The relationship between trade openness and economic growth: The case of Ghana and Nigeria.

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Abstract

This study purposed to determine the long run relationship between trade openness and economic growth in Ghana and Nigeria covering the period between 1980 and 2016. It incorporated investment, exchange rates and inflation as the additional variables. To test for stationarity of the data, the augments Dickey-Fuller (ADF) (Dickey and Fuller, 1981), the Phillips and Perron (1988) and the DF-GLS test proposed by Elliot, Rothenberg and Stock (1996) were used. The Autoregressive distributed lag (ARDL) model was employed in this study to examine the long run relationship between the variables. The findings of the study suggested existence of a long run relationship among the variables for both countries. The results further showed that trade openness has a positive impact on economic growth and significant at the 1% level in Ghana while in Nigeria trade openness has a negative but insignificant effect on economic growth. These results imply that different policy measures should be put into place for each of these two countries.

JEL Classification: C1, F14, F41, F43

Keywords: Trade Openness, Economic growth, ARDL, Nigeria and Ghana

1. Introduction

The relationship between trade openness and economic growth in not new. However much this relationship has been conducted in literature, the results are still inconclusive. Some studies established a positive relationship between trade openness and economic growth (Dollar and Kraay (2004), Wang, Liu, and Wei (2004), Freund and Bolaky (2008), Das and Paul (2011),) but studies failed to find the relationship between these variables. The main reason for the difference in the results of these studies lie with different methodologies used, different study periods explored and country specifics.

The most important fact about the relationship between trade openness and economic growth is that trade openness drives growth. African countries have experienced low performances because of colonization. For instance, Ghana inherited industrial sector was underdeveloped mainly because the colonial rulers had focused on the extraction of raw materials from the gold coast while at the same time creating economic system heavily dependent on manufacture products from Britain (Sakyi, 2010). Nigeria's export performance has also been lackluster. Unlike some other fuel producing countries like United Arab Emirate, Russia and Saudi-Arabia, Nigeria has not been able to diversify its export-base so that the oil sector continues to dominate almost all merchandise exports and contributes over 70 percent of its total foreign earnings (Nduka, 2013). Both Nigeria and Ghana have experimented with different exchange rates regimes, which might have implications for the trade-growth relationship. This led to some researchers examining the relationship between trade openness and economic growth with the aim of coming with policy implications for these economies.

Few studies have been done to investigate the relationship between economic for Nigeria (Nduka, 2013 and Olufemi, 2004). Bigsten et al. (2000) focused on Ghana. To the best of our knowledge, no study has been done on both the Nigerian and Ghana economies to examine the causal relationship between these two countries simultaneously using the ARDL model. The only study which incorporated the two countries was done by Osabuohein (2007) who only used the Johansen multivariate method for the period between 1975 to 2004. Therefore, this study serves to fill the gap.

The paper is structured as follows: Section 2 focuses on the review of the literature. Section 3 discusses the theoretical framework. Section 4 present the methodology and the results of the study. Section 5 concludes the study.

2. Literature Review

2.1 Theoretical literature review

The relationship between trade openness and economic growth has caused a lot of on-going debate both in the empirical and theoretical literature around the globe. In order to establish the theoretical part, this paper summarizes them into three groups namely the mercantilism, classical economist and Heckscher-Ohlin trade theories.

On one hand, the mercantilism suggest that economic activity are a zero-sum game in which one country's economic benefit was at the cost of another. It is argued that exports should be more than imports, and domestic industry should be protected from import competition in order for a country to be rich and powerful (Olasode, Raji, Adedoyin & Ademola, 2015, Nduka et al. 2013, Edwards, 1998).

The classical economist on the other hand argues that it is not possible for a nation to continue to maintain a positive balance of trade indefinitely. They had a view that countries should produce and export commodities with lower cost advantage and the same country should import a commodity in which it has higher absolute cost disadvantage. The argument is that partaking in foreign trade can have a strong positive strength for economic growth (Keho, 2017; Olasode et al., 2015 & Nduka et al., 2013).

Meanwhile, the Heckscher-Ohlin argue that if two countries want to enter into trade with each other they must have the same technology, constant returns to scale, and a given factor-intensity relationship between final products. The country with better factor endowment should produce goods at a larger scale and trading will boast economic growth (Heckscher, 1919 & Ohlin, 1933).

2.2 Empirical Literature review

On the empirical front, studies on the issue of trade openness and economic growth have been examined. There are a large number of empirical studies on trade and economic growth and reported that trade has a positive impact on economic growth (see Keho (2017), Frankel and Romer

(1999), Karras (2003), Yanikkaya (2003), Dollar and Kraay (2004), Wang et al. (2004), Freund and Bolaky (2008), Das and Paul (2011), Marelli and Signorelli (2011), Nowbutsing (2014) and Zarra-Nezhad, Hosseinpour, and Arman (2014).

Keho (2017) established a positive effect of trade openness on economic growth in Cote d'Ivoire over the period 1965 and 2014 using the Autoregressive Distributed Lag bounds test to cointegration and the Toda and Yamamoto Granger causality tests. Frankel and Romer (1999) point out to positive growth effects of trade openness using ordinary least square technique. Karras (2003) found that trade openness has a positive impact on economic growth in China using ordinary least square over the period 1976-2002. Yanikkaya (2003) and Dollar and Kraay (2004) found a positive impact of trade openness on economic growth especially on developing countries using panel data analysis. Wang et al. (2004), found that trade openness has a positive relationship on economic growth using a panel of 79 countries over the period 1970 and 1998. Freund and Bolaky (2008), point out to positive effect of trade openness on economic growth using panel data analysis form more than 100 countries.

Das and Paul (2011) found that trade openness has a positive effect on economic growth in Asia over the 1971 to 2009 period using a Generalized Methods of Moments of a dynamic panel data. Marelli and Signorelli (2011) reported a positive impact of trade openness on economic growth in China and India over a period 1980 and 2007 using a panel data analysis, and Nowbutsing (2014) found a positive relationship between trade openness and economic growth for Indian Ocean Rim Countries over the time period 1997 to 2011 using Fully Modified Ordinary Least Square.

In Africa, a study by Yeboah, Naanwaab, Saleem and Akuffo, (2012) found that trade openness has a positive relationship with GDP in 38 countries between 1980 and 2008. Likewise, Nduka, (2013) found that trade openness has a significantly impact on economic growth in Nigeria. Olufemi, (2004) found a unidirectional relationship between openness and growth. This indicates that an increasing level of openness will be beneficial, depending on the level of economic development in Nigeria. Nduka et al., (2013) reported a unidirectional causality ranging from economic growth to openness without a feedback in the pre-Structural Adjustment Programme period (growth-led trade), whereas there exists a bi-directional causality going from economic growth to openness with a feedback effect in the post SAP period (growth-led trade and trade-led growth respectively).

Bigsten et al. (2000) found that exports had a positive effect on productivity growth in Ghana, Kenya and Zimbabwe. Sakyi, (2010) found a positive and statistically significant in both the short-run and the long run in Ghana using an ARDL bounds test. Kwame (2013) investigated trade liberalization and economic growth in Ghana over the period 1986 and 2010 and found that trade liberalization enhances GDP growth in Ghana in the long run but hampers growth in the short run using an ARDL approach.

3. Theoretical framework

The model specification to investigate the relationship between economic growth, trade openness, investments, exchange rates and inflation is based on simple multivariate framework where the link is represented as follows:

$$LGDP_t = \alpha + \beta_1 LTR_t + \beta_2 LINV_t + \beta_3 XR_t + \beta_4 INF_t + \mu_t \quad (1)$$

Where LGDP represents economic growth, LTR is the trade openness, LINV is the investment, INF stands for inflation and XR represents the exchange rates. The study further discusses the steps used estimating the series.

4. Data and Methodology

The data was sourced from the world bank development indicators and spans from 1980 to 2016. Table 1 presents description of the variables in the study.

Table 1: Description of the variables

Variable	**Description**
GDP	Gross value added by all resident producers in the economy
Investments	Gross fixed capital formation in current prices
Trade	Imports plus exports
Exchange rate	Local currency unit relative to the US dollar
Inflation	Consumer price index reflecting the percentage change in the cost of a basket of goods

Source: World Bank

4.1 Descriptive statistics

Tables 2 and 3 show the descriptive statistics. The descriptive statistics for the raw data presented on table 2 reveals that the variables are not normally distributed based on the Jarque-Bera test. The null of normality is rejected at the 1% level for all variables with the exception of the exchange rate. Furthermore, the standard deviations indicate that the variables have a great deal of variability (volatility) except for the exchange rate for Ghana.

Table 2: Descriptive statistics

	Ghana			**Nigeria**		
Variable	**Mean**	**Std. Dev**	**Jarque-Bera statistic**	**Mean**	**Std. Dev**	**Jarque-Bera statistic**
GDP	1.85E+10	9.37E+09	6.63***	1.29E+11	1.65E+11	15.96***
Inflation	28.93	26.36	85.69***	19.71	17.94	18.17***
Investments	2.72E+09	3.49E+09	29.39***	1.74E+10	2.51E+10	17.88***
Trade	8.93E+09	1.08E+10	22.86***	5.71E+10	6.24E+10	9.54***
Exchange	0.50	0.59	5.29*	71.41	66.19	4.27

Source: authors' own computation. Note: (***) and (*) indicate significance at 1% and 10% level of significance respectively.

Due to the variability and skewness in the data the variables are log transformed with the exception of the exchange rate for Ghana. As shown by table 3 the log transformed variables are normally distributed and less volatile.

4.2 Unit root tests

Unit root tests are conducted before the empirical estimations in order to determine the order of integration of the variables. The unit root tests utilised are the Augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1981), the Phillips and Perron (1988) and the DF-GLS test proposed by Elliot, Rothenberg and Stock (1996). The ADF and the Phillips-Perron tests have been criticised for their low power when variables are stationary but with a root close to non-stationary boundary (Brooks, 2014). Elliot et al (1996) argue that the DF-GLS test has more power in the presence of an unknown mean or trend compared to the ADF and the Phillips-Perron tests. The null of a unit root

is tested against the alternative of stationarity in all tests. The unit root tests are run with and without a trend term and the results are presented on tables 4 to 7.

Table 3: Descriptive statistics

	Ghana			Nigeria		
Variable	**Mean**	**Std. Dev**	**Jarque-Bera statistic**	**Mean**	**Std. Dev**	**Jarque-Bera statistic**
LGDP	23.53	0.47	1.89	24.91	1.11	4.23
LInflation	3.10	0.68	2.96	2.68	0.73	4.11
LInvestments	21.03	1.22	0.54	22.76	1.22	4.81
LTrade	22.22	1.29	0.63	24.18	1.12	2.19
Exchange	0.50	0.59	5.29*	3.18	2.03	4.20

Source: authors' own computation. Note: (*) indicate significance at 10% level of significance.

Table 4: Unit root tests (Ghana intercept)

	Levels			First difference		
Variable	**ADF**	**PP**	**DF-GLS**	**ADF**	**PP**	**DF-GLS**
LGDP	0.64	2.82	-0.16	-3.44***	-3.32***	-2.23**
LTrade	-0.47	-0.47	-0.81	-4.89***	-4.90***	-2.51**
LInvestments	-0.59	-0.52	0.24	-5.64***	-5.74***	-2.63**
Exchange	3.41	3.41	1.20	-3.57**	3.54**	-3.54***
LInflation	-3.75***	-3.66***	-3.26***	-5.99***	-15.58***	-6.86***

Source: authors' own computation. Note: (***) and (**) indicate significance at 1% and 5% level of significance respectively.

The results of the unit root tests for Ghana are presented on tables 4 and 5. In the absence of a trend term, all the variables are non-stationary in levels with the exception of inflation in all tests. Inflation is thus I(0) while the rest of the variables are I(1). With a trend term included the ADF and DF-GLS tests suggest that inflation and trade are stationary in levels (I(0)) while the rest of the variables are stationary at first difference (I(1)).

Table 5: Unit root test (Ghana intercept and trend)

	Levels			First difference		
Variable	**ADF**	**PP**	**DF-GLS**	**ADF**	**PP**	**DF-GLS**
LGDP	-3.78	-3.19	-1.82	-3.47*	-3.13	-3.27**
LTrade	-4.05**	-2.51	-4.39***	-4.86***	-4.89***	-3.59**
LInvestments	-2.40	-2.57	-2.40	-5.57***	-5.68***	-5.15***
Exchange	-0.04	-0.13	-0.86	-4.86***	-4.87***	-5.00***
LInflation	-5.20***	-5.25***	-5.35***	-5.86***	-24.48***	-8.25***

Source: authors' own computation. Note: (***), (**) and (*) indicate significance at 1%, 5% and 10% level of significance respectively.

The unit root results for Nigeria are presented on tables 6 and 7. All the variables are I(1) except for inflation which is I(0) irrespective of whether the test includes a trend or not.

Table 6: Unit root tests (Nigeria intercept)

	Levels			First difference		
Variable	**ADF**	**PP**	**DF-GLS**	**ADF**	**PP**	**DF-GLS**
GDP	0.30	0.17	0.14	-5.25***	-5.28***	-5.13***
Trade	-0.68	-0.72	-0.74	-5.34***	-5.34***	-5.23***
Investments	0.03	-0.42	-0.23	-4.02***	-4.02***	-3.71***
Exchange	-1.77	-1.77	0.17	-5.09***	-5.09**	-5.16***
Inflation	-3.35**	-3.24**	-3.31***	-13.03***	-10.90***	-5.18***

Source: authors' own computation. Note: (***) and (**) indicate significance at 1%, and 5% level of significance respectively.

The variables in the study are a mixture of I(0) and I(1) and therefore the estimation technique chosen is the ARDL bound cointegration test proposed by Pesaran, Shin and Smith (2001). The test can be used irrespective of whether regressors are purely I(1), purely I(0) or mutually cointegrated as opposed to the Engle-Granger and Johansen cointegration tests which require all variables to be integrated of order 1. Furthermore, there are no I(2) variables which result in a crash of the ARDL technique.

Table 7: Unit root tests (Nigeria intercept and trend)

	Levels			First difference		
Variable	**ADF**	**PP**	**DF-GLS**	**ADF**	**PP**	**DF-GLS**
LGDP	-2.52	-2.71	-1.53	-5.81***	-5.81***	-5.88**
LTrade	-3.25*	-3.34	-2.23	-5.36***	-5.36***	-5.44***
LInvestments	-2.69	-2.82	-1.40	-4.87***	-4.79***	-5.00***
LExchange	-1.11	-1.19	-1.16	-5.35***	-5.38***	-5.39***
LInflation	-3.80**	-3.25*	-3.48**	-5.92***	-12.58***	-5.88***

Source: authors' own computation. Note: (***), (**) and (*) indicate significance at 1%, 5% and 10% level of significance respectively.

The application of ARDL bound test in examining the long run relationship among the variables entails estimation of an Unrestricted Error Correction Model (UECM) in first difference form (Khobai et.al 2016). The study employs the following UECMs

$$\Delta LGDP_t = \alpha_1 + \alpha_T T + \alpha_{GDP} LGDP_{t-1} + \alpha_{TR} LTR_{t-1} + \alpha_{INV} LINV_{t-1} + \alpha_{XR} XR_{t-1} + \alpha_{INF} INF_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta LGDP_{t-i} + \sum_{j=0}^{q} \alpha_j \Delta LTR_{t-j} + \sum_{k=0}^{r} \alpha_k \Delta LINV_{t-k} + \sum_{m=0}^{t} \alpha_m \Delta XR_{t-m} + \sum_{n=0}^{u} \alpha_n \Delta INF_{t-n} + \varepsilon_{1t} \quad (2)$$

where the Δ is defined as the first difference operator, T is the time trend, $LnGDP_t$ is the natural logarithm of Gross domestic product, $LnTR_t$ is the natural logarithm of trade openness, $LnINV_t$ is the natural logarithm of investment, XR_t is the exchange rates and $LnINF_t$ is the inflation. It is assumed that the residuals ($\varepsilon_{1t}\varepsilon_{2t}\varepsilon_{3t}\varepsilon_{4t}\varepsilon_{5t}$) are normally distributed and white noise

The results of the ARDL bound test are presented in Table 8. The computed F-statistics for both countries are greater than the critical values at the 1% level suggesting that the null of no long-run relationship is rejected. These results are consistent to the findings of see Keho (2017), Frankel and Romer (1999), Karras (2003), Yanikkaya (2003), Dollar and Kraay (2004). After finding the existence of a long-run relationship, the long-run and short-run dynamics between the variables are estimated. The model selection criteria used is the Akaike information criteria (AIC).

Table 8: Bound testing cointegration results

Country	**F-statistic**	**Critical values**					
		1%		**5%**		**10%**	
		I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
		3.29	4.37	2.56	3.49	2.2	3.09
Ghana	11.94***						
Nigeria	5.22***						

Source: authors' own computation. Note: (***) indicates significance at 1% level of significance.

The long-run estimates for both countries are presented on table 9. In Ghana trade openness has a positive impact on economic growth and significant at the 1% level. A 1% increase in trade openness leads to a 0.18% increase in economic growth. However, in Nigeria trade openness has a negative but insignificant effect on economic growth. The other coefficients are in line with theoretical expectations. Investments have a positive and significant impact on economic growth in both countries, however, the coefficient is much higher for Nigeria. Inflation is negatively signed in both countries but significant only in Nigeria. Exchange rate is positively signed and statistically significant at the 1% level in both countries suggesting that a depreciation in the currency has a positive impact on economic growth.

The shot-run estimates are shown on table 10. The coefficients of the error correction term are negative and significant at the 1% level in both countries further providing evidence of the existence of a long-run relationship between the variables. The error correction coefficient terms suggest a much quicker adjustment to equilibrium for Nigeria compared to Ghana. 93% of the disequilibrium in the previous year is corrected in the following year in Nigeria compared to 23% for Ghana. Trade has a positive and significant impact on economic growth in the short-run in both countries. The remaining variables have similar signs in both countries and are in line with a priori expectations with the exception of the exchange rate coefficient. A depreciation of the exchange rate has a positive impact on economic growth in Ghana while in Nigeria a negative impact is observed.

Table 9: The long-run estimates. Dependent variable: GDP

Variable	Ghana ARDL(2, 1, 1, 1, 3)	Nigeria ARDL(1, 2, 2, 2, 3)
Investments	0.15 (3.06)***	0.78 (9.66)***
Inflation	-0.02 (-1.01)	-0.23 (-3.58)***
Trade	0.18 (3.73)***	-0.15 (-0.91)
Exchange	0.20 (4.78)***	0.23 (4.30)***
Constant	16.42 (36.38)***	7.28 (3.65)***

Source: Researcher's own computations, Note (***) indicate significance at the 1% level. Figures in parenthesis are t-statistics

The results suggest that trade openness has a positive impact on economic growth in both the short and long-run only in Ghana and are consistent to Sakyi's (2010) results. In Nigeria trade openness has a positive effect on economic growth only in the short-run. These results are in line with Nduka, (2013).

Diagnostic tests for normality, serial correlation, heteroscedasticity and model misspecification are conducted on the estimated model. The serial correlation test selected is the Breusch-Godfrey LM proposed independently by Breusch (1978) and Godfrey (1978). The null of the test is that there is no serial correlation. Heteroscedasticity is tested using the Breush & Pagan (1979) test under the null that the variance of the error term is constant (homoscedasticity). The Ramsey (1969) test is applied to ensure that the model is correctly specified. The null is that the model is correctly specified. Normality is tested using the Jarque-Bera test under the null that the residuals are normally distributed (Gujarati & Porter, 2009). The results for the diagnostic tests are shown on table 11 and these reveal no evidence of serial correlation, heteroscedasticity and model

misspecification in both countries as the respective null hypotheses are not rejected. The assumption of normality of the residuals is also not rejected.

Table 10: The short-run estimates. Dependent variable: Δ(GDP)

Variable	Ghana	Nigeria
Δ(GDP(-1))	-0.32 (-3.26)***	
Δ(Inflation)	-0.01 (-5.18)***	-0.10 (-2.79)***
Δ(Exchange)	0.15 (6.35)***	-0.12 (-2.10)**
Δ(Trade)	0.02 (2.48)**	0.37 (5.17)***
Δ(Investment)	0.06 (7.13)***	0.39 (5.17)***
ECM(-1)	-0.28 (-9.57)***	-0.93 (-6.33)***
R-Squared	0.93	0.89

Source: Researcher's own computations, Note: (***) and (**) indicate significance at the 1% and 5% level respectively. Figures in parenthesis are t-statistics

Table 11: Diagnostic tests

Country	Normality	Serial Correlation	Heteroscedasticity	Ramsey's RESET test
Ghana	1.21 (0.55)	1.70 (0.21)	1.54 (0.20)	1.05 (0.37)
Nigeria	0.61 (0.74)	1.77 (0.20)	1.34 (0.27)	0.12 (0.89)

Source: Researcher's own computations, Note: Figures in parenthesis are p-values

To test the stability of the coefficients, the cumulative sum of recursive residuals (CUSUM) test is conducted for both countries. The CUSUM graphs presented on figures 1 and 2 indicate model stability for both countries as the plots are within the 5% confidence interval critical bands.

Figure 1: CUSUM test. Ghana

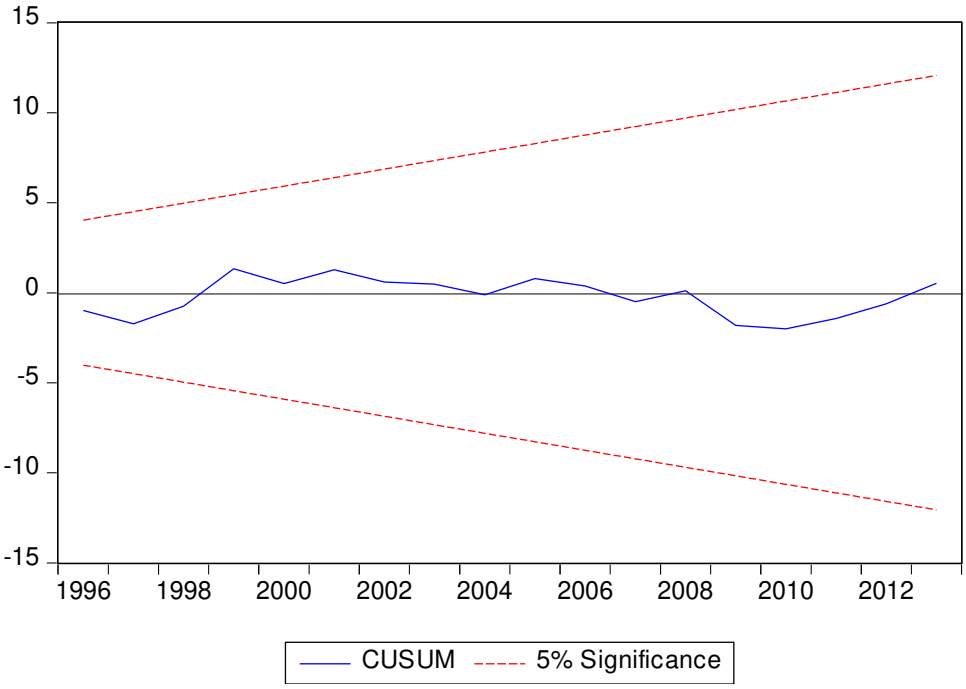
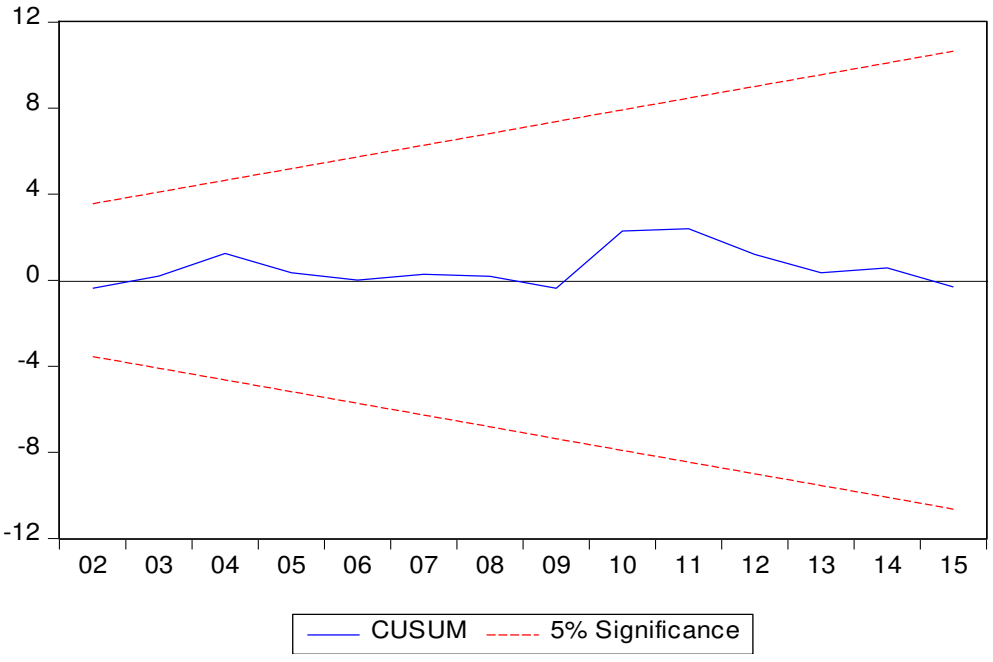


Figure 2: CUSUM test. Nigeria



5. Conclusion

Trade openness is believed to stimulate economic growth due to its effect in integrating world economies and generation of new and broader markets for various nations worldwide. Against this backdrop, this study investigated the impact trade openness on economic growth in Nigeria and Ghana using the ARDL bounds test for the period 1980 to 2016. It included investment, exchange rates and inflation as the additional variables to form a multivariate framework.

The following results were established: A long run relationship between trade openness and economic growth was validated for both Nigeria and Ghana. The results further showed that trade openness has a positive impact on economic growth and significant at the 1% level in Ghana while in Nigeria trade openness has a negative but insignificant effect on economic growth in the long run. Trade was found have a positive and significant impact on economic growth in the short-run in both countries.

The short run positive relationship between economic growth and trade openness found in this study implies that Nigerian and Ghana should ensure that the policies are initiated and implemented with needed speed if they need to partake in the gains that are in trade openness and willing to stimulate the economic levels of performance. Nigeria should ensure that it aligns its exports and imports components with appropriate policies that will reduce importation of consumer goods and other technologies. This will ensure that the Nigerian economic growth is stimulated by trade openness.

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