298 and had 917,946 exchanges.

The NGSE has two main indices; the NGSE 30 Index and the NGSE All-Share Index (ASI) (Nigeria Stock Exchange, 2016). In the year 2012, the NSE all offer Index shut the year with its most astounding execution since 2008 with a 35.45% addition. All out exchange an incentive in the year-end 2013 was terrific and has been same in earlier years and volume of trade developed from 89 billion of every 2013 to 105 billion out of 2013, connoting the potential displayed by the market. Additionally, market capitalization for the years 2010, 2011, 2012 and 2013 has been $53.40, $43.06, $57.77 and $80.69 billion, of course clarifying the development in the market and its chances accessible to financial specialists (ASEA, Yearbook, 2014).

2.2. Empirical Review

In the US and Norway, Næs, Skjeltorp and Ødegaard (2011) set out to demonstrate that financial exchange liquidity is a fitting driving marker of the real economy. Concentrating on the year 1947 – 2008, Næs et al. (2011) picked various liquidity estimates dependent on their requirement for a sensibly prolonged time series. To quantify the condition of the real economy, the indicators utilized are unemployment, real consumption, real GDP and real investment. The study uses the VAR methodology. Næs et al. (2011) finds a significant relationship between liquidity and the real economy (30). Moreover, it is discovered that there is a connection between time difference in market liquidity and the adjustments in interest in the stock market.

A Chile study by Brandao-Marques (2016) examines the liquidity of the stock market in the Chilean stock exchange. Time series is used to test the cyclical behavior and liquidity (6). A total of 23 emerging markets are included for the year ranging from 2003 to 2014 using panel regression. (Brandao-Marques, 2016: 8). It is discovered that market liquidity improved with a better assurance of minority investors. Brandao-Marques (2016) noted the likelihood that the positive connection among liquidity and financial specialist assurance is a minor impression of the cross-country disparity of the significance of institutional speculators, similar to insurance agencies, annuity reserves and shared assets (12).

In Taiwan, Hoang, (2017) examines the connection between liquidity and stock returns. The study covers the period from 2007 to 2014. The study utilize the CAPM Three Moment model and the Fama – French model. Results of the investigation establish a positive connection between illiquidity proportion and stock returns.

In Poland, Lischewski and Voronkova (2012, p.13) explore the impact of value, size and liquidity on stock return in the most exceptional stock trades in the country. Results in this market are steady to those in developed markets as far as market, estimate, book – to – market yet could barely completely clarify whole equity premium notwithstanding when incorporating liquidity factor in the model. Liquidity factor, however, assumes a job in diminishing event of the measurably huge hazard balanced abundance return, has no proof as an estimated factor in this market (Lischewski & Voronkova, 2012, p.21).

A study conducted in Latin America examine the relationship among four (4) Latin American nations to be specific Argentina, Brazil, Chile and Mexico while utilizing the U.S market as linkage (Diamandis & Drakos, 2010, p.384). The dynamic relationship between stock and foreign trade markets are analyzed by utilizing a cointegration approach. Moreover the markets show their connections with the United States market (Diamandis & Drakos, 2010, p.386).

In China, Jayasuriya (2011, p. 420) analyze the inter-linkages between the Chinese stock and the emerging markets in its neighborhoods. Vector autoregressive (VAR) model is employed in this study. Monthly data covering the year 1993 to 2008 was used for the countries including the Philippines, Thailand, Indonesia, and China. Results indicated that China stock market had a controlling role in the return behavior of the other markets throughout the years. This is evidence that stuns originating from China are incredibly felt in different markets (Jayasuriya, 2011, p.422). The markets were found not to be interrelated, but instead, there is a dimension of connection among China and different markets when foreign investor return is represented.

Focusing on Asian markets, Ali, Butt, and Rehman (2011, p.398) explored co-developments among developing and developed stock markets. The stock markets in the study included Pakistan, China, Taiwan, Malaysia, Indonesia, Singapore, Japan, UK, and the USA. Monthly data for the period ranging from July 1998 to June 2008 was used. Ali et al. (2011, p.401) employed the Gregory and Hansen cointegration test, the Johansen cointegration test, Engle-Granger cointegration test, and Granger causality test. The outcomes from the investigation demonstrated that there is no cointegration connection between the Pakistani securities exchange and the Malaysia, Taiwan, Singapore, UK and USA markets. Pakistani stock market was observed to be cointegrated with China, Indonesia, India, and Japan stock markets (p.402)

Using African stocks markets, Alagidede, Panagiotidis, and Zhang (2010) analyzed the level of integration between African markets, emerging markets and developed markets. African countries were represented by Kenya, Egypt, South Africa and Nigeria. The emerging markets selected were India, Brazil and Mexico while the UK, Japan and USA represented the developed markets. Bivariate cointegration tests were run (Alagidede et al., 2010: 4). The outcomes demonstrated the presence of a long-run connection among Egypt and Japan, Kenya and Japan, and South Africa and Brazil. Conversely, African markets had no cointegration amongst each other. Breitung test found a cointegration between only Egypt and Brazil, and Egypt and South Africa (Alagidede et al., 2010: 9).

The frontier economies (Tunisia, Ghana, Kenya, Ivory Coast, Mauritius and Botswana) and IFC Global category (Egypt, Morocco, Nigeria and South Africa) are analyzed by Agyei-Ampomah (2011) beginning from 1998 to 2007 in a monthly data range. Results have got low dimensions of the connection between's African stock markets. Besides, no proof of integration is found between them and the worldwide stock markets except for South Africa (Agyei-Ampomah, 2011: 12).

Ncube and Mingiri (2015) compare Johannesburg stock exchange to other African countries. Using a monthly data beginning from 2000 to 2008, Johansen and Julius cointegration methods are used. Ncube and Mingiri (2015) notes a division of the different value markets. The consequences of whether world market exercises influence the African equity markets additionally proved positive.

In South Africa, Vacu (2013) analyze the long-run relationship between the stock market and the development of the economy. Quarterly data is used covering the years 1990 to 2010. All share index, turnover ratio, market capitalization and GDP are analyzed by Johansen cointegration test, Vector Error Correction Model (VECM) and Granger causality tests. Results indicate a long run relationship existing between the factors.

Focusing on three African countries, Osamwonyi and Kasimu (2013) examine the causal and direction of the relationship for the countries Ghana, Kenya, and Nigeria. In the period beginning from 1989 to 2009, Granger test for causality is employed. Outcomes indicate that the stock market for Nigeria and Ghana have got no causal connection to economic development. In Kenya, a unidirectional and bidirectional causal relationship is found. The unidirectional causality that moved from the Stock market to GDP is found in market capitalization and number of listed securities. The bidirectional causality is found in the ratio of stock turnover and GDP (Osamwonyi & Kasimu, 2013, p.88).

Mohanasundaram and Parthasarathy (2015) examined the presence of securities exchange relationship and cointegration between India, South Africa, and the USA. The study employed the Johansen-Juselius multivariate cointegration approach. A month to month estimations of the market major indices (for example the Indian National Stock Exchange CNX NIFTY 50, the JSE Africa All Share file and the NASDAQ Composite) are utilized. The study covers the period from April 2004 to March 2014. Correlation test revealed high degrees of connection between the markets (481). Granger causality test is also run, and results show unidirectional causality relationship between the NIFTY 50 and JSE All Share index (483).

3. Empirical Results and Analysis

3.1. Descriptive Statistics

Business performance is a multi-dimensional concept (Hofer, 1983; Lenz, 1981) as it depends on a large number of different decisions, actions and measures. That's why it is used in several research areas. For this reason, parallel to the study discussed in the literature, the following sub-dimensions will be analyzed briefly in this section.

3.1.1 Financial Performance

The mean, median, maximum and minimum data of the respective stock market prices of the selected countries are as shown in Table 2. As shown in the table, Nigeria (318.3987) has got the least standard deviation followed by Kenya (690.6346). The standard deviation for Morocco, Egypt and South Africa are 1318.455, 3581.288 and 8920.007 respectively.

Egypt, Kenya Morocco and Nigeria have got a positive skewness indicating that their data are skewed toward the right. South Africa shows a negative skewness indicating that the data tends towards the left. The kurtosis of Egypt is close to the recommended value of 3 (at 2.732502). The value of kurtosis for other countries is less than the recommended value, 1.947046 for Kenya, 1.755484 for morocco, 1.772826 for Nigeria and 1.676452 for South Africa. The probability value of less than 5% (0.00 for all the five countries) confirms that the data is not normally distributed. The results imply that the data under study is not normally distributed.

Table 1 Descriptive Data

	CSE	ESX	JSE	NGSE	NSE
Mean	10662.31	8448.922	39463.43	1370.559	4053.810
Median	10450.14	7281.740	43217.96	1304.355	3970.530
Maximum	13292.27	18363.29	54530.63	2062.610	5491.370
Minimum	8413.720	3614.040	23111.25	829.2600	2755.000
Std. Dev.	1318.455	3581.288	8920.007	318.3987	690.6346
Skewness	0.195034	0.936332	-0.330085	0.273139	0.114177
Kurtosis	1.755484	2.732502	1.676452	1.772826	1.947046
Jarque-Bera	33.45244	70.37573	43.02287	35.48605	22.83022
Probability	0.000000	0.000000	0.000000	0.000000	0.000011

3.2. Stationarity Tests

Stationarity tests are used to check the presence or absence of unit root. If a model has unit root it is said to be non-stationary while absence of unit root indicates a stationary model. In this study, both Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test were applied.

3.2.1 Unit Root Test at Level

It is recommended that models should be non-stationary at level. The following hypothesis are applied;
Null hypothesis: variable is not stationary at level
Alternative hypothesis: variable is stationary
The null hypothesis is rejected if p value is less than 5% hence the model is said to be non stationary at level.

Table 2 Unit Root Test at Level

	Augmented dickey-fuller test			Phillips-Perron Test		
Variable	With intercept	With intercept and trend	With intercept and trend	With intercept	With intercept and trend	With intercept and trend
CSE	-1.781499	-1.780278	-0.005967	-1.796627	-1.786004	0.149022
ESX	-0.834036	-1.796313	0.788502	-0.769235	-1.819126	0.790037
JSE	-1.801935	-2.568563	1.491941	-1.546017	-2.136619	1.435523
NGSE	-2.867576	-2.001596	-0.119393	-2.037062	-1.817870	0.082386
NSE	-2.160294	-2.219030	-0.110967	-1.105160	-1.082913	-0.533515

The probability value for all the variables is more than 5% thus we cannot reject the null hypothesis. Therefore, the conclusion is that the variables are not stationary at level.

3.2.2 Unit Root Test after First Difference

It is expected that after first difference, the model should become stationary. The following hypotheses were therefore tested;
Null hypothesis: variable is not stationary
Alternative hypothesis: variable is stationary

Table 3 Unit Root Test after First Difference

	Augmented dickey-fuller test			Phillips-Perron Test		
Variable	With intercept	With intercept and trend	With intercept and trend	With intercept	With intercept and trend	With intercept and trend
CSE	-11.51419*	-11.50245*	-11.52352*	-21.69550*	-21.67780*	-21.71274*
ESX	-20.63693*	-20.62013*	-20.59118*	-20.61512*	-20.59824*	-20.58874*
JSE	-12.44174*	-12.54008*	-12.23853*	-24.76864*	-25.33432*	-23.99369*
NGSE	-6.051426*	-6.080612*	-6.048666*	-20.00283*	-20.01353*	-20.01330*
NSE	-7.273237*	-18.90213*	-7.284279*	-18.85886*	-18.90213*	-18.87249*

The * sign denotes a probability value of less than 0.05 or 5%. This therefore means the we reject the null hypothesis and conclude that the variables are stationary at first difference.

3.3. VAR lag order

VAR lag order for every two coutries stock indices are determined. To get the optimal lag length for each relationship, the order that has got the highest number of recommendation is taken.
According to the results of Final Prediction Error (FPE), Akaike Information Criteria (AIC), Schwarz Criterion (SC), and Hannan Quinn (HQ) the optimal number of lags are as following:
CSE & ESX: 3; CSE & JSE: 1; CSE & NGSE: 1; CSE & NSE: 3; ESX & JSE: 2; ESX & NGSE: 2; ESX & NSE:2, JSE & NGSE: 3; JSE & NSE:3 and NGSE & NSE: 3.

3.4. VAR Analysis

Following determining the lags for all index duals, VAR test is used. The test is applied to the first difference since the variables are stationary at first difference. Tables 7-16 are the VAR Analysis results for the times series duals.

Table 4 VAR Analysis between CSE and JSE

	Coefficient	Std. Error	t-Statistic	Prob.		Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.058066	0.043687	1.329134	0.1844	C(4)	-0.235098	0.219581	-1.070667	0.2848
C(2)	0.008736	0.008722	1.001585	0.3170	C(5)	-0.023638	0.043838	-0.539210	0.5900
C(3)	1.668440	7.104298	0.234849	0.8144	C(6)	54.19977	35.70780	1.517869	0.1297

R-squared	0.005331	Mean dependent var	2.290212	R-squared	0.002773	Mean dependent var	52.27754
Adjusted R-squared	0.001483	S.D. dependent var	161.7794	Adjusted R-squared	-0.001085	S.D. dependent var	812.0962
S.E. of regression	161.6594	Akaike info criterion	13.01461	S.E. of regression	812.5365	Akaike info criterion	16.24395
Sum squared resid	13511153	Schwarz criterion	13.03915	Sum squared resid	3.41E+08	Schwarz criterion	16.26849
Log likelihood	-3380.799	Hannan-Quinn criter.	13.02423	Log likelihood	-4220.427	Hannan-Quinn criter.	16.25357
F-statistic	1.385505	Durbin-Watson stat	2.013289	F-statistic	0.718806	Durbin-Watson stat	2.009816
Prob(F-statistic)	0.251125			Prob(F-statistic)	0.487820		

Table 5 VAR Analysis between CSE and ESX

	Coefficient	Std. Error	t-Statistic	Prob.		Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.025052	0.044773	0.559531	0.5760	C(8)	0.101411	0.082699	1.226265	0.2207
C(2)	0.072052	0.044698	1.611957	0.1076	C(9)	0.192504	0.082561	2.331640	0.0201
C(3)	0.065623	0.044939	1.460262	0.1448	C(10)	0.075770	0.083007	0.912815	0.3618
C(4)	0.025265	0.024301	1.039704	0.2990	C(11)	0.074382	0.044885	1.657166	0.0981
C(5)	0.010785	0.024216	0.445340	0.6563	C(12)	-0.050733	0.044730	-1.134208	0.2572
C(6)	0.017542	0.024136	0.726781	0.4677	C(13)	0.012937	0.044581	0.290183	0.7718
C(7)	-0.360219	7.073295	-0.050927	0.9594	C(14)	17.60973	13.06497	1.347858	0.1783

R-squared	0.018018	Mean dependent var	0.588630	R-squared	0.025276	Mean dependent var	18.37526
Adjusted R-squared	0.006328	S.D. dependent var	159.6266	Adjusted R-squared	0.013672	S.D. dependent var	295.9395
S.E. of regression	159.1207	Akaike info criterion	12.99081	S.E. of regression	293.9094	Akaike info criterion	14.21802
Sum squared resid	12760982	Schwarz criterion	13.04884	Sum squared resid	43536913	Schwarz criterion	14.27606
Log likelihood	-3312.151	Hannan-Quinn criter.	13.01356	Log likelihood	-3625.705	Hannan-Quinn criter.	14.24078
F-statistic	1.541269	Durbin-Watson stat	1.992900	F-statistic	2.178238	Durbin-Watson stat	1.990813
Prob(F-statistic)	0.162635			Prob(F-statistic)	0.043774		

Table 6 VAR Analysis between CSE and NGSE

	Coefficient	Std. Error	t-Statistic	Prob.		Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.066001	0.046192	1.428846	0.1537	C(4)	0.001543	0.012075	0.127792	0.8984
C(2)	0.006760	0.176524	0.038292	0.9695	C(5)	0.078820	0.046147	1.708026	0.0883
C(3)	1.325417	7.305795	0.181420	0.8561	C(6)	1.030684	1.909873	0.539661	0.5897

R-squared	0.004362	Mean dependent var	1.440596	R-squared	0.006264	Mean dependent var	1.129234
Adjusted R-squared	0.000098	S.D. dependent var	158.3176	Adjusted R-squared	0.002008	S.D. dependent var	41.42680
S.E. of regression	158.3098	Akaike info criterion	12.97335	S.E. of regression	41.38519	Akaike info criterion	10.29009
Sum squared resid	11703956	Schwarz criterion	12.99985	Sum squared resid	799846.7	Schwarz criterion	10.31659
Log likelihood	-3045.737	Hannan-Quinn criter.	12.98378	Log likelihood	-2415.170	Hannan-Quinn criter.	10.30051
F-statistic	1.023036	Durbin-Watson stat	1.999807	F-statistic	1.471791	Durbin-Watson stat	1.987909
Prob(F-statistic)	0.360306			Prob(F-statistic)	0.230577		

Table 7 VAR Analysis between CSE and NSE

	Coefficient	Std. Error	t-Statistic	Prob.		Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.046584	0.044095	1.056452	0.2913	C(8)	-0.011730	0.019842	-0.591200	0.5546
C(2)	0.076471	0.044022	1.737094	0.0830	C(9)	0.039061	0.019809	1.971872	0.0492
C(3)	0.056116	0.044075	1.273181	0.2035	C(10)	-0.014749	0.019833	-0.743658	0.4574
C(4)	-0.008558	0.098277	-0.087078	0.9306	C(11)	0.176166	0.044222	3.983633	0.0001
C(5)	0.025213	0.098897	0.254944	0.7989	C(12)	0.061205	0.044502	1.375356	0.1696
C(6)	0.119564	0.097406	1.227480	0.2202	C(13)	-0.000653	0.043831	-0.014906	0.9881
C(7)	1.645390	7.103537	0.231630	0.8169	C(14)	-0.590080	3.196436	-0.184606	0.8536

R-squared	0.016210	Mean dependent var	1.906506	R-squared	0.046126	Mean dependent var	-0.801197
Adjusted R-squared	0.004659	S.D. dependent var	161.9408	Adjusted R-squared	0.034926	S.D. dependent var	74.00368
S.E. of regression	161.5632	Akaike info criterion	13.02109	S.E. of regression	72.69988	Akaike info criterion	11.42398
Sum squared resid	13338460	Schwarz criterion	13.07852	Sum squared resid	2700774.	Schwarz criterion	11.48141
Log likelihood	-3365.463	Hannan-Quinn criter.	13.04359	Log likelihood	-2951.810	Hannan-Quinn criter.	11.44648
F-statistic	1.403317	Durbin-Watson stat	1.987602	F-statistic	4.118342	Durbin-Watson stat	1.981709
Prob(F-statistic)	0.211306			Prob(F-statistic)	0.000475		

Table 8 VAR Analysis between ESX and JSE

	Coefficient	Std. Error	t-Statistic	Prob.		Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.064763	0.044421	1.457926	0.1455	C(6)	-0.009097	0.123537	-0.073639	0.9413
C(2)	-0.029191	0.043686	-0.668200	0.5043	C(7)	0.013389	0.121491	0.110201	0.9123
C(3)	0.063199	0.015972	3.956973	0.0001	C(8)	-0.034324	0.044418	-0.772757	0.4400
C(4)	0.021170	0.016211	1.305930	0.1922	C(9)	-0.082337	0.045083	-1.826322	0.0684
C(5)	12.99107	12.93924	1.004005	0.3159	C(10)	61.72324	35.98450	1.715273	0.0869

R-squared	0.040679	Mean dependent var	18.46586	R-squared	0.007877	Mean dependent var	55.13189
Adjusted R-squared	0.033110	S.D. dependent var	295.6569	Adjusted R-squared	0.000050	S.D. dependent var	808.5257
S.E. of regression	290.7210	Akaike info criterion	14.19232	S.E. of regression	808.5056	Akaike info criterion	16.23797
Sum squared resid	42850994	Schwarz criterion	14.23371	Sum squared resid	3.31E+08	Schwarz criterion	16.27936
Log likelihood	-3628.235	Hannan-Quinn criter.	14.20855	Log likelihood	-4151.920	Hannan-Quinn criter.	16.25419
F-statistic	5.374669	Durbin-Watson stat	1.989281	F-statistic	1.006359	Durbin-Watson stat	2.012551
Prob(F-statistic)	0.000303			Prob(F-statistic)	0.403651		

Table 9 Interdependencies between ESX and NGSE

	Coefficient	Std. Error	t-Statistic	Prob.		Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.110894	0.046372	2.391400	0.0172	C(6)	-0.006362	0.006490	-0.980363	0.3274
C(2)	-0.051656	0.046316	-1.115307	0.2653	C(7)	0.002171	0.006482	0.334918	0.7378
C(3)	0.518772	0.332114	1.562028	0.1190	C(8)	0.088230	0.046478	1.898324	0.0583
C(4)	-0.304757	0.332492	-0.916585	0.3598	C(9)	-0.067828	0.046531	-1.457686	0.1456
C(5)	14.06164	13.67194	1.028504	0.3042	C(10)	1.074114	1.913335	0.561383	0.5748

R-squared	0.021758	Mean dependent var	15.07299	R-squared	0.013089	Mean dependent var	1.043220
Adjusted R-squared	0.013325	S.D. dependent var	297.3441	Adjusted R-squared	0.004581	S.D. dependent var	41.42900
S.E. of regression	295.3564	Akaike info criterion	14.22485	S.E. of regression	41.33399	Akaike info criterion	10.29185
Sum squared resid	40477235	Schwarz criterion	14.26910	Sum squared resid	792743.5	Schwarz criterion	10.33610
Log likelihood	-3330.727	Hannan-Quinn criter.	14.24226	Log likelihood	-2408.439	Hannan-Quinn criter.	10.30926
F-statistic	2.580085	Durbin-Watson stat	1.987408	F-statistic	1.538481	Durbin-Watson stat	2.003774
Prob(F-statistic)	0.036739			Prob(F-statistic)	0.189890		

Table 10 Interdependencies between ESX and NSE

	Coefficient	Std. Error	t-Statistic	Prob.		Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.086178	0.044657	1.929774	0.0542	C(6)	0.016793	0.010706	1.568482	0.1174
C(2)	-0.033226	0.044726	-0.742880	0.4579	C(7)	0.007208	0.010723	0.672220	0.5017
C(3)	0.131392	0.184723	0.711292	0.4772	C(8)	0.143088	0.044286	3.230979	0.0013
C(4)	0.011945	0.184111	0.064880	0.9483	C(9)	0.040409	0.044140	0.915472	0.3604
C(5)	17.44468	13.09235	1.332433	0.1833	C(10)	-0.138339	3.138812	-0.044074	0.9649

R-squared	0.009678	Mean dependent var	18.46586	R-squared	0.034387	Mean dependent var	0.406465
Adjusted R-squared	0.001865	S.D. dependent var	295.6569	Adjusted R-squared	0.026768	S.D. dependent var	71.78313
S.E. of regression	295.3811	Akaike info criterion	14.22413	S.E. of regression	70.81586	Akaike info criterion	11.36776
Sum squared resid	44235733	Schwarz criterion	14.26552	Sum squared resid	2542547.	Schwarz criterion	11.40915
Log likelihood	-3636.377	Hannan-Quinn criter.	14.24035	Log likelihood	-2905.147	Hannan-Quinn criter.	11.38399
F-statistic	1.238685	Durbin-Watson stat	1.995695	F-statistic	4.513706	Durbin-Watson stat	2.003667
Prob(F-statistic)	0.293468			Prob(F-statistic)	0.001365		

Table 11 Interdependencies between JSE and NGSE

	Coefficient	Std. Error	t-Statistic	Prob.		Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.047488	0.046644	-1.018095	0.3092	C(8)	0.009571	0.002289	4.181122	0.0000
C(2)	-0.091164	0.047347	-1.925457	0.0548	C(9)	0.002499	0.002323	1.075391	0.2828
C(3)	-0.053769	0.047476	-1.132544	0.2580	C(10)	0.000829	0.002330	0.355752	0.7222
C(4)	1.047503	0.952680	1.099533	0.2721	C(11)	0.059058	0.046752	1.263225	0.2071
C(5)	-1.047110	0.950826	-1.101264	0.2714	C(12)	-0.080623	0.046661	-1.727851	0.0847
C(6)	-0.573130	0.934377	-0.613382	0.5399	C(13)	0.007439	0.045854	0.162224	0.8712
C(7)	53.83033	38.54297	1.396631	0.1632	C(14)	0.444316	1.891456	0.234907	0.8144

R-squared	0.018277	Mean dependent var	44.61006	R-squared	0.048411	Mean dependent var	0.998996
Adjusted R-squared	0.005500	S.D. dependent var	831.8252	Adjusted R-squared	0.036026	S.D. dependent var	41.46225
S.E. of regression	829.5345	Akaike info criterion	16.29445	S.E. of regression	40.70853	Akaike info criterion	10.26560
Sum squared resid	3.17E+08	Schwarz criterion	16.35650	Sum squared resid	763962.1	Schwarz criterion	10.32765
Log likelihood	-3805.901	Hannan-Quinn criter.	16.31887	Log likelihood	-2395.150	Hannan-Quinn criter.	10.29001
F-statistic	1.430452	Durbin-Watson stat	2.004189	F-statistic	3.908846	Durbin-Watson stat	2.000432
Prob(F-statistic)	0.201111			Prob(F-statistic)	0.000805		

Table 12 Interdependencies between JSE and NSE

	Coefficient	Std. Error	t-Statistic	Prob.		Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.038387	0.044022	-0.872002	0.3836	C(8)	0.013634	0.003935	3.464595	0.0006
C(2)	-0.100111	0.044143	-2.267890	0.0238	C(9)	0.007516	0.003946	1.904845	0.0574
C(3)	-0.067616	0.044431	-1.521825	0.1287	C(10)	-0.000530	0.003972	-0.133561	0.8938
C(4)	0.712840	0.495129	1.439705	0.1506	C(11)	0.156360	0.044260	3.532746	0.0004
C(5)	-0.519209	0.497380	-1.043888	0.2970	C(12)	0.062720	0.044461	1.410648	0.1590
C(6)	-0.748027	0.486337	-1.538082	0.1246	C(13)	0.007614	0.043474	0.175148	0.8610
C(7)	62.81324	35.63379	1.762744	0.0785	C(14)	-1.693260	3.185356	-0.531576	0.5953

R-squared	0.024138	Mean dependent var	53.35201	R-squared	0.065941	Mean dependent var	-0.801197
Adjusted R-squared	0.012680	S.D. dependent var	809.9353	Adjusted R-squared	0.054974	S.D. dependent var	74.00368
S.E. of regression	804.7840	Akaike info criterion	16.23245	S.E. of regression	71.94080	Akaike info criterion	11.40299
Sum squared resid	3.31E+08	Schwarz criterion	16.28988	Sum squared resid	2644670.	Schwarz criterion	11.46042
Log likelihood	-4197.204	Hannan-Quinn criter.	16.25495	Log likelihood	-2946.373	Hannan-Quinn criter.	11.42549
F-statistic	2.106601	Durbin-Watson stat	1.996998	F-statistic	6.012449	Durbin-Watson stat	1.976492
Prob(F-statistic)	0.051053			Prob(F-statistic)	0.000004		

Table 13 Interdependencies between NGSE and NSE

	Coefficient	Std. Error	t-Statistic	Prob.		Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.081690	0.048072	1.699342	0.0899	C(8)	0.167162	0.082551	2.024953	0.0434
C(2)	-0.098379	0.047867	-2.055249	0.0404	C(9)	0.056686	0.082200	0.689607	0.4908
C(3)	-0.016649	0.048085	-0.346230	0.7293	C(10)	0.040869	0.082574	0.494939	0.6209
C(4)	-0.002083	0.027798	-0.074922	0.9403	C(11)	0.128628	0.047736	2.694590	0.0073
C(5)	0.069184	0.027998	2.471063	0.0138	C(12)	0.024133	0.048079	0.501936	0.6160
C(6)	0.001038	0.027738	0.037411	0.9702	C(13)	-0.032499	0.047633	-0.682271	0.4954
C(7)	1.113673	1.909197	0.583320	0.5600	C(14)	-1.675492	3.278556	-0.511046	0.6096

R-squared	0.024226	Mean dependent var	0.998996	R-squared	0.037484	Mean dependent var	-1.511325
Adjusted R-squared	0.011526	S.D. dependent var	41.46225	Adjusted R-squared	0.024957	S.D. dependent var	71.68950
S.E. of regression	41.22261	Akaike info criterion	10.29070	S.E. of regression	70.78927	Akaike info criterion	11.37214
Sum squared resid	783379.1	Schwarz criterion	10.35275	Sum squared resid	2310126.	Schwarz criterion	11.43419
Log likelihood	-2401.023	Hannan-Quinn criter.	10.31511	Log likelihood	-2654.080	Hannan-Quinn criter.	11.39655
F-statistic	1.907556	Durbin-Watson stat	1.996824	F-statistic	2.992218	Durbin-Watson stat	2.005899
Prob(F-statistic)	0.078020			Prob(F-statistic)	0.007059		

3.5. Impulse Response Tests

An impulse response function traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables. This study uses cholesky decomposition to determine the influence of shocks on one variable to another. Cholesky uses the inverse of the Cholesky factor of the residual covariance matrix to orthogonalize the impulses.

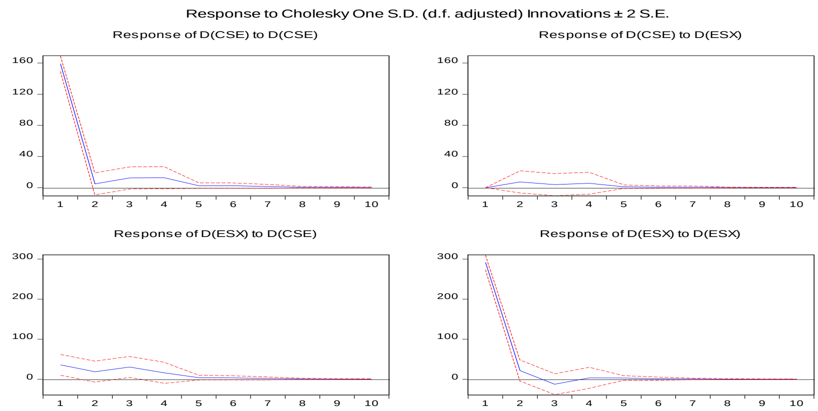

Figure 1: Interdependencies between CSE and ESX using Cholesky decomposition

As shown in Figure 1, ESX is partially affected by the shocks in CSE in the first week, however the shocks applied to ESX do not affect CSX prominently.

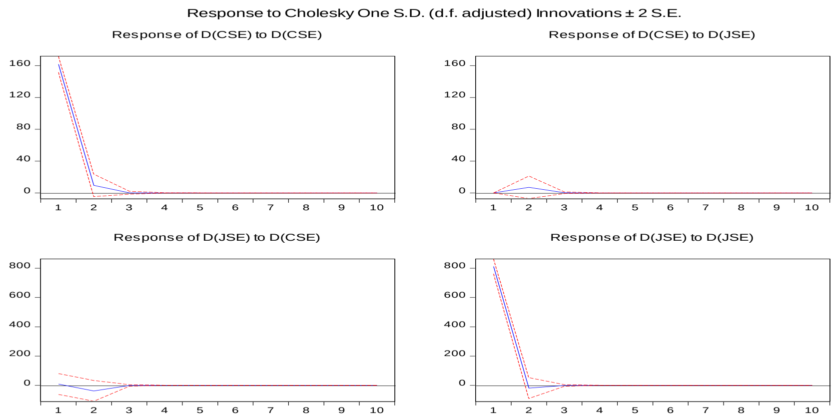

Figure 2: Interdependencies between CSE and JSE using Cholesky decomposition

It is seen in Figure 2 that both CSE and JSE do not affected prominently from the shocks on each other.

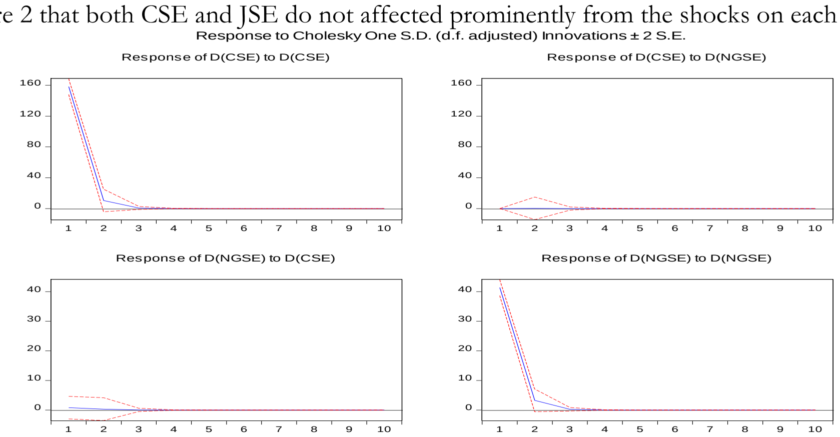

Figure 3: Interdependencies between CSE and NGSE using Cholesky Decomposition

It is seen in Figure 3 that both CSE and NGSE do not affected prominently from the shocks on each other.

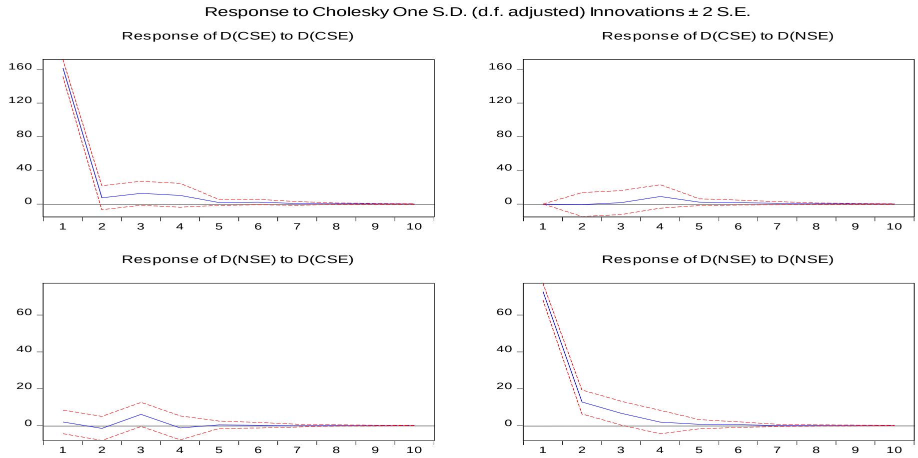

Figure 4: Interdependencies between CSE and NSE using Cholesky Decomposition

While the short term effect is examined, it is seen that NSE is effected from the shocks on CSE on the third week. CSE responses to shocks on NSE weakly in the fourth week.

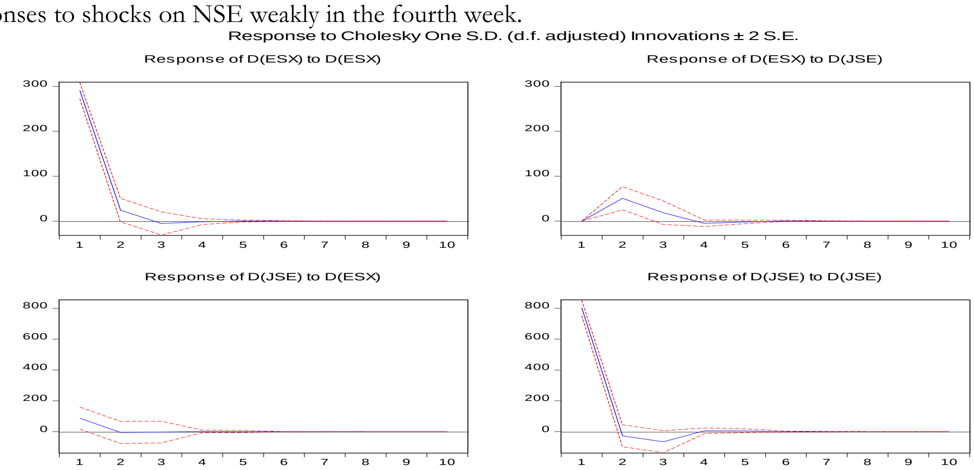

Figure 5: Interdependencies between ESX and JSE using Cholesky Decomposition

Figure 5 shows that ESX is influenced by JSE shocks in the second week. The changes are felt later and the effect dies down. But JSE react immediately to own shock in the first week.

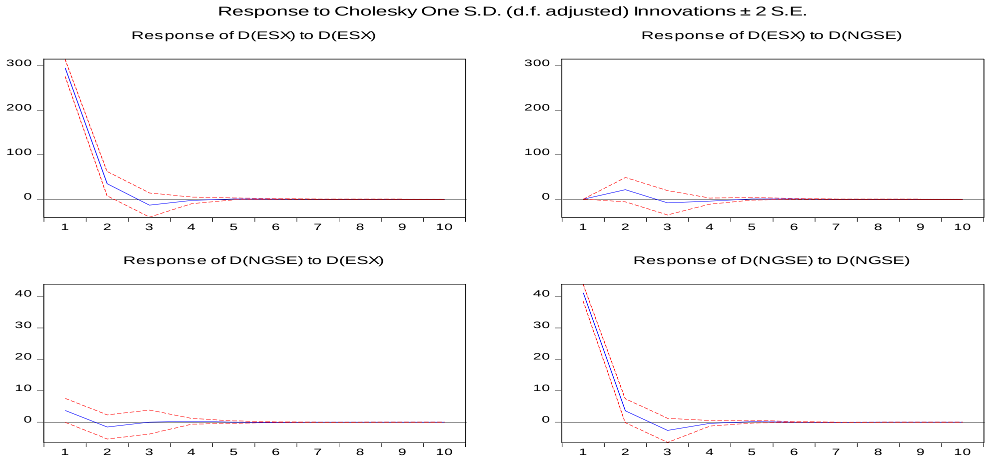

Figure 6: Interdependencies between ESX and NGSE using Cholesky Decomposition

Figure 6 shows that, shocks in NGSE stock prices influences NGSE stock prices in the first two weeks there is not a strong effect on ESX by the shocks on NGSE.

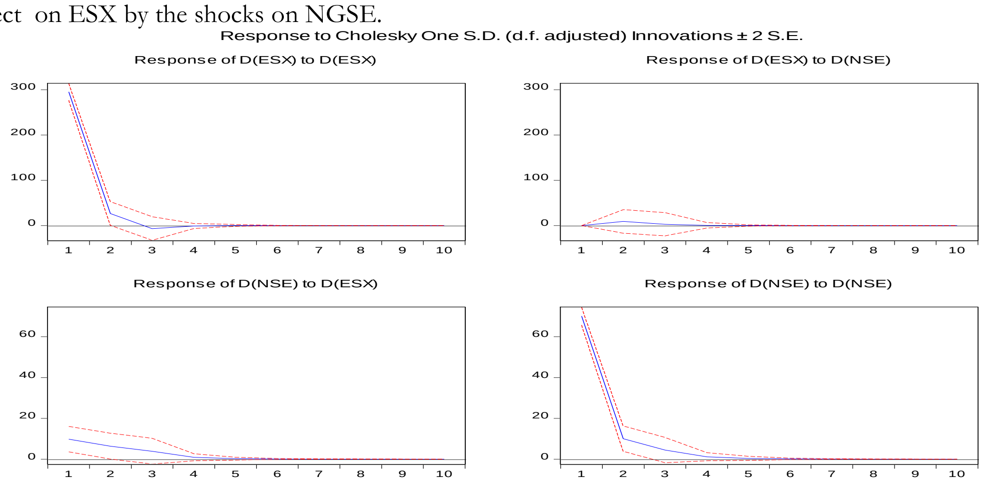

Figure 7: Interdependencies between ESX and NSE using Cholesky Decomposition

As indicated in Figure 7, the effect of shocks on ESX on NSE continues gradually up to the fourth week where it recedes, however shocks in NSE do not cause prominent effects on ESX.

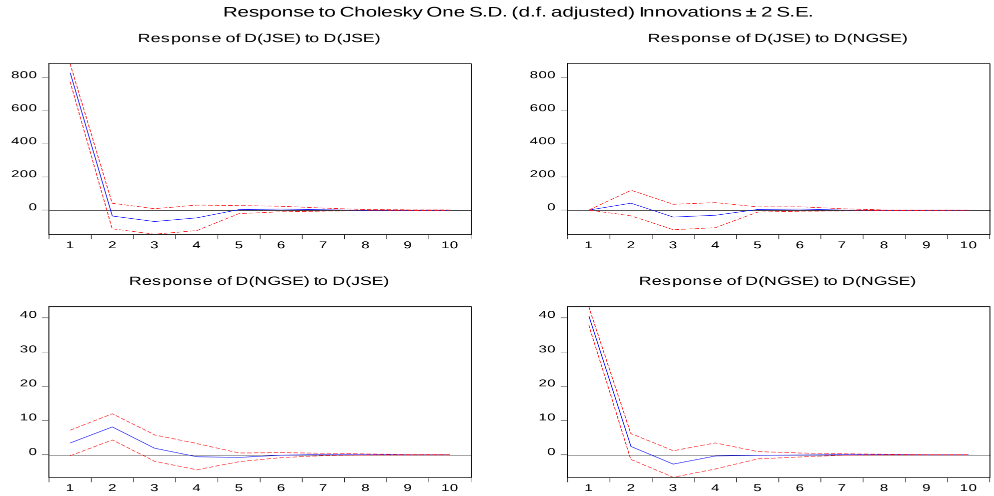

Figure 8: Interdependencies between JSE and NGSE using Cholesky Decomposition

Shocks in JSE stock prices and NGSE stock prices are immediately felt by their own stock markets. However, shocks in JSE stock prices are felt by NGSE stock prices in the first to third period. Shocks in NGSE stock prices have zero influence on JSE stock prices in the first period and subsequent periods.

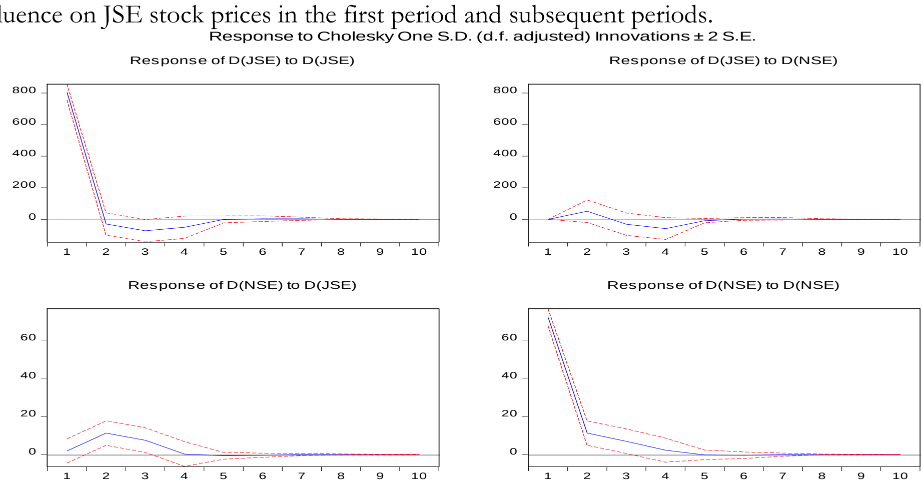

Figure 9: Interdependencies between JSE and NSE using Cholesky Decomposition

Figure 9 show that shocks in JSE stock prices and NSE stock prices are immediately felt by their own stock markets. Shocks in NSE prices have no influence on JSE prices. However, shocks in JSE stock prices are not felt by NSE stock prices in the first but the subsequent periods feels the shock.

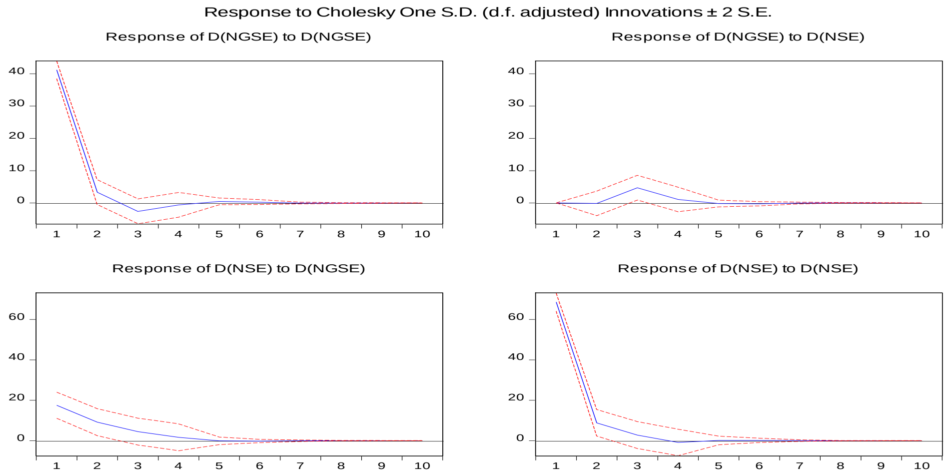

Figure 10: Interdependencies between NGSE and NSE using Cholesky Decomposition

Shocks in NGSE as indicated in Fig. 10 are immediately felt in the first week by NSE. And the shocks of NSE have got weak effect on NSE in the third week.

3.6. Granger causality

Granger causality is used to detect presence of either unidirectional or bidirectional causality between the stock market prices of the five selected countries. The lag length is based on the predictions done earlier in the study.

Table 14 Granger Causality between CSE and ESX

Dependent variable: ESX				Dependent variable: CSE			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
CSE	7.556056	3	0.0561	ESX	2.434922	3	0.4872
All	7.556056	3	0.0561	All	2.434922	3	0.4872

With ESX as the dependent variable, the p-value is 0.0561 which is greater than the recommended value of 0.05. Thus, CSE does not Granger cause ESX. Taking CSE as the dependent variable, the probability value for ESX is 0.4872 (greater than 0.05). We therefore conclude that ESX does not Granger cause CSE.

Table 15 Granger Causality between CSE and JSE

				Dependent variable: CSE			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
CSE	0.178826	1	0.6724	JSE	0.109819	1	0.7404
All	0.178826	1	0.6724	All	0.109819	1	0.7404

The results shown in Table 29 shows that the first null hypothesis cannot be rejected as the p-value is 0.6724. Thus, CSE does not Granger cause JSE. Also, JSE does not Granger cause CSE (p-value=0.7404 >0.05).

Table 16 Granger Causality between CSE and NGSE

Dependent variable: NGSE | Dependent variable: CSE

Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
CSE	0.153352	1	0.6954	NGSE	0.150202	1	0.6983
All	0.153352	1	0.6954	All	0.150202	1	0.6983

A p-value of 0.6954 indicates that the first hypothesis cannot be rejected. Therefore, CSE does not Granger cause NGSE. The p-value for the second hypothesis is 0.6983>0.05 hence NGSE does not Granger cause CSE.

Table 17 Granger Causality between CSE and NSE

Dependent variable: NSE | Dependent variable: CSE

Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
CSE	5.487182	3	0.1394	NSE	0.765466	3	0.8577
All	5.487182	3	0.1394	All	0.765466	3	0.8577

Taking NSE as the dependent variable, the probability value is 0.1394> 0.05 thus we conclude CSE does not Granger cause NSE. On the other hand NSE does not Granger cause CSE as the p-value is 0.8577.

Table 18 Granger Causality between ESX and JSE

Dependent variable: JSE | Dependent variable: ESX

Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
ESX	0.388657	2	0.8234	JSE	16.37996	2	0.0003
All	0.388657	2	0.8234	All	16.37996	2	0.0003

The first hypothesis of ESX does not Granger cause JSE is not rejected as the p-value exceeds 0.05. The conclusion therefore is ESX does not Granger cause JSE. The second hypothesis of JSE does not Granger cause ESX is rejected (p-value=0.0003<0.05). Thus JSE does Granger cause ESX.

Table 19 Granger Causality between ESX and NGSE

Dependent variable: NGSE | Dependent variable: ESX

Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
ESX	0.961717	2	0.6183	NGSE	3.162612	2	0.2057
All	0.961717	2	0.6183	All	3.162612	2	0.2057

The first hypothesis of ESX does not Granger cause NGSE is not rejected as the p-value exceeds 0.05 (p=0.6183). The conclusion therefore is ESX does not Granger cause NGSE. The second hypothesis of NGSE does not Granger cause ESX is not rejected (p-value=0.2057<0.05). Thus NGSE does not Granger cause ESX.

Table 20 Granger Causality between ESX and NSE

Dependent variable: NSE				Dependent variable: ESX			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
ESX	6.961702	2	0.0308	NSE	0.962768	2	0.6179
All	6.961702	2	0.0308	All	0.962768	2	0.6179

The first hypothesis is rejected (p-value = 0.0308< 0.05). The conclusion is ESX does Granger cause NSE. The second hypothesis of JSE does not Granger cause ESX is accepted (p-value=0.6179>0.05). Thus NSE does not Granger cause ESX.

Table 21 Granger Causality between JSE and NGSE

Dependent variable: NGSE				Dependent variable: JSE			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
JSE	18.26396	3	0.0004	NGSE	3.623450	3	0.3051
All	18.26396	3	0.0004	All	3.623450	3	0.3051

The first hypothesis of JSE does not Granger cause NGSE is rejected as the p-value is less than 0.05 (0.0004). The conclusion therefore is JSE does Granger cause NGSE. The second hypothesis of NGSE does not Granger cause JSE is accepted (p value = 0.3051 > 0.05). Thus NGSE does not Granger cause JSE.

Table 22 Granger Causality between JSE and NSE

Dependent variable: NSE				Dependent variable: JSE			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
JSE	17.59385	3	0.0005	NSE	4.296359	3	0.2312
All	17.59385	3	0.0005	All	4.296359	3	0.2312

The probability value for the first hypothesis (JSE does not Granger cause NSE) is less than 0.05 (p-value = 0.0005) hence its rejection. The conclusion therefore is JSE does Granger cause NSE. The p-value for the second hypothesis is greater than 0.05 (p=0.2312) hence NSE does not Granger cause JSE.

Table 23 Granger Causality between NGSE and NSE

Dependent variable: NSE				Dependent variable: NGSE			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
NGSE	5.261217	3	0.1536	NSE	6.116412	3	0.1061
All	5.261217	3	0.1536	All	6.116412	3	0.1061

The p-value for the first hypothesis is greater than 0.05 (p-value = 0.1536) hence it is not rejected. The conclusion therefore is NGSE does not Granger cause NSE. The p-value for the second hypothesis is 0.1061 > 0.05 hence we conclude that NSE does not Granger cause NGSE.

4. Conclusion

As the African continent has yet to play a unique role in global economic growth, the potential of African financial markets has got an increasing importance. On this content, this study focuses on the relationship of the African stock markets. In the ten years (2009 – 2018) period, Egypt, Kenya, Morocco, Nigeria and South Africa stock markets' relationships are analyzed by VAR models and Granger Causality test.

One of the main results is that Casablanca stock exchange is not influenced by other stock markets. Both in the short term and long term any significant result is not found. In the long term, the stock index of Egypt is not influenced by the indices too. But it can be used to predict the Kenyan stock market. Though Egypt also considered not part of Africa, it can have a significant influence on weaker countries. Kenya, for instance, is seen as a weaker economy compared to the other four countries under study.

While the Johannesburg stock market index is not influenced by other stock prices, South African stock market can be used to predict the Egyptian, Nigerian, and Kenya stock markets. South Africa is considered the giant economy of Africa. It is therefore not expected to be swayed by the performance of other African countries. However, an influence on other countries shows its superiority.

NSE and JSE stock indices have a significant influence on the performance of Nigeria stock exchange in the long run. Nigeria and Kenya are known to have a special relationship. The two countries heavily rely on each other. South African being the giant economy is expected to determine stock prices of other economies in Africa. NGSE responds to immediate changes in JSE and ESX stock performance.

The stock performance of the Nairobi stock exchange is seen to be influenced by the past performance of itself, CSE, JSE, and NGSE. Kenya heavily relies on other African countries in its investment strategies. This can, therefore, explain why the performance of other countries influences it. The NSE stock price responds to immediate performances of ESX and NGSE. Kenya also relies on the daily updates of other African countries. It particularly has a special relationship with Nigeria. The Kenyan stock market cannot predict the Morocco, Egypt, Nigeria, or South Africa stock markets. Though it is a giant in the East African community, Kenya is weak compared to the four nations under study.

The study concludes that Johannesburg stock exchange plays a vital role in influencing the stock prices of other African countries. African countries can, therefore, predict their future performances using South Africa stock market. The Egyptian stock market is also useful in predicting the stock performances of weaker countries.

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