Evaluation of Maritime Security and Piracy in the Gulf of Guinea

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Abstract:
This study evaluates maritime security and piracy in the Gulf of Guinea.To achieve the objectives of the study, secondary data were sourced from International Maritime Bureau, Ocean Beyond Piracy, world Bank and Fund for Peace from 2000-2019. The data collected were subjected to multiple regression analysis using statistical package for social science (SPSS V.22). The results shows(i) an increase in maritime piracy incidents (kidnapping for ransom) with 83.5%,coefficient of determination which is substantially high to affect the growth of maritime business in the Gulf of Guinea negatively (ii) an increase in the number maritime piracy incidents indicates a high Maritime security expenditurewith a coefficient of determination (R^2) of 89.6% indicating a significant decrease in the number of vessels calling at our ports (iii) as piracy incidence increases, failed state index, also increases (which averages between 65% to 95%) with R^2 of 81.4% indicating a significant relationship. (iv) an increase in the number of ships attacked with an R^2 of 79.8%, will lead to a significant decrease on the number of vessels calling at our ports (v) As productivity in the Gulf of Guinea increases, the economic cost of piracy also increases with a coefficient of determination (R^2) of 76.8%.Based on these findings, from the test of hypothesis, there is a statistical, significant relationship between maritime piracy incidents, maritime security expenditure, failed state index, number of ships attacked and economic cost of piracy, the study concludes that, the effect of maritime insecurity in the Gulf of Guinea is substantial and significant.

Keywords: Maritime security, piracy, kidnapping, shipping, failed state index

1.0 INTRODUCTION:

Maritime security is understood to include the preservation of territorial integrity and sovereignty, and the maintenance of peace and order, so as to ensure the safety and protection of ships together with their passengers, crews, and cargoes, and protecting of property and the environment.Maritime security at sea continues to be threatened , example the movement of terrorists, shipment of weapons of mass destruction and conventional arms, the smuggling of drugs and migrants, piracy and armed robbery at sea (Roach, 2004).

The Gulf of Guinea (GoG) is one of the world's most dangerous sea areas on the planet. This region is a vast, diverse and highly important region. It constitute about 16 country that are strung along roughly 6,000km of unbroken coastline. The waters of the Gulf of Guinea, stretching from Liberia in the west to Angola in the south, are currently considered to be much more dangerous for seafarers than any other region. The nations of that region produce 5million barrels of oil daily(IMB, 2012), and the ships which are at risk in the Gulf of Guinea are mainly those which are related to the oil industry.

However, emphasis is on the Gulf of Guinea where Nigeria's territorial waters is mostly affected. According to IMB 75,000-ton tanker, Kerala vessel vanished off the coast of Angola. A sophisticated pirate gang hijacked the Greek-owned vessel, disabling its identifications system and communication equipment, and painting over its identifying markers. More than a week later and 1,300 miles away, the hijackers released Kerala off the coast of Nigeria, after offloading 12,270 tons of its diesel cargo to other ships.

In the period of unabated insecurity in the Gulf of Guinea, one of the most welcomed maritime security-oriented acts of 2019 was when the country establishment of her Deep Blue Project. The Integrated National Security and Waterways Protection Infrastructure, otherwise known as the Deep Blue Project (DBP), aims to comprehensively address insecurity and criminality in Nigeria's territorial waters and exclusive economic zone (EEZ). The basis of the DBP involve the acquisition of assets, (e.g., unmanned aerial vehicles and fast intervention vessels), development of infrastructure (e.g. new command and control centers), inter-agency collaboration , and enhanced training of security services, among other things. Based on information from Nigeria Maritime Administration and Safety Agency (Agency) between August, 2019 and June, 2020, 80 percent of the necessary assets had been delivered and the Command, Control, Computer Communication, and Information Centre (C4i) was officially launched at NIMASA's headquarter in Kirikiri, Lagos (Kelly, 2020).

Ofosu-Boateng, (2018) study delves into piracy and maritime transportation and maritime security in the Gulf of Guinea. The study analysed the impacts of piracy on various economic indicators and measurements with shipping as the vector of maritime

transport. The economic indicators such as the liner shipping index, gross domestic product growth rate, imports growth rate, exports as a percentage of gross domestic product, and oil production as oil rents as a percent of gross domestic product.

Tsilis, (2011) adopted a regression model to analyse the effectiveness of a group of warships in protecting a convoy of commercial ships based on the variables such as warships' speeds, convoy's speed, number of pirates and speeds respectively.

Caplan, Moreto and Kennedy (2011) deployed an approach known as risk terrain modelling(RTM) to see if attacks locations can be predicted. Using a Geographical Information System (GIS), they generate a series of ''spatial layers'' that map out the characteristics of the environment thought to be conducive for piracy to thrive.

Morabito and Sergi (2018) x-rayed a standard gravity model augmented by some political factors that are also deemed to influence the depth of trade Southeast Asia. The result of the empirical study clearly shows that every additional pirate attack that happens at the expenses of either of the two trade partnering countries involved leads to a one percent decrease in export tradevolume.

Desai and Shambaugh, (2021) in their study with an unconstrained spatial Durbin error specification in which the spatial lags of the independent variables and the error enter the estimation and proceed to regression model based on fit and significance of additional spatial lags, and the log likelihoods of the varying estimations. The incidence of piracy is estimated as a sum of pirate attacks within a specific geographic cell during each of two five-year periods. This research attempts to close the knowledge gap with the use of yearly data and adopted a multiple regression approach, which is more robust approach to determining the effect of piracy in the Gulf of Guinea which has no bearing on seasonality in the Gulf of Guinea.

1.1 Objectives of the Study:
The main objective of this study is to evaluate maritime security and piracy in the Gulf of Guinea. The specific objectives of the research are:
i. To determine the effect of piracy incidents on maritime security the Gulf of Guinea
ii. To evaluate the effect of maritime security expenditure on maritime GDP in the Gulf of Guinea domain
iii. To determine the effect of failed state index in enhancing piracy in the Gulf of Guinea

1.2 Hypotheses:
Ho1: There is no significant effect of piracy incidents on maritime security in the Gulf of Guinea
Ho2:   There is no significant effect of maritime security expenditure on maritime GDP contribution to the Gulf of Guinea
Ho3:   There is no significant effect of the failed state index enhancing piracy in the Gulf of Guinea

2.0 MATERIALS AND METHOD:
The multiple regression analysis was used to model the relationship between the maritime GDP and piracy incidents, maritime security expenditure, failed state index,number of ships attacked, and economic cost of piracy.

The multivariate analysis was used to test the hypotheses stated in this study. Regression is concerned with the study of the dependence of one variable, the dependent variable, on one or more other variables, the explanatory variables, with a view to estimating and/or predicting the population mean or average value of the former in terms of the known or fixed (in repeated sampling) values of the latter (Gujarati and Porter, 2009).

High port charges on port services which emanates as a result of piracy can be identified as a constraint on port operation and productivity which militates against the economic development of nations in the Gulf of Guinea domain. The regression was used to obtain the coefficients associated with shipping activities in the Gulf of Guinea. The regression line which defines this relationship is expressed as:

2.1 Model Specification:

$$LogY = \alpha_o + B_1 LogX_1 + B_2 LogX_2 + B_3 LogX_3 + ut \ldots\ldots\ldots..(1)$$
Where:
$Y =$, Maritime GDP, which is the dependent variable
$\alpha_o =$ Constant
Where the variables below are the independent variables
$X_1 =$ Maritime Piracy Incidents (MPI)
$X_2 =$ Maritime Security expenditure (MSE)
$X_3 =$ Failed State Index (FSI)
B_o is the baseline while B_1, B_2, and B_3, are coefficients of the regression parameters to be estimated. The values of the coefficients are obtained using the ordinary least square method. The values will be gotten from the output of the Statistical Package for Social Sciences (SPSS V22.0).

3.0 RESULTS:

3.1. Influence of Piracy Incidents on maritime security in the Gulf of Guinea

The result from Table 3.1 reveals that the model for our study is well fitted (F-statistic= 33.62).

Table 3.1 Piracy Incidents along the Gulf of Guinea

Variable	Model
MPI(X_1)	-.567.41** [.003]
MSE(X_2)	-607.124 [.000]
FSI (X_3)	-678.324** [.000]
Constant	18819.259 [.211]
R^2	0.835
Adjusted R^2	0.692
F	33.62

Source: SPSS Output
1. Model: Dependent variable = maritime GDP;
2. Standard errors in brackets are robust to heteroskedasticity and serial correlation;
3. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Statistics of the first stage.

$$Log (Y)=18819.259 -567 Log(X_1)- 607Log(X_2) – 678Log(X_3) + ut……………(3.1)$$

The coefficient of correlation (R) = 84.4%, The coefficient of determination (R-square) 83.5%, which measures the goodness of fit of the model, indicates that 69.2% of the variations observed in the dependent variable were explained by the independent variables. This was moderated by the Adjusted R-squared to 69.2%, indicating that there are other variables other than our explanatory variables that might also impact on the dependent variable. The result shows that piracy incidence has a positive and significant influence on maritime security the in the Gulf of Guinea (MPI coefficient = -567.41, p = 0.014 < 0.05, t-value = 3.81). This undermines maritime security in this region, ransom will certainly be paid by ship-owners while huge insurance claims will be paid by marine insurance firm. This increase in the number of kidnappings of ship's crew deters prospective vessels from visiting seaports within the Gulf of Guinea domain, thereby reaffirming this region as a high risk area (HRA) by IMO. This implies a downturn in international trade which has a grave economic implication. Merchant vessels usually pays for kidnapping and ransom (K&R) policy for any vessel transiting this region, this directly increases the price of commodity as can be seen with Nigeria where citizens pay for this economic burden.

3.1.1 Test for Hypothesis One:

Ho: There is no significant influence of piracy incidents on maritime GDP along the Gulf of Guinea
This test was conducted using the Statistical Student t-test from the coefficient table of the regression analysis. The t-test measures the individual contribution of the independent variable on the dependent variable. From Table 3.1 , the coefficient of number of maritime piracy incident (X_1) is -576.494 and the standard error is 120, This value corresponds with the number of maritime piracy incidents (X_1) 't-stat' value of the regression output; the significant – value of number of piracy incident (X_1) is 0.001, since this sig-value is less than 0.05 and the calculated t-value (4.728) is greater than the tabulated t value (3.82) at (9) degrees of freedom (df) , then the null hypothesis was rejected, that   is; There is no significant relationship between Maritime GDP   and number of piracy incidents in the Gulf of Guinea.

3.2. Influence of Maritime Security Expenditure on maritime GDP along the Gulf of Guinea:

Table 3.2. The extent of maritime security expenditure along the Gulf Guinea domain

Variable	Model
MPI(X_1)	-.567.41** [.003]
MSE(X_2)	-607.124 [.000]
FSI (X_3)	-678.324** [.000]
Constant	18819.259 [.211]

R^2	*0.896*
Adjusted R^2	*0.843*
F	*30.55*

Source: SPSS Output
1. Model: Dependent variable = maritime GDP;
2. Standard errors in brackets are robust to heteroskedasticity and serial correlation;
3. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Statistics of the first stage.

$$Log (Y) = 18819.259 - 567 Log(X_1) - 607 Log(X_2) - 678 Log(X_3) + ut \ldots\ldots\ldots\ldots (3.2)$$

The result in regression output reveals that the model for our study is well fitted (F-statistic= 30.55). From table 3.2, the coefficient of correlation (R) = 94.4%, The coefficient of determination (R-square), which measures the goodness of fit of the model, indicates that 89.6% of the variations observed in the dependent variable were explained by the independent variables. This was moderated by the Adjusted R-squared to 84.3%, indicating that there are other variables other than our explanatory variables that might also impact on the dependent variable. The result shows that maritime security expenditure has a positive and significant effect on maritime security in the Gulf of Guinea (MSE coefficient = 607.412, $p = 0.032 < 0.05$, t-value = 3.55)

OBP's estimates for this category include an assumption that 5-10% of the budget of the Nigerian Navy, as well as \$326 million from the budget of the Nigerian Maritime Administration and Safety Agency, are devoted to counter-piracy operations. Our estimate for these costs is between \$348.06 million and \$370 million. OBP showed that coastal states incurred personnel costs of about \$213.7 million; affiliated escorts, \$9.4 million; and private patrols, \$134.9 million per year. It is noted that Nigeria spends about \$6.6 million yearly to protect its security anchorage area. Data from the UNODC estimates that between \$10,000 and \$15,000 worth of goods are stolen per pirate attack in in the Gulf of Guinea. Up to 40% of transits including a port visit will retain national private security at a cost of \$3,000-\$5,000 per day. An estimated 15% of these port visits will also hire a Western team leader at a rate of \$1,000 per day. As piracy incidents increases, the security expenditure also increases affecting cost of hiring armed guards, counter-piracy operations cost and cost of military operation in the Gulf of Guinea. This portends great danger to freight, thereby increasing freight rate and scares prospective vessels from calling at our seaports.

3.2.1 Test for Hypothesis Two:

H_o: There is no significant influence of maritime security expenditure on maritime GDP in the Gulf of Guinea
From Table 2.2 above , the coefficient of maritime security expenditure(X_2) is -607.412 and the standard error is 141, This value corresponds with the maritime security expenditure (X_2) 't-stat' value of the regression output ; the significant – value of maritime security expenditure (X_2) is 0.001, since this sig-value is less than 0.05 and the calculated t-value (4.490) is greater than the tabulated t value (3.55) at (9) degrees of freedom (df) , then the null hypothesis was rejected, that is; There is no significant relationship between maritime GDP and maritime security expenditure in the Gulf of Guinea.

3.3 Influence of Failed State Index on maritime GDP in the Gulf of Guinea:

Table 3.3: Failed state index on maritime piracy inthe Gulf of Guinea

Variable	Model
MPI(X_1)	-.567.41** [.003]
MSE(X_2)	-607.124 [.000]
FSI (X_3)	-678.324** [.000]
Constant	18819.259 [.211]
R^2	*0.814*
Adjusted R^2	*0.824*
F	*40.35*

Source:SPSS Output
1. Model: Dependent variable = maritime GDP;   2.
Standard errors in brackets are robust to heteroskedasticity and serial correlation;
3. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Statistics of the first stage.

Log (Y) = 18819.259 -567 Log(X_1)- 607Log(X_2) - 678 Log(X_3)-978 Log(X_1) - 568 Log (X_1) + ut…………..(3.3)

The result in Table 3.3 reveals that the model for our study is well fitted (F-statistic= 40.35). From Table 3.3, the coefficient of correlation (R) = 81.4%, The coefficient of determination (R-square), which measures the goodness of fit of the model, indicates that 74.3% of the variations observed in the dependent variable were explained by the independent variables. This was moderated by the Adjusted R-squared to 82.4%, indicating that there are other variables other than our explanatory variables that might also impact on the dependent variable. The result shows that failed state index associated with piracy has a negative and significant impact on maritime GDP in the Gulf of Guinea (FSI coefficient = -678.41, p = 0.024 < 0.05, t-value = 3.02).The Gulf of Guinea states falls within failed state index, that ranks the countries on a dozen social, economic, and political indicators including: the movement of refugees and internally displaced persons, evidence of demographic pressures and ethno-religious grievances, gaps between rich and poor, economic growth or recession,performance of public services, corruption, the human rights situation and rule of law, and the intervention on other states or foreign non-state actors. Notably, pirates can conveniently operate on the land and territorial waters of such nation's states where non state actors can prosper. Places near littoral "failed' states will be at the greatest risk for maritime piracy than places near "sustainable" states. This implies that maritime insecurity thrives more on failed states.

3.3.1 Test for Hypothesis Three:
H_0:There is no significant influence of the failed state index on maritime GDP along the Gulf of Guinea
From Table 3.3 , the coefficient of failed state index (X_3) is 678.41 and the standard error is 210, This value corresponds with the failed state index (X_3) 't-stat' value of the regression output ; the significant – value of failed state index (X_3) is 0.001, since this sig-value is less than 0.05 and the calculated t-value (3.228) is greater than the tabulated t value (3.02) at (9) degrees of freedom (df) , then the null hypothesis was rejected, that is; There is no significant relationship between a failed state index and maritime GDP in the Gulf of Guinea.

4.0 DISCUSSIONS:
From the results obtained in this study, several observation and interpretations can be deduced as follows:
The R^2 value obtained for Objective One is high and aligns within the acceptable range, hence the model has a high goodness of fit and confirms that 83.5% variations of the dependent variable (maritime GDP) is explained by the independent variable (piracy incidents).

The coefficient of piracy incidents (X_1) parameter indicates an indirect proportionate relationship with maritime GDP contribution in the Gulf of Guinea, this concurs with the findings ofSmead (2001) where he stated that lack of any deterrent action to pirates by the affected government could result in a boycott of its port facilities. In the event that seafarers are kidnapped and held hostage, seafarers are entitled to captivity pay. This pay is estimated using the Maritime Labour Convention's minimum wage of $23 per day. Maritime insecurity in the last few years, saw several new militant groups, such as the Niger Delta Avengers (NDA), emerged and targeted assets and personnel of oil corporations. Kidnappings of crew from vessels reemerged, with 32 crewmembers kidnapped from vessels in 2016.Many shipping lines avoided most Nigerian port and the Gulf of Guinea in general. The p-value of number of kidnapping (X_1) variable of the regression output; is (0.014< 0.05), then the null hypothesis was rejected, that is; number of kidnapping has no statistical significant relationship with maritime GDP contribution.

The R^2 value obtained for Objective two is high and aligns within the acceptable range, hence the model has a high goodness of fit and confirms that 89.6% variations of the dependent variable (maritime GDP) is explained by the independent variable (maritime security expenditure). The coefficient of maritime security expenditure (X_2), variable, indicates an indirect proportionate relationship between maritime GDP contribution and maritime security expenditure in the Gulf of Guinea. This is agrees with the findings of OEF (2013) that in 2012 the cost of military operations including vessel deployments, vessel protection detachments, the administrative budgets of naval operations, amounted to US$1.09 billion, which is quite high. Naval escort vessels, armed onboard security teams, and security measures adopted by the crew often discourage pirates, but usually at the great expense of the ship owners, these are key items that skyrocket maritime transportation cost.

The p-value of maritime security expenditure(X_2) variable of the regression output; (0.032 <0.05), then the null hypothesis was rejected, that is; maritime security expenditure has no statistical significant relationship with maritime GDP contribution in the Gulf of Guinea.

The R^2 value obtained for Objective Two aligns within the acceptable range, hence the model has nice goodness of fit and confirms that 81.4% variations of the dependent variable (maritime GDP) is explained by the independent variable (failed state index).The coefficient of failed state index (X_3) variable indicates an indirect proportionate relationship with maritime in the Gulf of Guinea, this is consistent with Donna (2008) who posited that there is a relationship between global pirate attacks and failed state indicators. He noticed that in 2007, 98.4% of all pirate attacks occurred in either moderately or highly failed states and 23.2% of all moderately or highly failed states experienced at least one pirate attack.

CONCLUSION:

Based on the result of the analysis, it indicates that the effect of piracy is substantial and significant. Piracy increases maritime trade cost between West Africa, European, USA and Asia by a non-negligible amount. Without deliberate effort to stop maritime insecurity, piracy will continue to increase in the Gulf of Guinea, leading deteriorating conditions for its inhabitants and serious consequences for the security of the region.

Besides, the impact of maritime security and piracy in the Gulf of Guinea can be said to reverberate around the world due to the fact that attacks on oil tankers and bulk carriers, would definitely raise insurance premiums, additional costs for ship owners for transiting the Gulf of Guinea and ultimately high cost of goods. Within the period of this study, many vessels attacked within Gulf of Guinea waters affected significant revenues from port activities, and thus heavily affecting shipping firms which reroute vessels in response to insecurity.

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