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Asymmetric effects of exchange rate and oil price on export performance and economic growth in WAMZ

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Abstract

The purpose of the study is to explore the effects of exchange rate and oil price asymmetries on export performance and economic growth in the West African Monetary Zone (WAMZ). The study uses monthly data from 1970 to 2022. The study makes use of the asymmetric ARDL approach. Our findings show that there exists a long-run relationship between oil price, exchange rate, export performance, and output growth. We find that depreciation of the exchange rate and increases in oil prices generally hinder the economic prospects of these nations. Furthermore, it was found that currency depreciation did not significantly improve the export performance of these nations, primarily due to the largely stagnant manufacturing sectors and other challenges such as infrastructural decadence that these nations face. The findings imply that these countries, as well as the rest of Africa, still need to implement sincere and significant economic changes. We need to make large-scale investments in infrastructure development, revive the dormant manufacturing sector, actively and transparently combat corruption at all levels, and take other actions to stabilize their currencies and boost export performance, all of which will contribute to economic prosperity. We also recommend a strong institutional framework that will strengthen and support the effective policy outcomes.

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1. Introduction

The West African Monetary Zone (WAMZ), a consortium of West African nations, has faced several significant questions about its economic stability and growth prospects. Exchange rates and oil prices are the key determinants of economic performance in the WAMZ nations. The six nations of Gambia, Ghana, Guinea, Liberia, Nigeria, and Sierra Leone comprise the West African Monetary Zone (WAMZ). These nations share the goal of economic stability and regional monetary union. It is crucial to take into account in this situation how currency rates and oil prices impact exports and economic growth. Exchange rates are crucial to a nation's export performance and overall economic growth. The exchange rate impacts a country's export competitiveness by influencing the prices of goods and services in international marketplaces (Chen, 2008; Eregha, 2017; Haque, 2005). Exchange rate fluctuations can also negatively impact the export performance and economic growth of the WAMZ countries, just like they do for any other nation. This can negatively impact economic growth and potentially lead to a trade deficit. Oil prices are another important determinant of the WAMZ countries' economic performance. Many of the countries in the region, such as Nigeria and Ghana, are

heavily dependent on oil exports for revenues and external exchange earnings. When oil prices are high, these countries can experience increased government revenues and foreign exchange earnings, stimulating economic growth. However, when oil prices are low, revenues and earnings from external exchange decline, leading to budget deficits and economic challenges. Furthermore, the reliance on oil exports makes the WAMZ countries vulnerable to external shocks and price volatility in the global oil market (Eregha, 2017).

However, exchange rate swings can also negatively impact exports and economic growth. Higher import costs may result from a dramatic decrease in exchange rates, particularly for nations whose export-oriented industries depend substantially on imported commodities. The erosion of profit margins could lead to a decline in competition. A decline in the rate of exchange could also raise manufacturing costs and hurt export performance if a nation imports a lot of intermediate goods or raw materials for its exports. Oil prices significantly influence both the success of exports and the rate of economic expansion in WAMZ countries. Asiedu (2006) asserts that the major way in which oil prices affect exports and economic growth is through their influence on tax revenue and foreign exchange revenues. Major oil-exporting nations will have increased export earnings when oil prices are high, which can help spur economic growth. The government can allocate higher tax and fee receipts from rising oil prices towards public investments and social welfare initiatives. On the other hand, declining oil prices can have a detrimental effect on exports and economic expansion in WAMZ nations. Falling oil prices lead to budget deficits and reduced government spending, as they reduce government income and export earnings. As a result, the government may need to make budget cuts, which could slow down economic growth (Asiedu, 2006).

Furthermore, many WAMZ countries rely heavily on the sale of crude oil as their primary economic driver and income source. Changes in the oil price on the world market may significantly impact the economies of these nations. Government revenues, foreign exchange reserves, and the general economic health of the population may all suffer as a result of these swings. Understanding the connection between changes in prices of oil and the growth of the economy resulting from these price changes is therefore crucial for the WAMZ region.

A nation's exchange rate directly influences the competitiveness of its exports and the appeal of its imports, making it crucial for economic stability and global trade. In the WAMZ setting, managing the exchange rate and its impact on exports and economic growth presents complex and interesting challenges, given the availability of multiple export currencies and their introduction into the market. To promote trade and keep the economy stable, it is crucial to establish a stable exchange rate. The government must also implement measures to support the exchange rate and guarantee its sustainability (Balogun, 2007).

States in the WAMZ are also vulnerable to external shocks and price volatility due to their reliance on oil exports. Large income swings caused by changes in the price of oil on the world market might make it more challenging for governments to prepare for and carry out long-term development objectives. Additionally, this disarray can erode investor confidence and deter private-sector investment. Oil prices and exchange rates have a complex and multifaceted effect on export success and economic growth in WAMZ countries. Changes in exchange rates can impact foreign direct investment, export competitiveness, and import pricing. On the other side, oil prices are impacted by the economy's overall stability, foreign exchange earnings, and tax income. WAMZ-Nation officials must closely monitor these factors to preserve export success and steady economic growth (Asiedu, 2006).

The central aim of the study is to investigate and analyze the asymmetric effects of oil prices and exchange rates on export performance and overall economic growth in WAMZ countries. The study probes the effects of both exchange rate and oil price on export performance and economic growth, unlike previous studies that have mostly focused on either exchange rate or oil price. We structure the remainder of our discussion accordingly. Section 2 reviews empirical literature. Section 3 presents the methodology framework. Section 4 presents findings from the estimation process, while Section 5 concludes the study by providing a summary and recommendations.

2. Empirical Literature

The literature has extensively examined the effects of exchange rates on export performance and economic growth, but there are still very few empirical investigations in WAMZ. A currency depreciation stimulates exports, increasing their volume, but at the same time making imports more expensive. Onwuka, Obi, Ezenekwe, and Ukeje (2020) suggested that the exchange rate can mediate the relationship between oil prices and export performance, emphasizing the importance of exchange rate stability for oil-exporting WAMZ countries. When a currency increases in relation to the base currency, exports become more expensive, and it is more economically beneficial to import certain goods. In the medium and long terms, the exchange rate has no discernible impact on export commerce among the chosen oil-exporting nations in Africa, whether small, large, or moderate. Etale and Ochuba (2019) argued that rate of exchange significantly and positively influences GDP. A sample of fifty-two developed was employed by Nouira, Plane, and Sekkat (2010). The findings demonstrated that, between 1991 and 2005, a number of industrialized nations employed devaluation to boost their manufacturing sectors. Nasir, Wu, and Guerrero (2015) examined how Andalucía's growth was affected by the currency rate. They submitted that unexpected change in rate of exchange slowed economic growth. In a similar vein, Paudel and Burke (2015) utilized a gravity model to concentrate on Nepal between 1980 and 2010. They

confirmed that the exports to other countries were negatively impacted by currency appreciation, confirming the position of Li, Ma, and Xu (2015).

Nasir and Simpson (2018) demonstrated how the devaluation significantly impacted the trade balance and inflation in the United Kingdom. Nasir, Naidoo, Shahbaz, and Amoo (2018) examined the relationship between unexpected changes in oil prices and the BRICS (Brazil, Russia, China, and South Africa) economies between Q2 1987 and Q2 2017. They proposed that oil negatively impacted the GDP, inflation, and trade balance. Nasir and Jackson (2019) proposed that the misalignment of the exchange rate has a negative impact on the balances in the current account. Using the TVSVAR (Time-Varying SVAR) approach, Nasir and Vo (2020) submitted that the shock to the rate of exchange negatively affected trade performance in Canada. Bahmani-Oskooee, Huynh, and Nasir (2021) and Bahmani-Oskooee and Nasir (2020) demonstrated that industries experienced asymmetric effects from the dollar-pound rate between 1996 and 2018 in the United Kingdom and the United States. Using asymmetric ARDL, Nasir and Leung (2021) argued that there exists a strong link between the balance of trade and the rate of exchange in the United States. Moreover, they argued that productivity and financial restraint negatively impacted the balance of trade.

Empirical investigations in Asian economies were carried out by Fang, Lai, and Thompson (2007). They discovered that whereas an increased rate of exchange improved exportation. The study also found that in six of the nations it looked at, exchange rate variability had a net negative effect on exports; in Thailand and Korea, however, there was no net effect. Cheung and Sengupta (2013) found that the improved currency has a negative but significant effect on Indian export. Alemu and Jin-Sang (2014) discovered that in the 14 Asian economies they chose, commerce was decreased by currency devaluation. The study concluded that devaluation improved trade balance after analyzing eight more industrialized Asian economies.

Hooy, Siong-Hook, and Tze-Haw (2015) submit that depreciation of currency had a favourable and considerable impact on the total exports of ASEAN countries. Specifically, the depreciation of the RMB had a greater effect on the export of technology and final goods. This is consistent with Patel and Mah (2018) as they evaluated link between development and the exchange rate for South Africa from 1980 to 2015. The VECM (Vector Error Correction Model) demonstrated that exports and economic growth shocks worsened the exchange rate. Nyeadi, Atiga, and Atogenzoya (2014) argued that Ghana's exports were unaffected by the exchange rate between 1990 and 2012. Datta (2014) on the other hand, argued that currency depreciation improved India's trade balance.

3. Theoretical and Empirical Approaches

This section provides the theoretical foundation for the study and outlines the empirical method to achieve the objectives of the study.

3.1. Theoretical Approach

The Marshall-Lerner condition and proposition generally anchor empirical studies on the exchange rate and trade nexus. This is due to the acknowledgement of the crucial role a stable exchange rate plays in maintaining overall macroeconomic stability. A stable exchange rate system ensures all the economic players are able to plan without worrying about fluctuations in currency values. If the absolute price elasticity of the demand for exports and imports is larger than 1, the Marshall-Lerner condition indicates a stable foreign exchange market. Movement in the rate of exchange cannot impact the payment balance as long as import and export price elasticities are equal to 1; otherwise, the foreign exchange market will be unstable. By implication, if the import and export price elasticities are greater than one, the Marshall-Lerner criterion assumes a stable foreign exchange market. However, the summation of the two elasticities should consistently exceed one, enabling the supply and demand curves of the external currency to be elastic, thereby ensuring or guaranteeing the necessary adjustments.

3.2. Empirical Approach

3.2.1. Data Sources

Our study explores the asymmetric impacts of both the rate of exchange and oil price on export performance and economic growth in the West African Monetary Zone (WAMZ). The countries under investigation are Ghana, Guinea, Gambia, Nigeria, Liberia, and Sierra Leone. Exports measure export performance as a percentage of Gross Domestic Product (GDP). GDP growth measures the economy's growth. The exchange rate is the external value of the country's domestic currency in dollar terms. Each country denotes the oil price in its own domestic currency. We source the monthly data on the selected variables from the Statistical Bulletin of the apex bank of each country, covering the period from the first month of 1970 to the last month of 2022.

3.2.2. Econometric Strategy

Our econometric strategy involves the non-linear ARDL model, and our estimated model follows. The estimated model follows Kazeem Abimbola Sanusi (2020).

$$Y = X\beta + \varepsilon \qquad (1)$$

Y is a matrix of the regressed variable.

X is a vector of regressors.

β is a matrix of model parameters ε is a matrix of error terms.

The multivariate asymmetric ARDL (Autoregressive Distributed Lag model) technique put forward by Shin, Yu, and Greenwood-Nimmo (2014) is adopted to capture the asymmetric relationships in our model.

The nonlinear ARDL (NARDL) technique is adaptable, and strong coefficients' variation is commonly associated with the conventional ARDL technique. According to Van Hoang, Lahiani, and Heller (2016) the NARDL is most suitable and appropriate when variables under investigation have varying integration order. . The asymmetric ECM model, as described in Shin et al. (2014) is expressed as:

$$\Delta y_t = \alpha_0 + \emptyset y_{t-1} + \beta_1^+ x_{t-1}^+ + \beta_2^- x_{t-1}^- + \sum_{i=1}^{p} \vartheta_i \Delta y_{t-i} + \sum_{i=1}^{q} \emptyset_i^+ \Delta x_{t-1}^+ + \sum_{i=1}^{q} \emptyset_i^- \Delta x_{t-1}^- + \varepsilon_t \quad (2)$$

The long-run and short-run parameters are denoted by β_i and ϕ_i respectively. The presence of short-run and long run asymmetry is determined using Wald test. The vector of independent variable (oil price and exchange rate) becomes the relative sums of negative and positive processes for either direction of change.

$$x_i^+ = \sum_{k=1}^{t} \Delta x_k^- = \sum_{k=1}^{t} max(\Delta x_k, 0) \text{ and } x_i^- = \sum_{k=1}^{t} \Delta x_k^- = \sum_{k=1}^{t} min(\Delta x_k, 0) \quad (3)$$

The asymmetric link among the independent variables is confirmed using the bound test. The null hypothesis of the cointegration analysis $(\alpha = \beta = \beta^+ = \beta^- = 0)$ and the alternative hypothesis $(\alpha \neq \beta \neq \beta^+ \neq \beta^- \neq 0)$ are used to investigate the F-statistic. According to Pesaran, Shin, and Smith (2001) the rejection of our null hypothesis validates the regressors' long-term asymmetric connection.

4. Empirical Findings

This section of the study includes a description of the findings. The section begins with the graphical presentation and summary properties of the variables.

4.1. Summary Properties of the Series

Table 1 of the study displays the summary statistics of the series for each of the countries. Each country's average local currency rates to the US dollar are relatively high, except for Ghana, which had a lower average exchange rate during the study period. On the other hand, during the study period, the average oil price was highest in Ghana and lowest in Nigeria. Over the study period, we found that the average trade volume as a ratio of GDP was lowest in Nigeria and highest in Liberia. Additionally, we find that Sierra Leone has the highest average output growth rate, while Ghana has the lowest. Positive kurtosis values for the variables indicate a heavy-tailed distribution. The Jarque-Bera test statistics indicate that the variables do not follow a normal distribution pattern.

Table 1. Summary properties of the variables.

Countries	Variables	Mean	Std. dev.	Max.	Min.	Skewness	Kurtosis	Jae. B
	Exchange rate	179.5	119.1	519.1	61.8	1.3	4.1	212.7
	Oil price	67.9	67.7	372.3	2.5	1.6	6.4	590.5
	Export	49.6	122.0	1142.2	0.0	4.4	30.6	222.9
Gambia	Output growth	5.2	1.0	6.6	3.0	-0.7	2.0	77.6
	Exchange rate	12.5	3.0	19.0	7.2	0.1	1.7	35.6
	Oil price	248.0	1979.0	4445.0	62.1	22.1	493.6	511.0
	Export	3.8	5.3	29.4	0.0	1.5	5.0	273.6
Ghana	Output growth	2.0	0.1	2.5	1.7	0.4	2.5	16.1
	Exchange rate	103.2	61.3	281.0	28.2	0.9	3.1	89.9
	Oil price	65.4	62.6	248.0	4.6	1.1	3.1	120.3
	Export	80.8	107.9	511.7	0.1	1.2	3.6	160.5
Guinea	Output growth	2.6	1.1	4.2	1.4	-0.4	1.6	68.8
	Exchange rate	88.5	66.0	320.9	10.2	1.8	5.9	605.5
	Oil price	176.9	132.1	641.9	20.5	1.9	5.8	605.6
	Export	220.2	513.4	5114.7	0.1	4.9	37.4	3392.0
Liberia	Output growth	5.4	1.2	7.7	3.0	-0.2	2.0	28.2
	Exchange rate	99.7	38.2	207.9	59.0	1.7	4.5	290.5
	Oil price	53.3	33.9	138.7	9.8	0.4	1.9	40.6
	Export	2.3	3.9	39.2	0.1	3.2	20.2	710.9
Nigeria	Output growth	2.5	0.9	5.6	0.7	-0.2	2.5	9.9
	Exchange rate	108.0	58.9	319.6	29.5	1.1	3.9	156.6
	Oil price	67.5	98.7	458.4	0.1	1.9	6.0	597.5
Siera Leone	Export	55.0	128.3	1278.7	0.2	4.9	37.4	339.3
	Output growth	5.7	1.2	7.9	3.3	-0.2	2.0	28.2

4.2. Stationary Test Results

Table 2 presents the results of the time series properties using ADF (Augmented Dickey Fuller) and PP (Phillips Perron). We establish that most of the variables are not stationary in their level form, but all become stationary when they undergo a single differentiation.

Table 2. Unit root test results.

Countries	Series	Panel A: ADF test		Panel B: PP test	
		Level	1st diff	Level	1st diff
Ghana	Exc rate	0.71	0.00*	0.53	0.00*
	Oil price	0.41	0.00*	0.65	0.00*
	Export	0.21	0.00*	0.03*	0.00*
	Output growth	0.03*	0.00*	0.01*	0.00*
Ghana	Exc rate	0.26	0.00*	0.41	0,007*
	Oil price	0.33	0.00*	0.06	0.00*
	Export	0.21	0.00*	0.31	0.00*
	Output growth	0.00*	0.00*	0.00	0.00*
Guinea	Exc rate	0.32	0.00*	0.96	0.04*
	Oil price	0.21	0.00*	0.22	0.00*
	Export	0.04*	0.00*	0.03*	0.00*
	Output growth	0.13	0.00*	0.06	0.00*
Liberia	Exc rate	0.61	0.00*	0.28	0.00*
	Oil price	0.18	0.00*	0.13	0.00*
	Export	0.49	0.003*	0.07	0.00*
	Output growth	0.04*	0.00*	0.01*	0.00*
Nigeria	Exc rate	0.14	0.00*	0.38	0.00*
	Oil price	0.06	0.00*	0.35	0.00*
	Export	0.26	0.004*	0.05*	0.00*
	Output growth	0.14	0.00*	0.21	0.00*
Siera Leone	Exc rate	0.61	0.004*	0.35	0.00*
	Oil price	0.18	0.00*	0.06	0.00*
	Export	0.49	0.03*	0.31	0.00*
	Output growth	0.24	0.00*	0.22	0.00*

Note: * indicate parameter significance level at 5% respectively.

4.3. NARDL Bound Test

Table 3 contains the findings of long-run cointegration among the regressors. We use the Akaike Information Criterion to select the optimal lag structure for our model because of its superiority over other selection criteria. We find that the bound test values for the WAMZ countries exceed the upper bound values at the crucial 5% levels. We find evidence of long-run asymmetric cointegration among the variables, rejecting the null hypothesis of no cointegration relation. Additionally, the NARDL bound result confirms an asymmetric link in the long run between the exchange rate, oil price, export performance, and economic growth in the WAMZ countries.

Table 3. Non-Linear ARDL results.

Countries	Test statistic (F-statistics)	Values	
Gambia	NARDL (Export model)	5.645*	
	NARDL (Economic growth model)	17.23*	
Ghana	NARDL (Export model)	6.71*	
	NARDL (Economic growth model)	9.75*	
Guinea	NARDL (Export model)	11.51*	
	NARDL (Economic growth model)	19.2*	
Liberia	NARDL (Export model)	8.92*	
	NARDL (Economic growth model)	5.49*	
Nigeria	NARDL (Export model)	4.61*	
	NARDL (Economic growth model)	5.31*	
Sierra Leone	NARDL (Export model)	36.12*	
	NARDL (Economic growth model)	7.06*	
Level of significance		Critical bound values	
		Levels	1st difference
10%	-	2.08	3
5%	-	2.39	3.38
2.5%	-	2.7	3.73
1%	-	3.06	4.15

Note: * Indicates parameter is significant at 5%.

4.4. Empirical Results on Asymmetry Relation

Tables 4 and 5 respectively, present the findings from the empirical investigation of the asymmetry effect of the exchange rate and oil price on the performance of exports and the growth of the economy. Long-run findings show that exchange rate or currency depreciation (EXR+) has insignificant positive impacts on the performance of exports in Gambia, Ghana, Guinea, and Liberia. However, Nigeria's export performance experiences a significant negative impact. Sierra Leone experiences an insignificant negative impact. All WAMZ countries, with the exception of Liberia, experience an insignificant positive impact from currency appreciation (EXR-). We find that long-term oil price increases have significant negative impacts in Nigeria and Ghana, and insignificant negative impacts in Gambia, Liberia, Guinea, and Sierra Leone. However, the oil price decrease has insignificant positive impacts in all the WAMZ countries.

Short-run analysis reveals that currency depreciation follows the long-run impact, with the Gambia, Ghana, Guinea, and Liberia observing insignificant positive impacts on export performance, and Nigeria establishing significant negative impacts over time. Sierra Leone experiences an insignificant negative impact. In the short run, currency appreciation exerts an insignificant positive impact on export performance in Gambia, Guinea, Liberia, and Sierra Leone, while Ghana and Nigeria experience insignificant negative impacts. When it comes to oil price asymmetry, Ghana, Guinea, Nigeria, and Sierra Leone experience significant negative impacts on their export performance, while Gambia and Liberia experience insignificant negative impacts. Conversely, Ghana, Guinea, and Sierra Leone experience significant positive impacts on export performance in the short run, whereas the Gambia, Liberia, and Nigeria experience insignificant positive impacts from a decrease in oil price.

Table 4. Asymmetric ARDL results of exchange rate and oil price on export performance.

Variables	Dependent variable: Export performance					
	Gambia	Ghana	Guinea	Liberia	Nigeria	Sierra Leone
Long-run non-linear ARDL estimates						
EXR^{+}	0.00	0.13	0.57	0.64	-0.07***	-0.26
EXR^{-}	-0.00	-0.59	-0.06	0.36	-0.11	-0.57
OP^{+}	-0.08	-0.00***	-0.46	-0.13	-0.16**	-0.66
OP^{-}	0.83	0.47	0.25	0.18	0.12	0.36
Output growth	0.08**	0.18	0.891	0.24***	0.13*	0.42***
Constant	150	20.1	28.3	0.27***	0.06***	48.7***
Short-run non-linear ARDL estimates						
$\Delta(EXP(-1))$	0.02**	0.23**	-0.11*	-0.14***	0.30*	-0.16***
$\Delta(EXR^{+})$	0.23	0.01*	0.03	0.55	-0.00**	-0.04
$\Delta(EXR^{+}(-1))$	0.07	0.02***	0.01	0.38	-0.00	-0.04
$\Delta(EXR^{-})$	0.61	-0.11	0.26	0.53	-0.00	-0.09
$\Delta(EXR^{-}(-1))$	0.51	0.06*	0.36	0.01***	0.00	0.18
$\Delta(OP^{+})$	-0.35	-0.01***	-0.05**	-0.14	-0.109*	-0.10***
$\Delta(OP^{+}(-1))$	-0.20	-0.16**	-0.32*	-0.19	–0.12**	-0.14*
$\Delta(OP^{-})$	0.30	0.74*	0.29**	0.02	0.19	0.02**
$\Delta(OP^{-}(-1))$	0.45	0.04	0.49	0.58	0.03	0.14
Δ(Output growth)	0.48*	0.21**	0.20	0.78***	0.03*	0.90***
Δ(Output growth (-1))	0.03**	0.04**	0.06	0.10*	0.06	0.82***
ECT (-1)	-0.07***	-0.19***	-0.03***	-0.06	-0.05**	-0.51***
Adjusted R^2	0.75	0.86	0.86	0.87	0.70	0.71
F-statistics	321***	171.***	459***	389***	153.***	55.1***
Durbin-Wat	2.02	1.96	2.01	2.03	2.09	2.08
Diagnostic test results						
Serial correlation	0.14	0.21	0.50	0.7	0.51	0.82
Normality test	1. 51	0.79	5.6	0.76	6.03	10.1
Hetereskedasticity	0.41	0.18	0.35	0.32	0.89	4.67
Functional form	0.65	0.82	0.63	0.82	4.61	0.96

Note: ***, ** and * indicate parameter significance level at 1%, 5% & 10% respectively.

Table 5 outlines an empirical investigation of the asymmetric effect of exchange rate and oil price on economic growth. Long-run empirical findings show that the depreciation of currency (EXR+) impacts negatively and significantly economic growth in Ghana, Guinea, and Nigeria. However, Gambia, Liberia, and Sierra Leone experience insignificant negative impacts. On the other hand, appreciation of currency (EXR-) has a significant positive impact on economic growth in Guinea. The remaining WAMZ countries show negligible positive impacts. Increases in oil prices significantly hinder Nigeria's economic growth. The impact is found to

be insignificant but positive Gambia. Insignificant negative impact is however found in Guinea, Ghana, Liberia and Siera Leone. Interestingly, all WAMZ countries find that a decrease in oil price has insignificant positive impacts on economic growth in the long run, except for Liberia, where there is an insignificant negative impact. Short-run findings indicate that depreciation of currency (EXR+) significantly and negatively impacts economic growth in Guinea and Nigeria. However, Gambia, Ghana, Liberia, and Sierra Leone experience insignificant negative impacts. Ghana, Gambia, and Guinea experience significant positive economic growth due to currency appreciation, while Liberia, Nigeria, and Sierra Leone experience insignificant positive growth. As regard the oil price asymmetric relationship, increase in oil price has significant negative impacts on economic growth in all the WAMZ countries except Gambia where insignificant positive impact is also observed. On the other hand, a decrease in oil price has significant positive impacts on economic growth in all four of the WAMZ countries. Nigeria and Sierra Leone exhibit negligible positive effects.

Table 5. Asymmetric ARDL results of exchange rate and oil price on economic growth.

Variables	Dependent variable: Output growth					
	Gambia	Ghana	Guinea	Liberia	Nigeria	Sierra Leone
Long-run non-linear ARDL estimates						
EXR^{+}	-0.00	-0.02***	-0.00**	-0.09	-0.02***	-0.26
EXR^{-}	0.00	0.01	0.00**	0.07	0.02	0.35
OP^{+}	0.00	-0.04	-0.02	-0.08	-0.18**	-0. 51
OP^{-}	0.02	0.02	0.01	-0.09	0.05	0.37
Export	0.00	0.00	0.22	0.06***	0.19*	0. 21***
Constant	5.52**	2.12***	1.83***	7.5***	3.05***	0.22***
Short-run non-linear ARDL estimates						
$\Delta(EG(-1))$	0.02**	0.03**	0.06***	0.0***	0.04**	-0.12***
$\Delta(EXR^{+})$	-0.09	-0.00***	-0.01***	-0.76	-0.07***	-0.0
$\Delta(EXR^{+}(-1))$	0.086	0.01***	0.55	0.43	0.60	-0.07
$\Delta(EXR^{-})$	0.01**	0.00***	0.00***	0.051	0.08	0.01
$\Delta(EXR^{-}(-1))$	0.02***	-0.00***	0.06***	0.09	0.08**	0.60
$\Delta(OP^{+})$	0.24	-0.06**	-0.06***	-0.01***	-0.19*	-0.02***
$\Delta(OP^{+}(-1))$	0.36	-0.05***	-0.43	0.03	0.00**	-0.17*
$\Delta(OP^{-})$	0.00**	0.86**	0.01***	0.04***	0.12	0.02
$\Delta(OP^{-}(-1))$	0.02***	0.01***	0.00***	0.01***	0. 20*	0. 317
Δ(Export)	0.00**	0.01**	0.07	0.43	0.39*	0.14***
Δ(Export(-1))	0.00***	0.00**	0.11	0.46	0.72	0.05***
ECT (-1)	− 0.25***	-0.02***	-0.31***	-0.30	-0.01***	-0.31***
Adjusted R^2	0.87	0. 78	0.73	0.709	0.70	0.86
F-statistics	420***	487***	819***	4943***	103***	458***
Durbin-Wat	1.98	1.88	1.88	2.02	1.94	2.00
Diagnostic test results						
Serial correlation	0.42	0.86	0.51	0.71	0.59	0.92
Normality test	0. 78	0.70	0.35	0.48	0.76	0.66
Hetereskedasticity	0.82	0.73	0.43	0.65	0.26	10.9
Functional form	0.10	0.19	0.67	0.92	0.71	0.51

Note: ***, ** and * indicate parameter level of significance at 1%, 5% & 10% respectively.

4.5. Structural Stability and Diagnostic Investigation

Findings from the investigation diagnostic analysis are reported under the Table 4 and 5. The findings from the various diagnostic investigations confirm the existence of long-run relationship.

We use the cumulative sum (CUSUM) technique of recursive residuals to verify the stability of the NARDL models. Parameter estimates will be deemed unreliable if the lower and upper bounds do not lie between the blue lines, which is a prerequisite for model stability. The models' CUSUM in Figures 1-6 (a and b). We determine that the models are legitimate and appropriate for drawing conclusions because the required conditions are largely met.

4.6. Discussion of Empirical Findings

The presence of an asymmetric relationship between exchange rate, economic growth, and trade performance is consistent with empirical submissions of Hooy et al. (2015). The findings of Abed, Amor, Nouira, and Raul (2016) and Kazeem Abimbola Sanusi (2020) are supported by the asymmetric nature of the oil price. Our findings show that depreciation of the exchange rate significantly and negatively affects export performance in Nigeria in the short run. This is not surprising given the infrastructural decadence, high level of insecurity,

and perennial corruption in Nigeria. One would have expected a depreciating currency to significantly boost export performance. The rest of the WAMZ countries also observe a negligible impact of depreciating currency on export performance. This underscores the diverse challenges that WAMZ nations face, primarily stemming from their economies' supply and production. The current situation is consistent with the long-term findings. Nyeadi et al. (2014) argued that exchange rate depreciation does not significantly impact Ghana's export performance, which is consistent with our findings. However, our findings are at variance with those of Hooy et al. (2015) and Fang et al. (2007), among others, as they conclude that exchange rate depreciation significantly impacted export performance in Asian economies. Our findings shed light on the asymmetric relationship between oil prices. The negative impacts of oil price increases on export performance in WAMZ nations can be explained by the fact that oil price increases worsen the production cost, and as such would likely reduce the output capacity, which consequently explains the negative impact on exports. We can also observe that the drop in domestic oil prices does not improve the export performance of these nations, as the manufacturing sectors responsible for driving exports are largely stagnant.

Several factors, common to both WAMZ countries and African countries in general, explain the negative impact of currency depreciation on economic growth. Most of the countries in the region rely on imports, and a depreciating currency increases the cost of imports. Depreciating currency among other also erodes the foreign investors' confidence, all these hinder the economic growth attainment of these nations. This position is at variance with Sanusi, Ferreira-Schenk, and Dickason-Koekemoer (2023) as they argued that increase in exchange rate (depreciation of currency) positively impact growth of the economy in SADC. All WAMZ nations, except for Gambia, experience significant negative impacts from an increase in domestic oil prices, both in the short and long term. Increased production costs, which hinder economic growth in most WAMZ nations due to the lack of adequate enabling technology, could explain the negative impacts of oil price increases on economic growth. Additionally, the benefits of a decrease in oil prices on economic growth may not be significantly translated into economic growth due to numerous structural rigidities and widespread corruption within these economies.

5. Conclusion

The current study attempts to investigate the asymmetric effects of exchange rate and oil price on export performance and economic growth in WAMZ (Gambia, Ghana, Guinea, Liberia, Nigeria, and Sierra Leone) countries. We sourced monthly data on GDP, exports, oil prices, and exchange rates from the Statistical Bulletin of the apex bank of each country, covering the period from the first month of 1970 to the last month of 2022. The study makes use of a non-linear ARDL approach. Our findings indicate the existence of asymmetric long-run relations among the variables. Additionally, the NARDL bound-testing result confirms an asymmetric long-run link between the exchange rate, oil price, export performance, and economic growth in the WAMZ countries.

Exchange rate depreciation has insignificant favorable long-term effects on the performance of exports in Ghana, Guinea, Liberia, and the Gambia. However, we observe a significant negative impact on Nigeria's export performance. However, in Sierra Leone, the adverse effects are insignificant. All WAMZ countries, except for Liberia, experience negligible negative effects on export performance due to currency appreciation. The Gambia, Liberia, Guinea, and Sierra Leone demonstrate negligible long-term effects from rising oil prices, while Nigeria and Ghana experience considerable effects. Nonetheless, all of the WAMZ countries experience negligible beneficial effects from the decline in oil prices.

Short-term analysis reveals that currency depreciation follows the long-term impact, with notable long-term negative effects on export performance established in Nigeria and negligible positive impacts on the performance of exports identified in the Gambia, Ghana, Guinea, and Liberia. However, we note negligible adverse effects in Sierra Leone. We discover that in the short term, currency appreciation has negligible beneficial effects on export performance in The Gambia, Guinea, Liberia, and Sierra Leone, while it has negligible negative effects in Ghana and Nigeria. Due to the asymmetry of oil prices, a rise in oil prices has a significant negative impact on export performance in Ghana, Guinea, Sierra Leone, and Nigeria, while it has a negligible impact in the other countries. Conversely, a drop in oil prices has a notable short-term positive influence on the performance of exports in Ghana, Guinea, and Sierra Leone, but just a little positive impact in the Gambia, Liberia, and Nigeria.

Similarly, the depreciation of currency has a detrimental effect on the economic growth of Ghana, Guinea, and Nigeria. However, the Gambia, Liberia, and Sierra Leone experience minimal adverse effects, whereas the appreciation of currency only has a significant long-term impact on the economy of Guinea. Researchers have also discovered that rising oil prices significantly impede Nigeria's economic expansion. Researchers establish a positive impact, albeit not significant, in the remaining countries. With the exception of Liberia, where a negligible negative impact is observed, a decline in oil prices is found to have insignificantly favorable long-term effects on economic growth in all of the WAMZ countries. Our results also indicate that currency depreciation significantly hinders Guinea's and Nigeria's economic growth in the short term. However, the effects of currency depreciation are negligible in Ghana, Liberia, Gambia, and Sierra Leone. Researchers have established that while currency appreciation significantly boosts economic growth in Ghana, Gambia, and Guinea, it has a negligible

beneficial impact in Liberia, Nigeria, and Sierra Leone. Oil price increases generally hinder the economic expansion of most of these nations, whereas decreased oil prices may not have the desired impact. Our study's overall conclusion is that both exchange rate depreciation and oil price increases generally impede the economic prospects of these nations. And also, currency depreciation could not be found to significantly improve the export performance because the manufacturing sectors that should drive the exports are largely moribund in these nations, among other challenges confronting them, such as infrastructural decadence. The majority of the countries are importing economies, and depreciating economies makes imports costlier. Depreciating currency, among other factors, also undermines the confidence of foreign investors, thereby impeding the attainment of economic growth in these nations. The study recommends that honest and serious economic reforms are still required in these nations and in Africa in general. Massive investments in infrastructure development, the revitalization of stagnant manufacturing sectors, and a deliberate and transparent fight against corruption at all levels are among the measures that should be implemented to stabilize their currencies, enhance export performance, and ultimately promote economic prosperity for all.

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Appendix

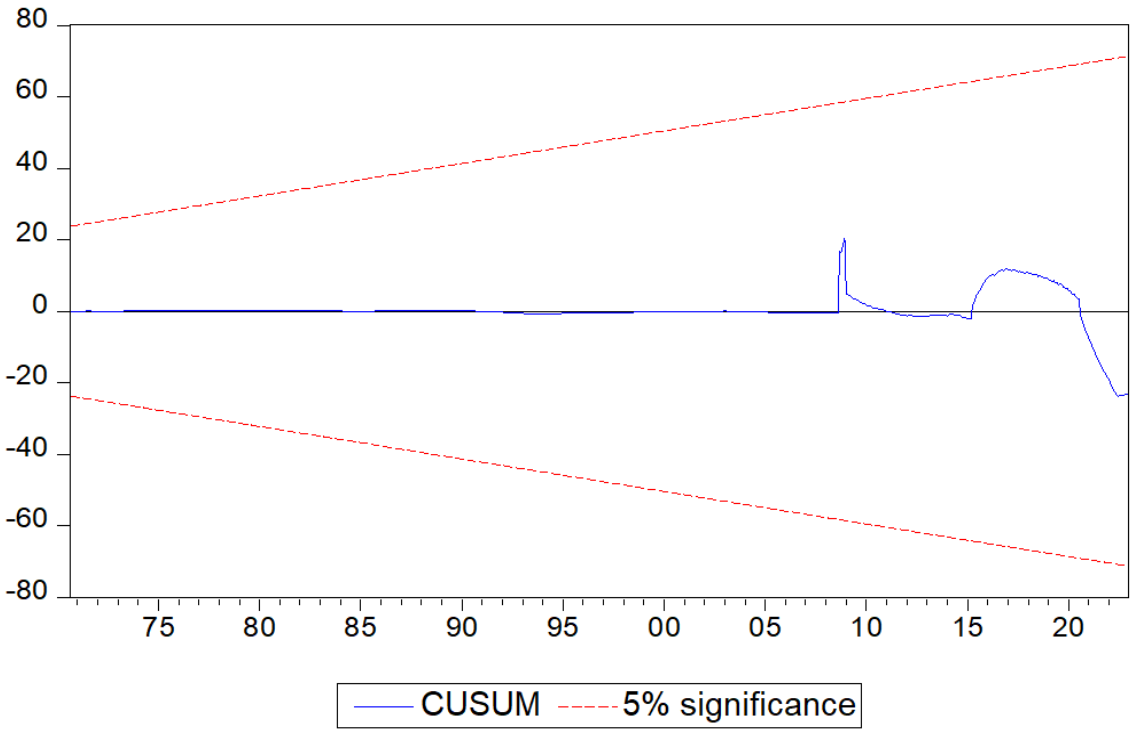

Figure 1a. Export performance model for Gambia.

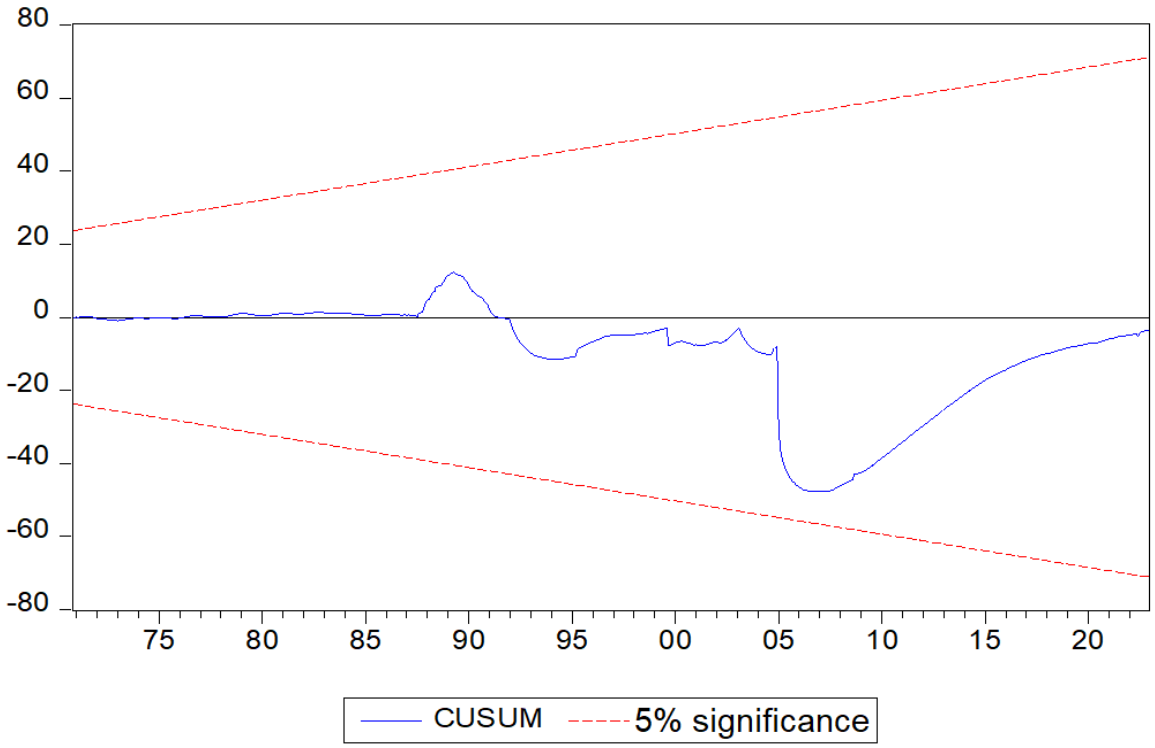

Figure 1b. Output growth model for Gambia.

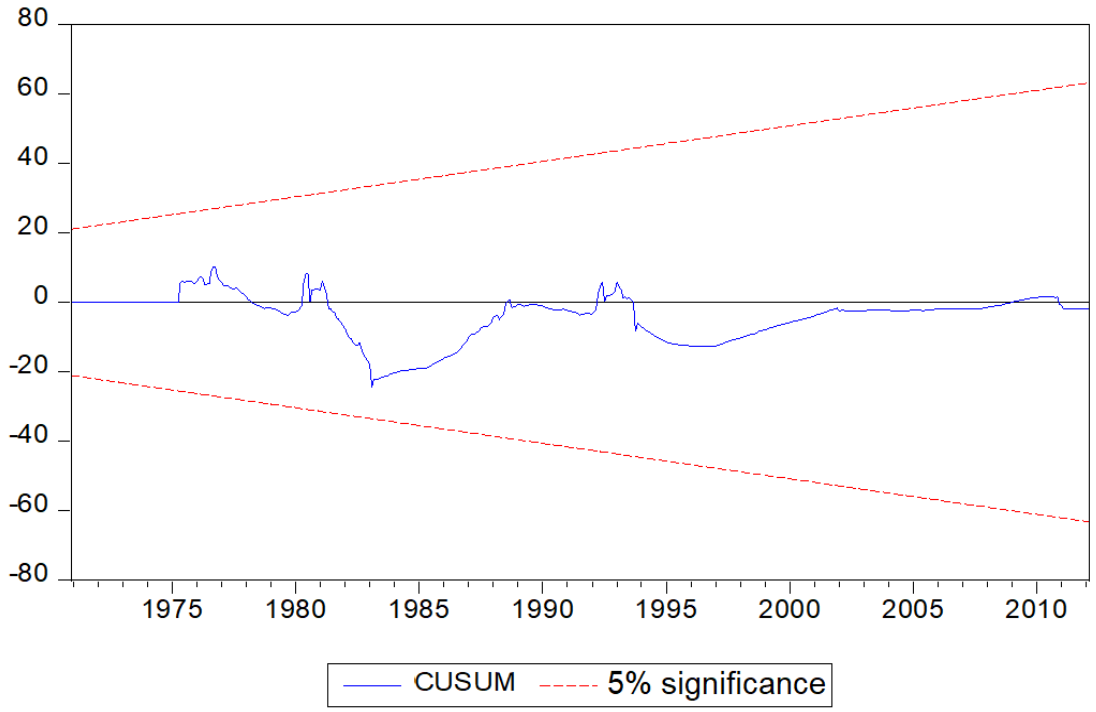

Figure 2a. Export performance model for Ghana.

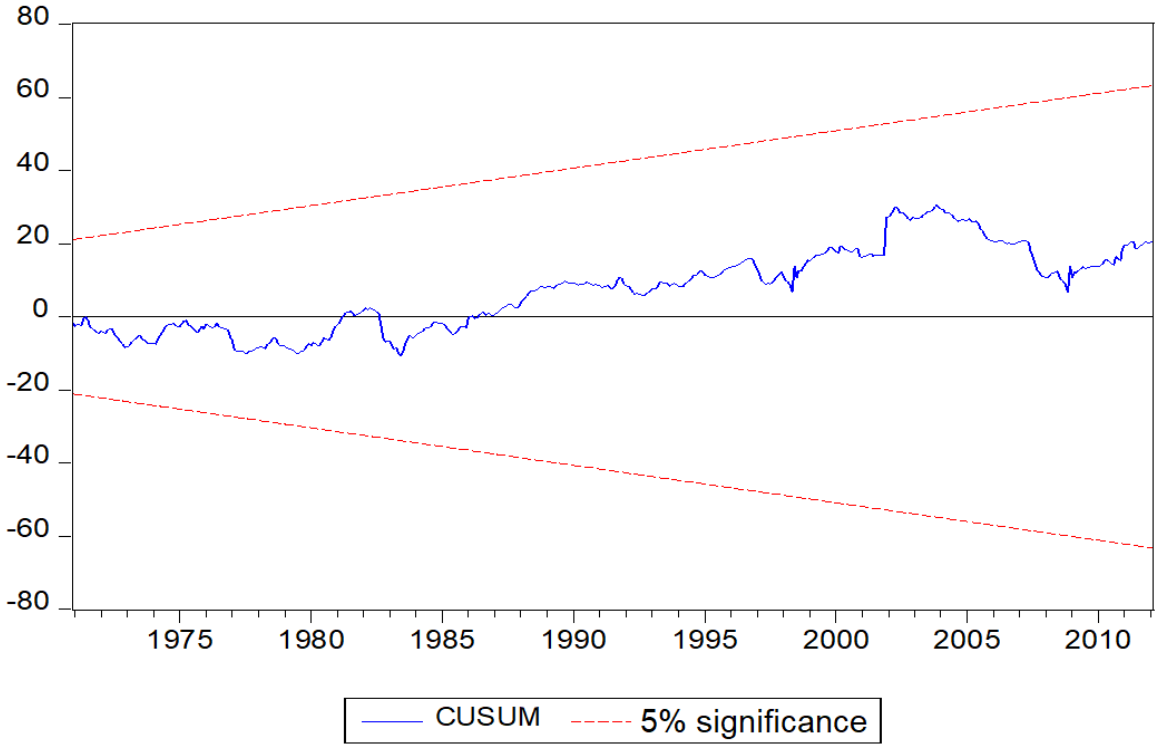

Figure 2b. Output growth model for Ghana.

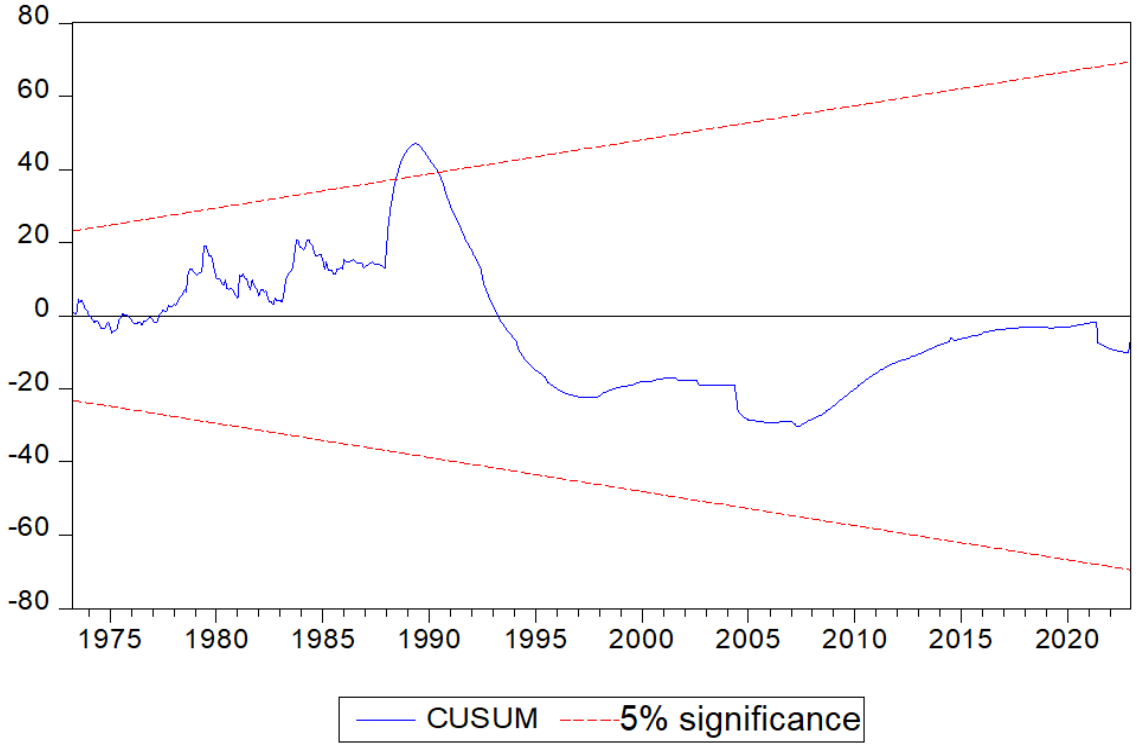

Figure 3a. Export performance model for Guinea.

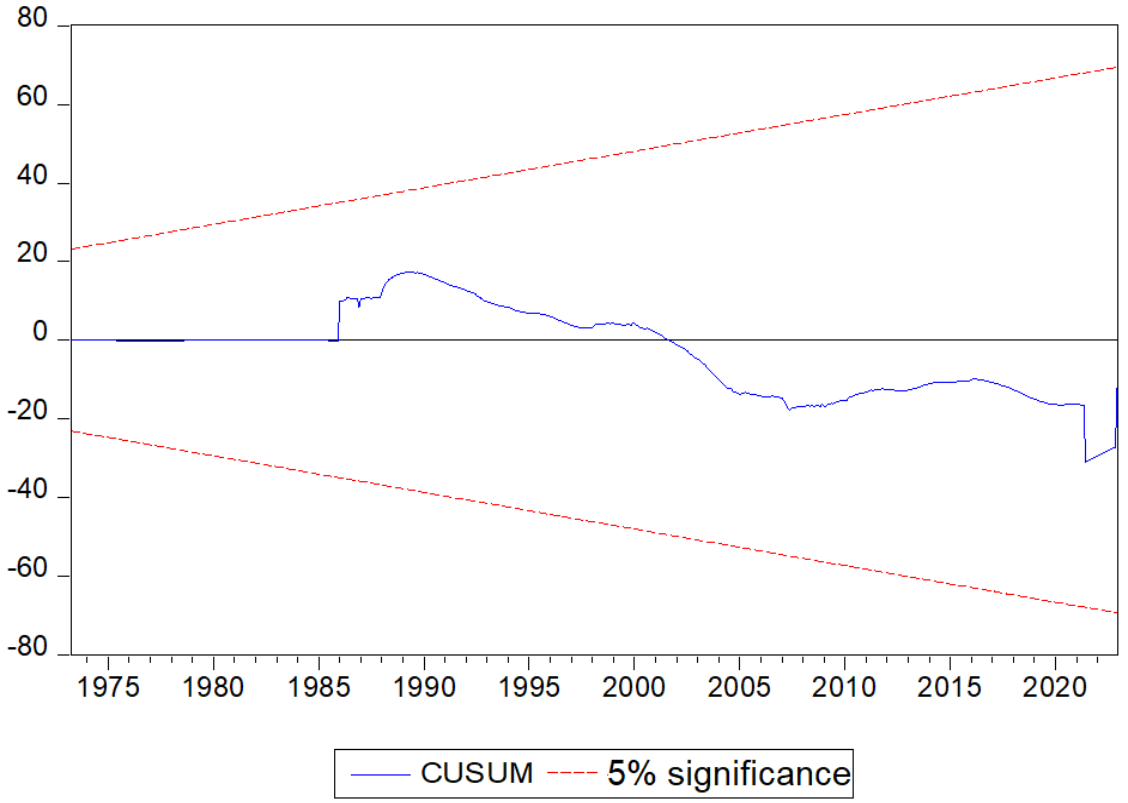

Figure 3b. Output growth model for Guinea.

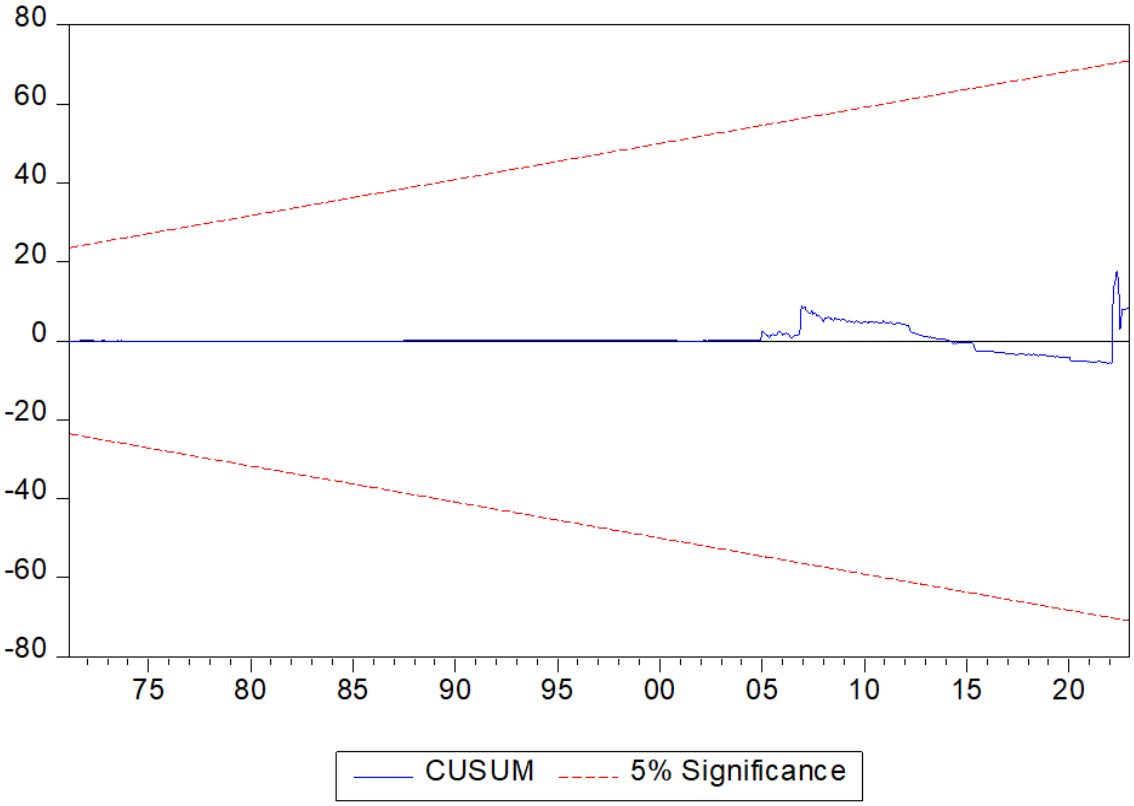

Figure 4a. Export performance model for Liberia.

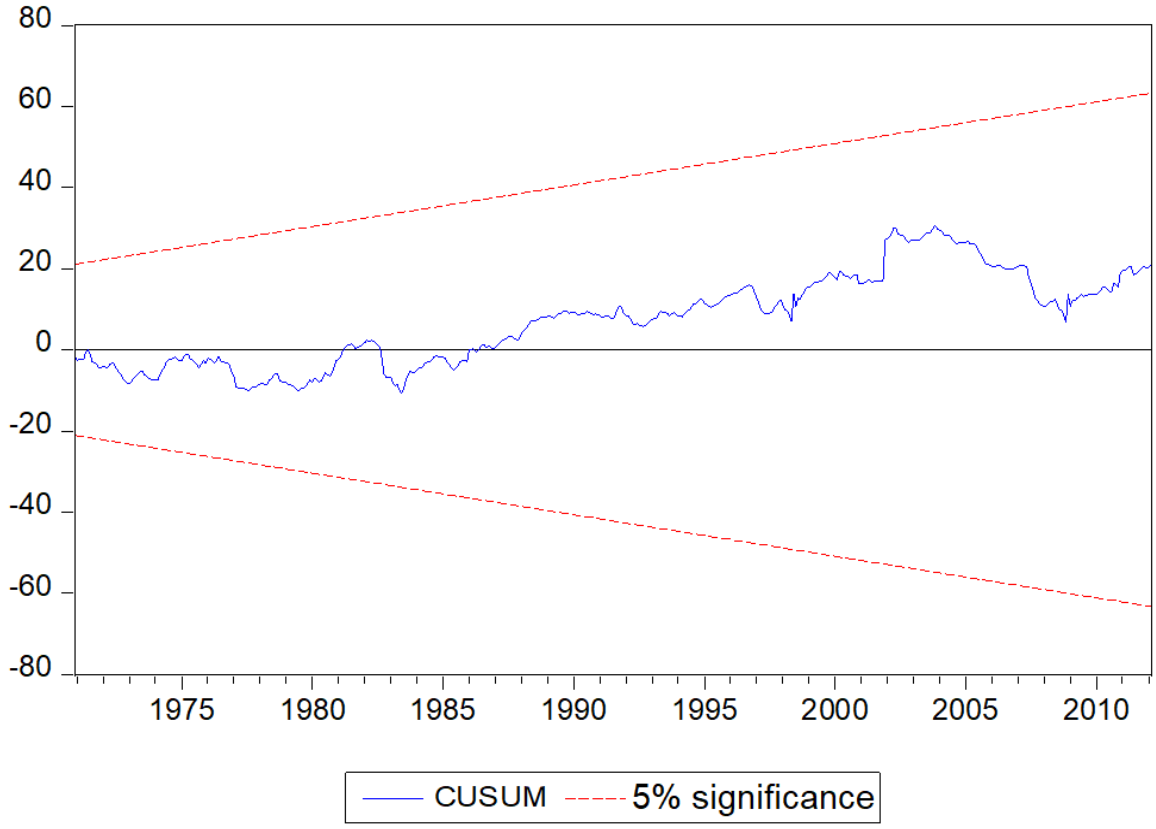

Figure 4b. Output growth model for Liberia.

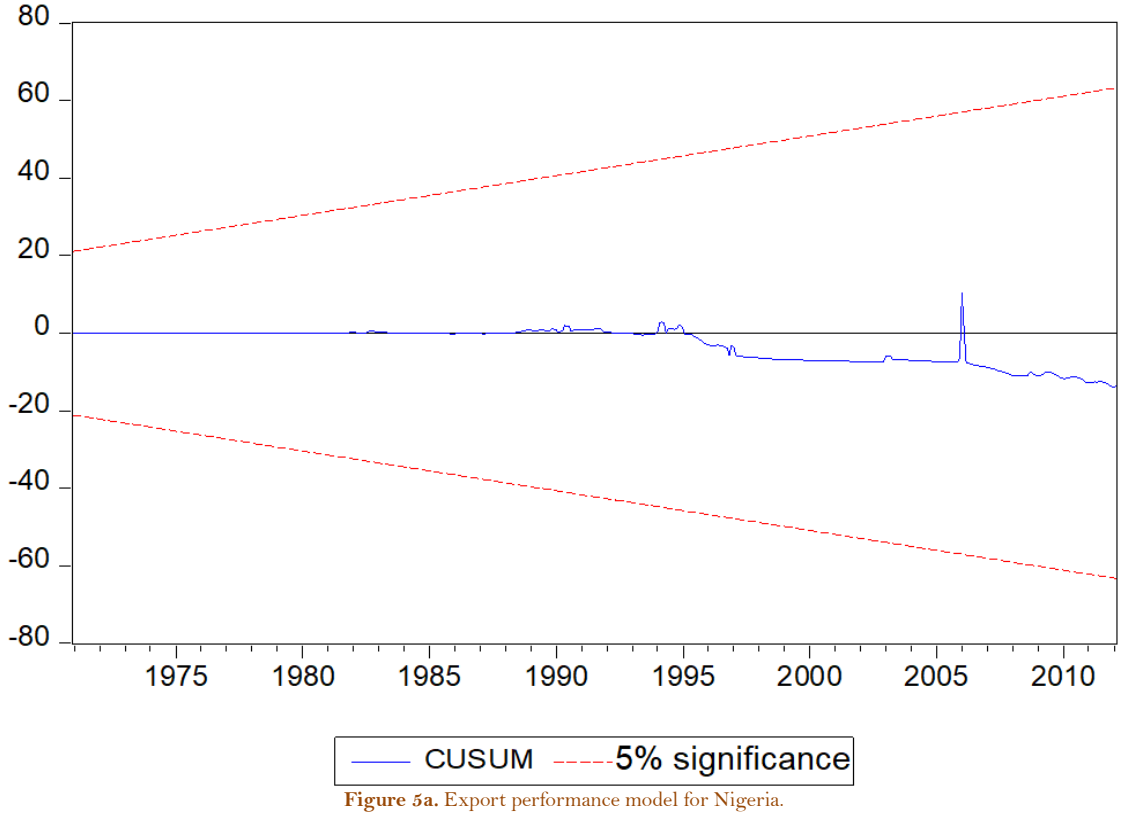

Figure 5a. Export performance model for Nigeria.

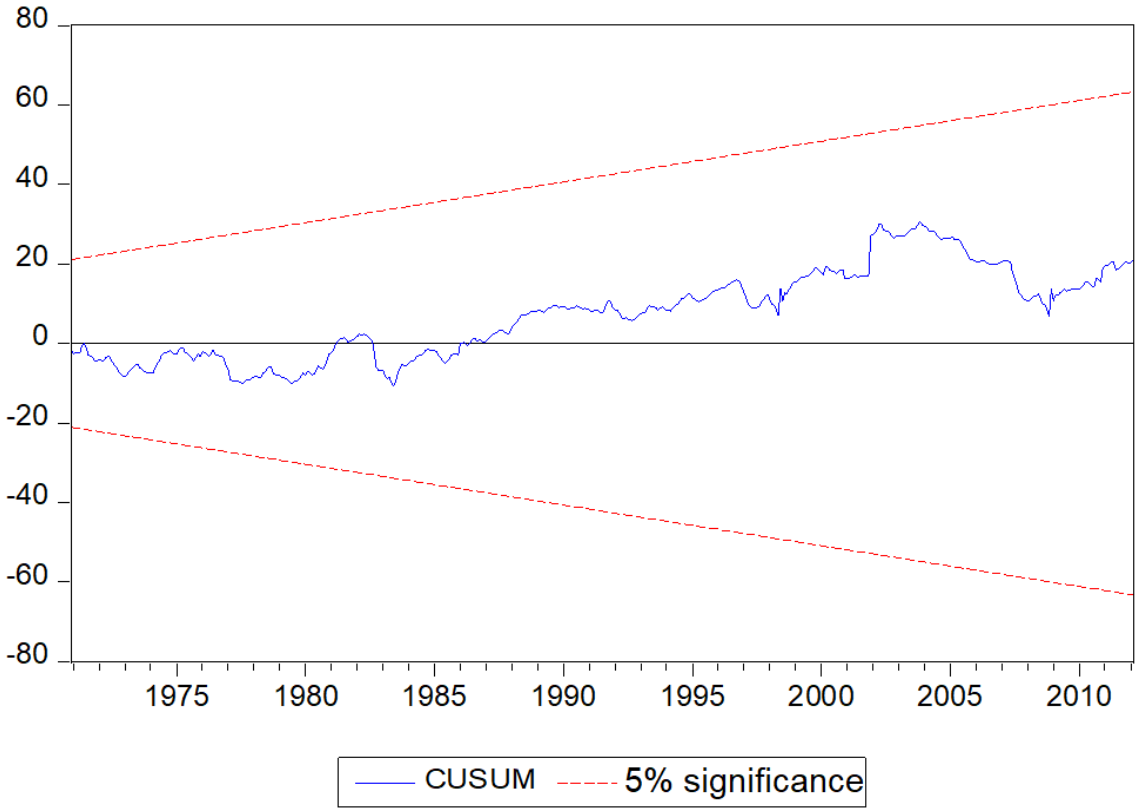

Figure 5b. Output growth model for Nigeria.

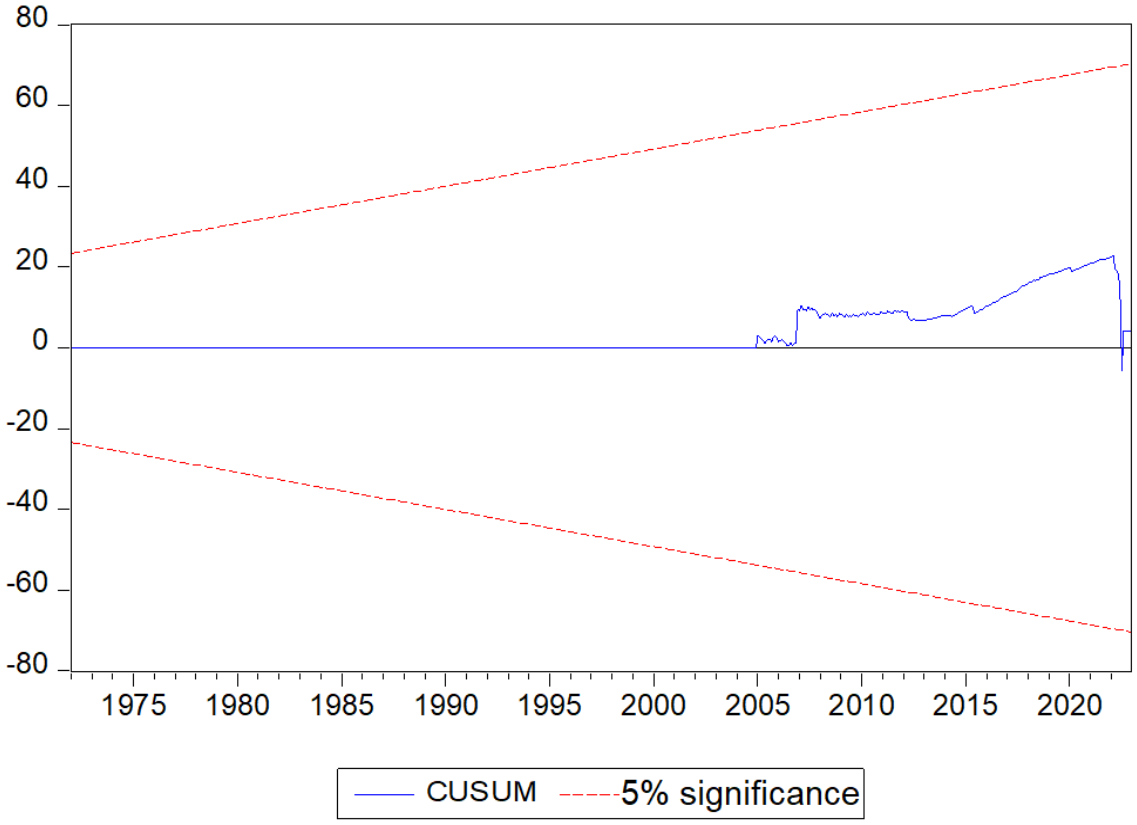

Figure 6a. Export performance model for Sierra Leone.

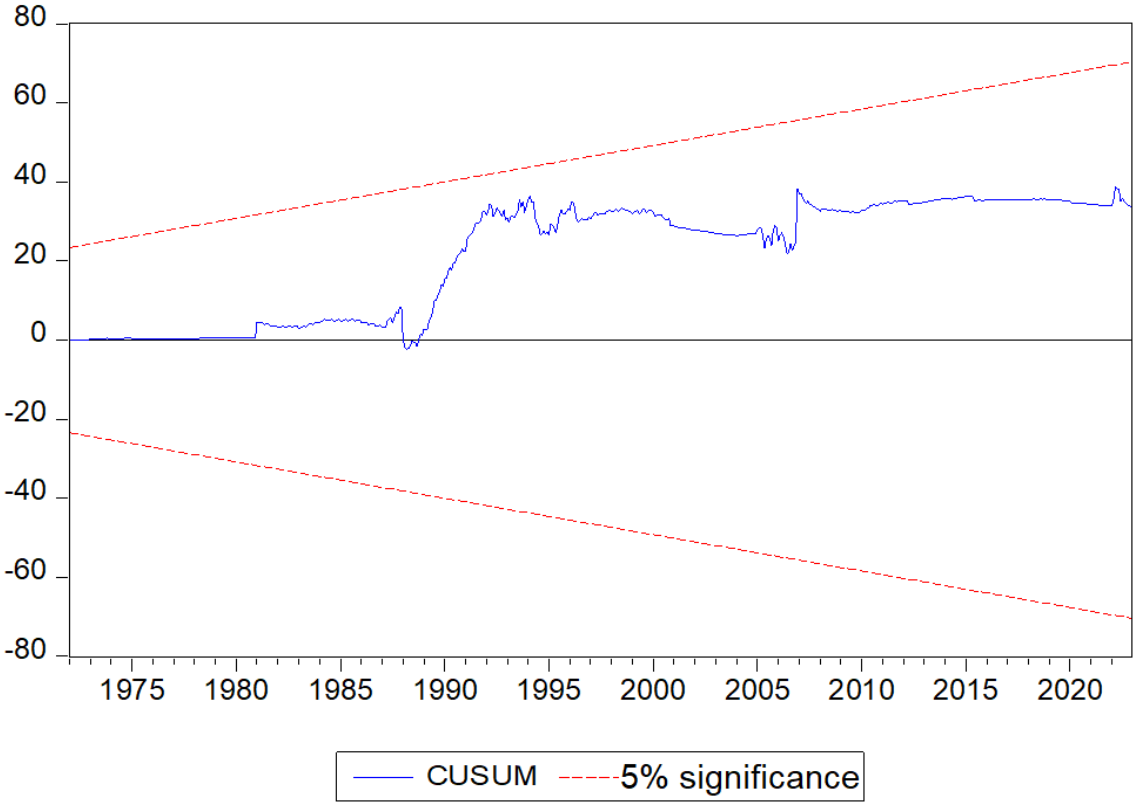

Figure 6b. Output growth model for Sierra Leone.