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Dynamic Long-Run of Trade Openness on Economic Growth Among Selected West African Countries: A Panel Data Approach

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Abstract

The study aims to examine the dynamic long-run effect of trade openness in stimulating economic growth among selected West African Countries (WACs) namely: Nigeria, Ghana, Niger, and the Benin Republic for the period 1986 - 2016. The unit root test establishes mix integration I(0) and I(1). The Cointegration test base on Pedroni confirm the variables are cointegrated. Pooled Mean Group (PMG) employs after a Hausman test of model selection. The finding reveals that trade openness and foreign direct investment influence growth among the selected economies and statistically significant. Besides, openness to trade and FDI found to be long-run driver to growth and the need for government to reform their institutions to liberalize the foreign sector so that all barriers to trade are address and to attract investors as well as to improve trade partnership with the rest of the world and the benefits from the positive spillover of both FDI and trade openness into WACs. The inflation rate does not stimulate economic growth in WACs due to the instability in the macroeconomic environment. Whereas the exchange rate was found to be negative and statistically significant, this indicates a negative relationship to GDP.

Keywords: Trade Openness, Economic Growth, West African Countries, PMG model

***JEL* classification:** O40, O11, N87

1 Introduction

In recent years, the link between trade openness and growth has been at the epicentre of much attention in the globe. Empirical findings and policymakers, especially in the developed and developing economies, emphasise that trade openness is needed to boost growth and development. There are a large volume of published studies (for instance, Hassen *et al*., 2018; Huchet-Bourdon *et al*., 2018; Amirkhalkhali and Dar, 2019; Ma *et al*., 2019) that describe the link between openness and growth in the perspective of developed and developing economies. In the history of development economics, openness to trade is essential for growth, employment opportunity, and poverty cuts. The potentials of trade openness are emerging of competitive markets within the economy, an increase in productivity and technical innova-

tions through capital inflows. More in-depth trade integration results to increase in take-hohome, regional benefits, and improvements in alternatives and freedom (see, Rani and Kaur, 2018; Antoine and Andreas, 2006; Claudia and Farid, 2009).

The Classical and Neo-classical regards trade as an engine of growth. Theories of economics held that open economies would experience increase economic growth while closed economies, those with restrictive tariffs and not open to trade, would experience little economic growth. The studies conducted by Opeyemi and Francois (2019), Ahmad and Suardi (2009), Fetaki-Vehapi *et al*. (2015), Harrison (1996) supported the assertion of classical and neo-classical theories. However, modern trade theories developed by Helpman and Krugman (1985) and Romer (1986) emphasise that countries, that embraced trade openness benefited from the total shift of production frontier faster than economies with restrictive measures.

Edwards (1998) maintains that the cost of technical know-how is essential in trade growth relationships. However, If the cost of invention and innovation is expensive in developing countries than developed economies, the developed economies would embrace the advantages of trade competitiveness and openness. The argument advanced by the growth of export and import shows the scope of how the economy is open. Further, the openness of the economy are analyzed by the magnitude of exports and imports (for instance, Heitger, 1987; Xu *et al*. 2018; Rani and Kumar, 2018 and Zhao, 2019). The trade flow analysis provides the foundation of robust empirical investigation of the openness of an economy. Empirically, openness can be measured by the share of trade (import plus export) in total output, measured by the Gross Domestic Product (GDP). This is a broad concept of openness; in the narrow context, the ratio of imports or exports to GDP can represent the degree of openness of an economy. (Olufemi, 2004).

Besides, trade openness with the rest of the world comes with some disadvantages. Disequilibrium in terms of import and export amongst the countries might cause an economy to become a dumping ground for the developed economies and which lead to shutdown of local industries. Empirical studies that confirm the adverse effect of trade openness in the absence of proper macroeconomic policies (see, Arabiyat *et al*. 2020 and Ramzan *et al.* 2019).

The purpose and novelty for conducting this study is to examine the effect of trade openness on growth amongst selected WACs. The study scheduled as Section 2 literature review, Section 3 data and methodology, Section 4 empirical analysis and Section 5 conclusion and recommendations.

2 Literature review

A number of empirical studies have examined the long-term impact of trade openness on economic growth and the relationship between trade openness and economic growth has been an issue of controversy. However, there is no consensus on whether greater openness to trade stimulates economic growth. Clement and Hlalefang (2018) analyse the relationship between trade openness and economic growth in SADC countries for the period between 1990 and 2016. The paper employed the ARDL-bounds test approach and the Pooled Mean Group (PMG) model and found that trade openness has a negative impact on economic growth in the long-run. Matthew, Oduntan and Adediran, (2017) examine the interaction effect of trade openness and institutions on economic growth in selected African countries using panel data analysis and found that the interaction effect of trade openness, political and cultural institutions is stronger than the interaction effect of trade openness and economic institutions hence economic growth tends to be better in the former case than the latter in the selected African

countries. The study employed Least Square Dummy Variable (LSDV) technique and the Generalized Method of Moments (GMM).

Ahmet, Fahri and Mahamane, (2017) establish a link between trade openness, capital formation and economic growth in African countries. The study applied panel cointegration and causality by using time series of 38 African countries from 1990 to 2014. The analysis found a long-run relationship among all the variables, but the cross-sectional cointegration test discovered that there is more cointegration in Comoros, Equatorial Guinea, Niger and Guinea-Bissau. With the highest GDP per capita and Equatorial Guinea has more long-run relationship between trade openness, capital formation and economic growth.

Milton and Ajan, (2017), in their study, examined the impact of trade on economic growth in ECOWAS countries. Fixed Effects Model, Random Effects Model and Dynamic Panel regression model, were used in addition to pooled OLS. The results reveal that exports, exchange rate and investment were significant determinants of per capita real income growth. Moreover, exports were consistently positively related to growth, thus confirming the hypothesis of trade having a significant positive impact on economic growth in ECOWAS countries. Study conducted by Yaya (2017) in investigating the effects of trade openness on economic growth and reveals a positive and robust complementary relationship between trade openness and capital formation in promoting economic growth. And also found that trade openness has positive effects on economic growth both in the short and long run. The case of Cote d'Ivoire over the period 1965–2014 and employing ARDL bounds test to cointegration and the Toda and Yamamoto Granger causality.

Similarly, Dinkneh and Yushi (2016) assess the impact of Africa-China trade openness on technology transfer and economic growth for Africa. The dynamic panel data approach for 38 African countries was employed for the periods 1995-2013 after controlling for endogeneity. They found that Africa-China trade openness has a positive effect on GDP growth in African countries. And also shows the evidence of interaction between Africa and China trade openness which contribute to African economic growth. However, Tsaurai, (2016) looks at the inter-linkages between trade openness, human capital development and growth in selected emerging markets using panel approach with data from 1994 to 2014. The panel cointegration tests and panel vector error correction model (VECM) was used for the analysis. The results reveal that no causality was observed from trade openness and human capital development to economic growth. But, economic growth and trade openness individually and jointly influenced human capital development in the long run. While an insignificant causality relationship running from GDP and human capital development towards trade openness in the long-run only was also detected in the three emerging markets studied. The study carried out by Jamilah, Zulkornain and Muzafar (2016) investigate trade openness and economic growth: a causality test in panel perspective and dynamic panel general method of moments (GMM), The empirical results reveal a bidirectional causal relationship for both developing and OECD countries. They found that increased openness leads to higher growth which is consistent with the endogenous theory.

However, Henok (2015) assessed trade policy and economic growth in sub-Saharan Africa by using panel data covering 47 Sub-Saharan Africa countries over the periods 2000-2008 and generalised least square (GLS) estimation technique. This posits that openness to international trade stimulates both economic growth and investment. But trade policies such as average weighted tariff rate and real effective exchange rate have both direct and indirect impacts on economic growth. Mercan, Gocer and Bulut (2013) indicates positive and statistically significant in line with theoretical expectations of openness on economic growth and utilises panel data analysis of the period from 1989 to 2010 on the effect of openness on economic

growth for BRIC-T countries. Shahbaz, Azim and Ahmad (2011a) tested the impact of trade openness on economic growth in the case of Pakistan, by considering exports as an indicator of trade openness after financial reforms regime. The empirical results confirmed that long-run relationship does exist between economic growth and trade openness. Further, results illustrated that export-leads growth hypothesis and exchange rate changes reduce domestic output while capital stock improves the volume of local production and hence economic growth.

Finally, Klasra (2011) examined the association between trade and economic growth in Turkey and Pakistan, and realised the positive impact of trade on economic growth in both countries. From the above literature, the effect of trade openness on the economic growth of any country depends on its terms of trade with other countries of the world. Therefore, trade openness impacts the economy positively and negatively.

3 Methodology and Data

The paper uses secondary data, which sourced from World Development Indicators (WDI) International Monetary Fund (IMF), United Nations Conference on Trade Development (UNCTAD) and National Bureau of Statistics (NBS) publications. The paper employs dynamic panel data techniques to test the long-run relationship between trade openness and economic growth for the period 1986-2016. The panel unit root tests are used to check whether the time series variables are stationary or not. And also, panel co-integration tests are carried out to test for the presence of a long-run relationship between the variables included in the models. For this paper the following equation was specified in line with the objective in order to have a specification that is consistent with the literature and allow for the identification of the channels through which trade openness affect economic growth over time, a multivariate regression equation is built so as to empirically examine the nexus between trade openness and economic growth specified as:

$$lGDPC_{it} = \beta_o + \beta_1 lOPEN_{it} + \beta_2 lFDI_{it} + \beta_3 lINFL_{it} + \beta_4 lEXRT_{it} + \varepsilon_{it} \quad [1]$$

where,

GDPC	=	Log Gross Domestic Product per capita
OPEN	=	Log Trade Openness
FDI	=	Log Foreign Direct Investment
INFL	=	Log Inflation Rate
EXRT	=	Log Exchange Rate

hence, β_s are the unknown parameters to be estimated, i is the country cross-country dimension, t is the country's time-series dimension, and ε is random disturbance term.

i.e. i = 1, 2, 3...t = 1986…2016.

3.1 Pooled Mean Group (PMG) Estimator

Pooled mean group is that allows short-run coefficients, including the intercept, the speed of adjustment to the long-run equilibrium values, and error variances to be heterogeneous country by country, while the long-run slope coefficients are restricted to be homogeneous across countries. This is particularly useful when there are reasons to expect that the long-run equilibrium relationship between the variables is similar across countries or at least a subset of them. The PMG estimator constrains the long term coefficients to be the same across countries and allows only the short term coefficients to vary. The error variances and the short-run

coefficients may differ due to the policies change or any other reasons. The PMG specify as follow:

$$y_{it} = \sum_1^p \lambda_{ij}\, y_{it-j} + \sum_{j=0}^q \delta^{\int} ij\, X_{i,t-j}\, \mu_i + \varepsilon_{it} \quad [2]$$

where $X_{i,t-j}$ is the (k x 1) vector of explanatory variables for group i, and μ_i represent the fixed effects, β_i are the long-run parameters and θ_i are the error correction parameters. For convenience, the above equation can be re-parameterised as follows:

3.2 Panel unit root tests

A unit root is a peculiarity of techniques that develop through time that can result in issues of statistical inferences, which involves models of time series. The unit root is ubiquitous in economics as well as financial time series variables that is most of macroeconomics variables are non-stationary. The unit root tests employ to check whether the time series variables are stationary or not. These tests include: Levin, Lin, and Chu (2002), Breitung (2000), Im, Pesaran, and Shin (2003), Maddala and Wu (1999), Choi (2001) all of which assume the null hypothesis of non-stationarity except the Hadri (2000) which implies the null for stationarity. These tests are based on the equations:

$$\boldsymbol{y_{it} = \rho_i\, y_{it-1} + X_{it}\, \delta_i + \varepsilon_{it}} \quad [3]$$

3.3 Panel Co-integration Test

The co-integration analysis in panel data setting is similar to the way co-integration analysis is carried out in time series data sets by first; testing for the presence of a long-run relationship between the variables (testing for co-integration); estimating the long-run coefficients of the variables and lastly; estimating the short-run coefficients of the variables. There exists a variety of tests for testing long-run movement in cross-sectional units. These tests include those proposed by Pedroni (1999; 2004). These tests can be specified in the following equation as:

$$\boldsymbol{y_{it} = \alpha_i + \delta_i t + \beta_{1i} X_{1i,t} + \beta_{2i} X_{2i,t} + \cdots + \beta_{Ni} X_{Nit} + \varepsilon_{it}} \quad [4]$$

4. Empirical Results and Discussion

4.1 Descriptive statistic

The descriptive statistic is presented in Table 1. The table reports the overall mean, standard deviation, minimum and maximum values for all the variables employed in the study. The variables are relatively closer to their mean values except for *GDP* and *EXRT*. The average *GDP* per capita for the sampled countries over the study period is US$628.7304 in WACs. *FDI* averaged 1.03e+09 per cent within the study period with the maximum, and minimum *FDI* recorded at 8.84e+09 and -1.17e+08, respectively. The standard deviation confirms little variability in the *FDI* and *TOPN* are 1.88 and 1.83, respectively.

Table 1
Descriptive statistic result

Variables	Mean	Standard Deviation	Minimum	Maximum
LGDP	628.7304	616.5867	153.6467	3221.678
LFDI	1.03e+09	1.88e+09	-1.17e+08	8.84e+09
LEXRATE	265.9344	244.8774	2 .008915	733.0385
LINFL	12.07727	15.11598	-7.796642	72.83551
LTOPN	1.87e+08	1.83e+09	1 .215879	2.04e+10

Note: Authors computations.

This paper employed different panel unit root tests, namely Levin-Lin-Chu's (LLC), Breitung, IPS, ADF-Fisher and PP-Fisher, to test for unit root in both the dependent and explanatory variables under consideration. The Table 2 shows evidence of non-stationary in *GDP*,

FDI and *EXRT* variables at level using different method employed in the paper. However, show evidence of stationary at level in constant and constant plus time trend in both *TOPN* and *INFL* variables. Stationary tests are then carried out at first difference with constant and constant plus time trend using variants method employed in testing the stationarity of the variables in the paper and find that for all series the null hypothesis of unit root test is rejected and conclude that there is evidence of order of integration among the variables.

Table 2
Unit roots test results

Level with Constant					
Variables	LLC	Breitung	IPS	ADF-Fisher	PP-Fisher
GDP	1.0593	-	2.2970	1.1540	1.2307
FDI	-1.2074	-	-1.8029**	18.2330**	6.7225
EXRT	5.5504	-	4.8915	2.4619	2.5159
TOPN	-2.6777**	-	5.0288***	-46.1021***	75.5437***
INFL	5.8666***	-	4.5820***	-35.6288***	35.4845***
Constant & Trend					
GDP	0.3478	0.5902	1.0135	3.0509	2.9968
FDI	2.0166	3.9799	-0.7318	11.6113	2.6730
EXRT	3.4431	3.9792	3.2366	1.6441	1.6582
TOPN	-5.6269***	-1.3918*	-6.4652***	51.6997***	1.2457***
examine	6.4951***	-5.9759***	-4.9882***	36.2790***	28.8187***
First Order Difference with Constant					
GDP	-7.3959***	-	8.0160***	-65.4641***	65.2745***
FDI	2.5782	-	-1.3485*	15.8180**	34.3349***
EXRT	0.6372	-	-2.5844***	36.5713***	42.8287***
TOPN	-6.4870***	-	-12.3500***	1.0132***	109.719***
INFL	-9.8203***	-	9.2735***	79.6208***	99.7965***
Constant & Trend					
GDP	6.4321***	4.4783***	7.0332***	52.0347***	51.7747***
FDI	4.2339	4.2402	1.1802***	9.5343**	25.3296***
EXRT	1.9183	2.2706	-2.0086**	28.0150***	36.2069***
TOPN	-4.8511***	1.3648	-11.7680***	1.2735***	5.8410***
INFL	-8.3255***	-6.9438***	-8.1179***	68.6922***	8.0658***

Note: ***, **, * represent 1%, 5% and 10% level of significant, respectively.

4.2 Panel co-integration test

The paper employ panel co-integration tests base on Pedroni co-integration test. The aim is to investigate whether steady long-run relationship or co-integration exist among the variables. The results are presented in Table 3. However, the empirical results show the co-integrations test without deterministic trend, and the summary of the effects indicates that 5 out of 11 outcomes do not reject the null hypothesis of no co-integration. In the panel co-integration test in the model with deterministic intercept and trend, the results indicate that 6 out of 11 outcomes reject the null hypothesis of no co-integration. It is shown that independent variables do hold co-integration in the long run for a group of selected countries and conclude that there is a long-run co-integration among the variables of interest.

Table 3
Co-integration tests results

	Intercept		Intercept + Trend		None	
Gross Domestic Products	**Statistic**	**Weighted Statistic**	**Statistic**	**Weighted Statistic**	**Statistic**	**Weighted Statistic**
Panel *v*-Statistic	1.9491*	-0.7842	3.4454***	1.2303	-1.8417**	-0.4026
Panel ρ Statistic	-2.4566**	-0.004	-0.9006	1.4180	-3.5108*	-3.0721**
Panel *pp* Statistic	-6.8924***	-1.0724	-4.9559***	-1.2231	-1.3319	-4.1740
Pane ADF Statistic	-6.7092***	0.6920	-4.9715***	-1.6683**	-5.3844***	-1.2905**
Group ρ Statistic	0.5241	-	1.8608	-	0.3860	-
Group *pp* Statistic	-2.4726	-	-1.3509**	-	-4.3910*	-
Group *ADF* Statistic	-1.4832	-	-2.0678**	-	-1.4718**	-
Conclusion	Cointegrated					

Note: ***, **, * represent 1%, 5% and 10% level of significance, respectively.

Table 4 presents the estimated coefficient of trade openness, which is statistically significant at one per cent level of significance. Therefore, in the long-run one per cent increase in trade openness trigger the growth by 0.72% in the same direction. The positive significant coefficient implies a high degree of openness and indicates the long-run driver to growth in the region. Moreover, the country's citizens have the opportunity to invest their savings on foreign firms that invest in the region. Open economy appears to be beneficial for regional development. This result indicates that the economy of WACs is open to trade with the rest of the world in the international trade and hence lead to growth. The results are consistent with findings of Yaya (2017), Darku and Yeboah (2018), Amirkhalkhali and Dar (2019) and Tang *et al*. (2019) which reveals that openness to trade have positive effects on economic growth in the long run. On the contrary, the study conducted by Shahbaz, Azim and Ahmad, (2011a) confirmed that long-run relationship does exist between economic growth and trade openness.

Table 4
Pooled Mean Group Estimation Results

Variable	Coefficient	Prob.
Long-run		
C	2.0785	0.3375
LTOPN	0.7225***	0.0000
LFDI	0.2511***	0.0000
LEXRT	-0.2619**	0.0030
LINFL	-0.0524*	0.0647
Short-run		
ΔLTOPN	0.2241*	0.0657
ΔLFDI	0.2637	0.4672
ΔLINFL	-0.0231	0.4261
ΔLEXRT	-0.7707**	0.0062
ECT_{t-1}	-0.2655	0.0537

Note: ***, **, * implies 1%, 5% and 10% level of significance, respectively.

The *FDI* coefficient is statistically significant at one per cent, and hence, an increase in *FDI* inflows stimulate growth by 0.25%. This indicates that foreign direct investment, in the long run, stimulates growth. The estimated coefficient of *EXRT* is -0.26 and statistically significant at five per cent which shows a negative effect on *GDP*, meaning that depreciation in exchange rates led to decline in growth by 0.26% while other variables included in the model are held constant.

In addition, the short-run effect of trade openness to growth is, however different. The coefficient is 0.22% at ten per cent level of significance, meaning that a one per cent increase in *TOPN* cause the growth of about 0.22%. The result of this study is consistent with the studies conducted by Ma *et at*. (2019), Çevik, Atukeren, and Korkmaz (2019) and Burange *et al*. (2019). Besides, inflation coefficient is -0.02 and statistically insignificant; it implies that an increase in inflation reduces the growth of the economy. The result of this reveals that some of the economies in WACs is facing macroeconomic problems in their economy due to unfavourable macroeconomic environment. In the model, the error correction terms is negative and statistically significant. The error correction terms of -0.26% means that the speed of adjustment to correct the economy when there is disequilibrium is 0.26% indicating sluggish speed of adjustment.

5. Conclusion and Recommendations

The impact of trade openness on economic growth has received more considerable attention in the literature. Several empirical studies provide evidence of a positive effect of trade openness on economic growth. The results of this empirical study indicate that the trade openness into the four countries of study stimulates economic growth in the long run. Besides, the study found that trade openness and *FDI* is critical in accelerating the growth of the economies in the region. However, exchange rate fluctuations and inflation pass-through indicates a negative effect on growth, i.e. do not lead to growth in the region.

Trade openness positively affects economic growth. Therefore, a significant positive coefficient implied a high degree of openness to trade. Furthermore, government needs to liberalise the foreign sector in WACs so that all barriers to trade such as arbitrary tariffs, import and export duties and other levies should be reduced to encourage investors and improve trade partnership with the rest of the world. Moreover, the country's citizens have the opportunity to invest their savings in appropriate sector of the economy. Furthermore, the open economy appears to be beneficial for regional development, at the same time indirectly reducing poverty among citizens. The results found that FDI is vital in achieving economic growth, and *FDI* comes with some invention and innovation that improve employees' skills. Hence, authorities in the sub-regions must initiate action plans, strategies, trade agreements reforms and dynamic institutional restructurings in line with best practices in an attempt to facilitate the functions and activities of these institutions, strengthen its regulations which would ensure free inflow of *FDI* into the region.

However, such investment must focus on those areas that are beyond the capacity and capabilities of domestic investors. Moreover, there is the need for governments of WACs to design and implement sound fiscal and monetary policies aimed at macroeconomic stability to create and improve an enabling environment to attract competitive domestic and foreign investments. Hence, necessary measures must put in place in order to manage the fluctuations of the exchange rate. The respective governments should also initiate policies that could curb the high rate of inflation to sustain the macroeconomic environment stability, which would

keep investment profitable. Because of the high inflation rate is a signal to macroeconomic instability that would increase the uncertainty and user cost of capital.

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